Anaphoric Presuppositions and Zero Anaphora

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Abstract

Soames (1989) and Heim (1987), referring to Kripke, have argued that an anaphoric notion of presupposition is required to account for words like *too*, *again*, and *stop*, citing cases where the presuppositions are partially satisfied in the context. Van der Sandt (1992) and Kamp & Roßdeutscher (1992) have proposed definitions of an anaphoric notion of presupposition, corresponding, if accommodation is disregarded, to Heim's (1983) strong admittance condition, requiring all models and all variable assignments satisfying the context to satisfy the presupposition too. In DRT terms, a mapping f must be found from the universe of the presupposition DRS into the universe of the context DRS such that the union of the context DRS and the presupposition DRS under f is a consequence of the context DRS; and f carries over to the assertion DRS. In short, the presupposition must 'unify' with the context.

Since Shopen (1973) distinguished 'definite' from 'indefinite ellipsis', it has been known that missing arguments sometimes have an existential interpretation but sometimes depend on context. The latter case gives rise to so-called zero anaphora, in particular with verbs with sentential or infinitival complements like *agree* or *refuse*. But it has remained a mystery why these zero arguments behave like anaphors. My hypothesis is that this phenomenon correlates with presuppositions and that the context dependence in a zero argument is a consequence of a presupposition. The point is that the corresponding variable is introduced in the presupposition DRS and that in the update, the substituted variable is propagated to the assertion DRS. For instance, *Sue agrees*, represented as *Sue agrees that p*, will be interpreted via the presupposition that someone else thinks that p. In this way, zero anaphors are not really anaphors but epiphenomena of presuppositions, and there will be no need to distinguish between indefinite and definite null complements in any other way than through the absence or presence of a presupposition.

1 Introduction

The purpose of this paper is twofold: To answer some questions concerning the notion of anaphoric presuppositions and an anaphoric notion of presuppositions, and to apply an anaphoric notion of presuppositions to sentences with so-called

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zero anaphors. First, it is important in its own right to assess precisely what an anaphoric presupposition is and what an anaphoric notion of presupposition implies. Second, my ultimate goal is to account for at least a prominent subset of zero argument anaphora with the use of an anaphoric concept of presupposition.

The structure of the paper is bipartite. First, section 2 satisfies the presuppositions of section 3, presenting the evidence for anaphoric presuppositions and reviewing the descriptions that have been proposed. This section does not contain many original ideas but mostly summarizes what has been recognized already, preparing the ground for section 3. The aim of this core section is to apply the notion of anaphoric presupposition to solve the problem of zero argument anaphora, or definite ellipsis: How zero arguments of many verbs regularly have an anaphoric (definite) interpretation while zero arguments of other verbs regularly have an indefinite interpretation. The paper is rounded off by a concluding section 4, setting the presuppositional account of zero anaphora in perspective. First, two introductory subsections sketch the ideas to be developed in the body of the paper.

1.1 Anaphoric Presuppositions

There have been repeated suggestions in the literature that some, if not all, presuppositions have an anaphoric property which makes even a notion of pragmatic presupposition as in Karttunen (1974) inadequate. Relevant data include the following, where there is a strong tendency, on account of the adverb *again*, to infer that Norway is a Scandinavian country.

(1) After suffering humiliating 0 to 2 against Norway,
Taylor vowed never to underestimate a Scandinavian team again.

Such 'accommodation effects' show that when we accommodate a presupposition, sometimes we do not add the presupposition totally but partially: We verify the presupposition as far as possible and only accommodate the rest. To be more precise, we tend to differentiate, in DRT terms, the discourse referents and the conditions of the presupposition, verifying the former and accommodating the latter. We prefer to bind the variables. What this amounts to is a more fine-grained notion of presuppositions: They can no longer be taken to be propositions but must be taken to be something richer, taking variables into account.

Such a fine-grained notion underlies Heim's (1982) familiarity theory of definite noun phrases, in particular, definite descriptions: For a definite description to be felicitous with respect to a file, the set of sequences satisfying it must include the set of sequences satisfying the file for every world. And Heim's (1983) strong definition of a presupposition as an admittance condition incorporates this: The context must entail the presupposition. This is similar to Karttunen's (1974) definition of pragmatic presupposition, but the crucial difference is that the context and the presupposition are both not propositions but sets of pairs of worlds and variable assignments. In the past few years, two proposals have been made for an anaphoric conception of presuppositions in DRT. The general theory of van der Sandt (1992) sees every instance of anaphora as an instance of presupposition and vice versa; from a sentence a provisional DRS is constructed as a triple the third member of which is a DRS set, the anaphoric structure, intuitively the presupposition. An anaphoric pronoun is per definition represented as a discourse referent in the anaphoric structure. The resolution of this anaphoric structure - the justification of the presupposition - is intended to render it empty, either by binding of its referents and verification or accommodation of its conditions or by accommodation of both. Binding of referents and accommodation of conditions essentially take the form of updating the set of conditions of the old DRS by the set of conditions of the new DRS, intuitively the assertion, and the set of conditions of the anaphoric structure, where in these two last sets of conditions the discourse referents are replaced by discourse referents of the old DRS, provided no incompatibilities arise. Since binding of referents has priority over accommodation of referents, accommodation effects like the one observed are in effect predicted.

Kamp's & Roßdeutscher's (1992) work on the adverb *wieder* in German, corresponding to English *again*, results in their 'Principle of Presupposition Justification', which resembles van der Sandt's definition in all essential respects. The incoming sentence is represented provisionally in a bipartite structure, the presupposition and the assertion, and as many as possible of the discourse referents of the former are mapped onto old discourse referents, respecting consistency of the merge of the old DRS and the so-called picture of the presupposition DRS under the mapping. Although van der Sandt's and Kamp's & Roßdeutscher's definitions do incorporate crucial intuitions about anaphoric presuppositions, they are weak in that they do not specify constraints on accommodation of conditions under binding; the requirement that the new conditions be compatible, or consistent, with the old may be adequate – in the absence of a more probable antecedent – for definite descriptions, but it sanctions many cases where intuitively accommodation is out of the question. For instance, it is predicted that in the following discourse the presupposition triggered by *again* is justified:

(2) ? Everyone in the hospital remembers some patient's cure by an intern of a blood disease. Now an intern has once again cured a child of some pernicious disease.

As Kamp & Roßdeutscher themselves note, permutation of *patient* and *child* restores resolution; and, we may add, so does substitution of a proper name for *some patient*. Evidently, the constraints involved are very difficult to generalize.

But in another respect, it is possible to sharpen the definitions of van der Sandt and Kamp & Roßdeutscher: Because they do not distinguish between verification and justification, entailment and compatibility-consistency, they are perhaps overly nondeterministic in cases where several solutions are in principle possible. They do not single out the perfect case where there the conditions of the presupposition subsume old conditions, so two resolutions are predicted for a definite description as in the following:

(3) An intern has cured a young woman of a dangerous blood disease.

Everyone agrees the woman has been very lucky.

If it is felt that the solution where the conditions on the antecedent entail the conditions on the anaphor definitely has priority over a solution where there is only compatibility, it is possible to define presupposition resolution, or justification, in the first instance as the case where the discourse referents of the presupposition can be mapped onto old discourse referents in such a way that the merge of the given DRS and the presupposition DRS under substitution is a consequence of the former.

Are all presuppositions anaphoric? On van der Sandt's theory, every presupposition is subject to the same rule of anaphoric presupposition, and this is, of course, preferable to operating with two different definitions. However, it may be that with some presuppositions, notably those of factive predicates, which do not strongly resist accommodation of their discourse referents, the anaphoricity does not show. This means, in DRT terms, that the universe of the presupposition DRS is empty and the content of the presupposition is represented as a condition in the form of a sub-DRS the referents of which are protected from coanchoring. An anaphoric presupposition in the narrow sense is, then, a presupposition with a nonempty universe.

1.2 Zero argument anaphora and presuppositions

This review of suggestions and proposals, intuitions and definitions, in the area of anaphoric presuppositions and anaphoric presupposition serve the subsidiary purpose of preparing preliminaries for the primary purpose of the paper: That of using the anaphoric notion of presupposition for solving the long-standing problem of definite vs indefinite ellipsis, or zero argument anaphora. It has been noted many times that the zero arguments of some predicates are regularly interpreted existentially while the zero arguments of other predicates are regularly interpreted anaphorically. But although intuitions converge that this different behavior of null arguments is related to semantic properties of the verbs, nouns, or adjectives involved, it has not proved possible to determine the responsible semantic property. However, on the basis of a strict definition of anaphoric presupposition resolution, or justification, that is, a definition of anaphoric presupposition verification, it can be shown that zero anaphora follows naturally from the plausible assumption of a presupposition triggered by the predicate. In fact, Tim Shopen in his pioneer paper (1973) actually hinted at a relationship between what he termed definite ellipsis and presupposition. The apparatus was not yet in place then for analyzing the presuppositions in such a way that the anaphoric interpretation of the zero argument follows, but now it is. Consider an example:

(4) John is finally stepping down as manager despite efforts to dissuade him.

The zero argument of the control verb *dissuade* is interpreted as 'from stepping down as manager', and the point I wish to make is that it is not necessary to assume a zero anaphor associated with the verb to predict this. Instead, I assume, and this assumption must be made anyway, that the verb triggers the presupposition that John has been planning to do what people have been trying to dissuade him from doing. More precisely, a sentence *Susan dissuades John* asserts that Susan dissuades John from P, and presupposes that there is some P such that John plans to P. On the anaphoric notion of presupposition, P must be anchored to some familiar (action) property Q such that John plans to Q; and once it is, Q replaces P in the assertion.

This, in a nutshell, is the argument I am going to present. It involves the assumption that any zero argument is represented by a discourse referent in the relevant argument position in the assertion structure, the assumption that the set of discourse referents of the presupposition is accessible to the set of conditions of the assertion, and two simple principles concerning provisional DRS construction: First, the merge of the presupposition and the assertion must be proper, that is, contain no free occurrences of referents, and second, the presupposition must be proper. From this, in a situation where there is no presupposition involving the zero argument, we can predict that the corresponding referent is either introduced in the presupposition, yielding an anaphoric interpretation, or in the assertion, yielding an indefinite interpretation. However, it would be nice to go a step further and say that a zero argument is anaphoric not only if but also only if it is involved in a presupposition, by imposing the third principle that only overt anaphors can cause referents to be introduced in the presupposition, that is, whenever a referent is introduced in the presupposition but does not occur in a condition in the presupposition, it comes from an overt anaphor. This hypothesis, however, hinges on empirical investigations which I cannot carry out completely in this paper. One has to make a convincing case that every instance of zero anaphora is connected with a presupposition of the predicate, and some putative presuppositions are admittedly subtle, vague and elusive. Still, it is my hope that further investigations can show that indeed, anaphoric presuppositions provide the key to the solution to the problem of zero anaphora in general, thus explaining this phenomenon once and for all.

2 Anaphoric Presuppositions

Anaphoric presuppositions have been approached from several different angles. For some ten years, Saul Kripke has been arguing that facts about certain presupposition triggers show the need for an anaphoric account of those presuppositions. This work is not available in writing, but Soames (1989) as well as Heim (1987) (the former was written earlier than the latter) have taken up his thread and cited his observations. In particular, these observations concern the presuppositions associated with the focus particles *also* and *too*, the adverbs *again* and *still*, and the aspectual verb *stop*.

An anaphoric account of presupposition invoking the concept of resolution has been proposed by van der Sandt (1992), who devises a general theory intended to cover all kinds of presuppositions. His empirical basis, however, is rather narrow, consisting predominantly of phenomena that motivate an anaphoric account less strongly, namely, 'linked' definite descriptions, where part of the presupposition is accommodated, his primary focus being on projection and accommodation. General definitions of an anaphoric concept of presupposition are also given by Zeevat (1992) and by Kamp & Roßdeutscher (1992), the latter in connection with work on the adverb *wieder* (*again*).

In a third category, Heim's (1982) analysis of definite descriptions in terms of the Familiarity Condition ("if NP_i is definite and a formula, F entails NP_i"), characterized as a presupposition, is in reality an anaphoric interpretation of the classical presupposition of definite descriptions. Heim (1983) in fact generalized this notion, without applying it, however, to phenomena where it makes a decisive difference - to the phenomena she describes in (1987). Heim (1992), however, applies the same mechanism in defining the presupposition of the focus particle *too*. I devote section 2.1 to reviewing the intuitions which can be traced to Kripke. Section 2.2 represents the presupposition of Heim (1982) and (1983) and presents a 'translation' into DRT, and section 2.3 discusses the definitions proposed by van der Sandt (1992), Zeevat (1992), and Kamp & Roßdeutscher (1992). Section 2.4, finally, is designed to develop a definition of anaphoric presuppositions that can form an adequate basis for the analysis of zero anaphora in section 3.

2.1 Anaphoric Presuppositions: Intuitions, Suggestions

2.1.1 The Specific Proposition Hypothesis

In the final section "Varieties of Presupposition: Unresolved Issues" of his article "Presupposition" in *Handbook of Philosophical Logic* (1989) (written in 1984), Scott Soames notes that "there are cases in which presuppositional requirements resist accommodation", citing (5) (p 604).

(5) The foreman was fired too. (Focus on 'The foreman')

Suppose, Soames writes, that (5) were uttered in a conversation in which

(6) Someone other than the foreman was fired

was not already assumed. Then even if the hearers were disposed to accept the suggestion that someone else had been fired, the remark would call for some further identification of the person or persons in question, so (5) requires something other than (6). He suggests that (5) requires the preceding conversational background to contain a set of propositions characterizing individuals as having been fired. If (5) is uttered in a conversation not containing information of that sort, accommodation will generally not occur, and the reason it won't is that the hearers may have no way of knowing how to accommodate the speaker, even if they desire to do so. The crucial point, he writes, is that what (5) requires is not that the general proposition (6) be in the preceding background, but that one or more members of a set of more specific propositions be there. If this requirement is not met, hearers will typically not know which propositions to add, and so will have to ask for clarification.

Heim (1987) discusses *too*, too; in the context of a comparison between two views of presuppositions: as conventional implicatures vs as admittance conditions (as set out in her (1983)), commenting on similar cases in much the same way. She notes, too, that sentences with *too* like (7) are strange uttered out of the blue:

(7) John went to Harvard too.

The presence of the proposition that someone beside John went to Harvard in the common ground doesn't seem to suffice, and "it seems more accurate to say that [(7)] requires a context that entails, for some particular x that is salient in the context and presupposed to be distinct from John, that x went to Harvard. What the common ground is to entail is not an existential generalization, but a singular proposition. The appearance of indefiniteness results from the fact that no particular such proposition is required, but any one of a certain kind will do." This refined picture of the presupposition of *too*, Heim writes, explains why (8) is not as easily rescued by accommodation as (9).

> "The problem with [(8)] is that the audience, however cooperative and willing to accommodate it may be, doesn't know which proposition among the many that would make [(8)] admissible it is supposed to add. [(9)], by contrast, leaves no room for such insecurity. The missing presupposition is fully determined by the sentence; it has to be that the speaker has a car." (1987: 10)

(8) Bill was at the party too.
(9) Sorry to be late. My car broke down.

Heim concludes that this situation provides a strong argument for viewing at least some so-called presuppositions as admittance conditions rather than conventional implicatures, since it is not describable within the latter view but "perfectly easy to characterize in terms of admittance conditions" (p 11).

In sum, what Soames and Heim claim is that the presupposition of *too* is in some sense more specific than the proposition that some alternative to the focus satisfies the open carrier sentence. I think that, by and large, everybody can agree with these intuitions. The two key formulations, though, that what is required is not that a general proposition be in the preceding background, but that one or more members of a set of more specific propositions be there (Soames), and that what the common ground is to entail is not an existential generalization, but a singular proposition (Heim), are, I think, ambiguous between

1. the presupposition itself is more specific than can be predicted from the carrier sentence and

2. the presupposition itself is just as unspecific as can be predicted from the carrier sentence but it must not only be entailed but also instantiated by the context.

Compare the informal characterization of a similar situation by Kamp & Roßdeutscher (1992: 99):

"... the presuppositional force of (restitutive) *wieder* is not existential but ... anaphoric: in order that the context satisfy the presupposition, it must not only contain the implicit information that there exist states and processes of the kind, and standing to each other in the relations the presupposition demands; it must contain explicit representatives for at least some of those processes and states."

There is a difference between attributing the specificity, or definiteness, to the proposition to be entailed and to the way it is to be entailed. Note that if the presupposition is to be found in the linguistic context, it may well be relatively unspecific:

(10) A woman's been fired, and John's been fired too.

On view 1., this is problematic, but on view 2., the line is drawn between this case and the case where it is common knowledge that a woman has been fired but this proposition is not represented in the linguistic context. It is view 1. that makes both Soames and Heim attribute the difficulty of accommodation to the hearer not knowing which proposition to add. There is something odd about this argument: If in connection with (9) it is clear what to accommodate, namely, that the speaker has a car, but in connection with (8) it is unclear, then why is it difficult to accommodate in connection with definite descriptions like the one in (11)? Isn't the missing presupposition fully determined, namely, that there is a woman?

(11) The woman's been fired.

The generalization in Heim (1982) is, of course, that the variable of a definite description can only be introduced under accommodation if it is linked to some familiar variable, as in (9). It is still an open question why this is so, but the answer can hardly be that the presupposition of (11) is indeterminate while that of (9) is not. Anyway, it is natural to assume that the presuppositions of *too* and the presuppositions of anaphoric definite descriptions are difficult to accommodate for the same reason, and this suggests that the description of the former be modelled on the description of the latter.

And in fact, the straightforward way of applying the presupposition definition of Heim (1983) to sentences with *too* like (7) provides the solution that the presupposition is the set of assignment-world pairs expressed by 'someone$_i$ went to Harvard' for some i, corresponding to an existential proposition (without the novelty condition). When this presupposition is to be entailed by the context, this amounts to the familiarity condition. (Such a formulation of the presupposition of *too* is found in Heim (1992).)

The correct interpretation of the suggestions that the presupposition arising from *too* is more specific than the proposition that some alternative to the focus satisfies the open carrier sentence, is, I believe, that the presupposition is not to be construed as a proposition at all but as something richer; as the case may be, a set of assignment-world pairs (in Heim's system) or a DRS.

2.1.2 Accommodation Effects

Soames (1989) credits Kripke for calling attention to a number of facts that show the necessity of an anaphoric concept of the presuppositions of *too*, *again*, and *stop*. According to Soames (1989: 613), Kripke has observed that the presuppositions of the sentences (12)(i)-(iii) should include (13)(i)-(iii), and that these presuppositions would not be forthcoming if the presuppositions of (12)(i)-(iii) arising from *too*, *again*, and *stop* were just (14)(i)-(iii).

(12) (i) If Herb's wife comes, then Francis will come too.
(ii) If Reagan criticizes Hart in his radio talk,
then he will criticize him again in his press conference.
(iii) If Bill watches the opera at 2 o'clock,
he will stop watching it when the Redskins' game begins.

(13) (i) Herb's wife will come $\rightarrow$ Francis is not Herb's wife.
(ii) Reagan criticizes Hart in his radio talk $\rightarrow$
the radio talk will take place before the press conference.
(iii) Bill watches the opera at 2 o'clock $\rightarrow$
the Redskins' game will begin after 2 o'clock.

(14) (i) Herb's wife will come $\rightarrow$
someone other than Francis will come.
(ii) Reagan criticizes Hart in his radio talk $\rightarrow$
Reagan will have criticized Hart prior to the press conference.
(iii) Bill watches the opera at 2 o'clock $\rightarrow$
Bill will have been watching the opera prior to
the beginning of the Redskins' game.

> "Kripke suggests that in all of these cases, the content of the presupposition of a sentence or clause containing *too*, *again*, or *stop* may vary with, and be dependent upon, the preceding discourse or conversational context. The idea is that these presupposition creating elements may, in some way, be anaphoric with other elements in the discourse or context." (Soames 1989: 614)

I think that the relevant intuitions are equally well accounted for by saying that the sentences (12)(i)-(iii) license the inferences (15)(i)-(iii).

(15) (i) Francis is not Herb's wife.
(ii) The radio talk will take place before the press conference.
(iii) The Redskins' game will begin after 2 o'clock.

Heim (1987: 12ff) provides an interpretation of this situation. Consider (16).

(16) We will have pizza on John's birthday,
so we shouldn't have pizza again on Mary's birthday.

> "As Kripke observes, you will spontaneously infer from this utterance that John's birthday precedes Mary's. This inference seems due somehow to the presence of *again* in the sentence; if *again* had

> been left out, it would have been just as easy to imagine the birthdays in the opposite temporal order. [...] Suppose ... that the presupposition of *again* amounts to the requirement that a particular proposition among a certain set be entailed by the common ground. For the sentence at hand, suppose that *we shouldn't have pizza again on Mary's birthday* calls for a context in which some occasion t is salient and the common ground entails about it that at t we have pizza and t precedes Mary's birthday. Under this analysis, we expect that the hearer of [(16)] will need to identify an appropriate contextually salient occasion of pizza eating, and of course the one that immediately comes to mind is the one mentioned in the first sentence, viz. John's birthday. This will do if only it can be presumed to lie before Mary's birthday, so what is more natural than to accommodate this missing bit of information."

Consider next (17) and Heim's comment (1987: 14).

(17) John is cooking.
He will stop (cooking) when tomorrow's football game starts.

> "This utterance invites the spontaneous inference that John is engaged in one single protracted cooking activity that started before the speech time and will continue through the night. Why should this inference, which isn't all that plausible pragmatically, arise? [...] Suppose what *John will stop cooking at t* really requires is a context with a salient cooking event by John about which it entails that it extends right up to t. Under this assumption, we can explain the inference: The obvious candidate for a saient event of John cooking is the one mentioned in the first sentence of [(17)]. The information that this event extends right up to the beginning of tomorrow's football game is then a natural one to accommodate in order to make the context fit the requirement of *stop* fully. This explains the inference and thereby receives empirical support."

Let us try to state as precisely as possible how the relevant inferences come about. The context should entail that there is somebody different from Francis who will come, that there is an event such that we have pizza prior to Mary's birthday, and that there is a state such that John is cooking prior to and adjacent to the start of tomorrow's football game. Now the linguistic context almost entails this, but not quite. What is lacking is the piece of information that Herb's wife is different from Francis, that the event such that we have pizza on John's birthday is prior to Mary's birthday, and that the state such that John is cooking now is adjacent to the start of tomorrow's football game. (In all three cases, this piece of information is what can be called the structural condition of the presupposition.) So this is accommodated. The most interesting point to note in this connection is that what is accommodated, then, is stronger than necessary, so to speak; the proposition that we'll have pizza on John's birthday and on Mary's and the former precedes the latter is stronger than the proposition that we'll have pizza on John's birthday and on Mary's and on some occasion preceding the latter. (This occasion might be John's birthday but it might be another.) This **accommodation effect** is a clear symptom of anaphoric presuppositions: Accommodation does not consist in taking the shortest logical route to recreating the presupposition but preserves the discourse referents already present, within limits of course. Accommodation effects of this sort support the conjecture of Kamp & Roßdeutscher (1992: 119) that accommodating new discourse referents carries a higher price than accommodating new conditions on old discourse referents. When this principle is effective, we can speak of **anaphoric accommodation**.

The 'conditions' accommodated in the cases considered so far are what can be called structural conditions, that is, conditions coming from the general format of the presupposition itself, independently of the individual carrier sentence. The referent involved is what can be called the structural referent, that is, the alternative individual or event, or the state about to stop. Here, it seems, accommodation is routine. But accommodation effects do not stop here. Rather, the anaphoricity of the presupposition can be seen to comprise other referents in the presupposition, in such a way that other conditions are accommodated.

(18) Mary loves Jan Tore. Sue, too, loves a Swede.
(19) Jack broke his leg in July 1933, and Joe also broke his leg at the age of 15.

¿From (18), we spontaneously (however falsely) infer that Jan Tore is a Swede, and from (19), we spontaneously infer that Jack was 15 in July 1933. Again, it is the stronger proposition which is accommodated: Instead of accommodating that Mary loves a Swede (possibly Jan Tore), by accommodating that the Swede she loves is Jan Tore, we end up with more information. And instead of accommodating that Jack broke his leg at the age of 15 (in addition, maybe, to the event in July 1933), we accommodate that the event of his breaking his leg at the age of 15 was the event of his breaking his leg in July 1933, thereby maximizing the sum of information.

An alternative characterization of the accommodation effect is this: A consequence of accommodating more information rather than creating entities is that presuppositions can provide new information by virtue of being presuppositions. By this I mean that the result of accommodation is something over and above what it would be if the presupposition were an assertion. It is a well-known fact that presuppositions, notably factive presuppositions, can carry new information; but this is different. The match is imperfect, but still close enough to license a 'unification' of two bits of information, and in this way, accommodation yields information that is new both with respect to the context and to the carrier sentence. Kamp & Roßdeutscher (1992: 109):

> "In general they [presupposition verification and accommodation] do not represent exclusive alternatives, with accommodation coming into play only when verification fails, and then wholesale. Rather . . . they often go hand in hand. We will refer to such combinations of verification and accommodation as *presupposition justification*."

Summing up this subsection, Heim concludes (1987: 14):

> "In sum, *too* is by no means an isolated case among presupposition inducing items; quite a few of them, upon closer inspection, impose requirements on the context that are not naturally characterized from the conventional implicatures perspective because they don't correspond to a fixed proposition to be entailed."

As suggested above, I believe the correct picture of these requirements not corresponding to fixed propositions to be entailed consists in construing the presuppositions not as propositions at all but as DRSs or equivalents thereof. This picture will become clearer when we turn to definite descriptions, where we encounter the phenomenon of variable propagation from the presupposition to the assertion, in the next section.

2.2 Anaphoric Presuppositions: Proposals, Definitions

2.2.1 Anaphoric Definite Descriptions

In her landmark thesis (1982), Irene Heim reinterpreted the classical presupposition of definite descriptions in terms of the familiarity condition (p 369).

> "For ϕ to be felicitous w.r.t. F it is required for every NP_i in ϕ that:
> [...]
> (ii) if NP_i is [+definite], then
> [...]
> (b) if NP_i is a formula, F entails NP_i"
>
> "A file F entails a formula ϕ iff for every world w:
> $\mathrm{Sat}_w(\mathrm{F}) \subseteq \mathrm{Sat}_w(\mathrm{F}+\phi)$"

Informally, for the file to entail the logical form of the definite description, every 'sequence' (variable assignment) and every world satisfying the file must satisfy (the update of the file by) the logical form of the definite description. This means that the index i on NP_i must have been introduced into the file previously and that the information going with it (the content of the NP) must have been assembled already. Heim calls the familiarity condition a presupposition.

The familiarity theory is in reality an analysis of anaphoric presuppositions with a limited domain of application: Definite descriptions. I think it is useful to think of the familiarity analysis as the existential presupposition traditionally associated with definite descriptions interpreted as an anaphoric presupposition. Let me illustrate this.

(20) A man wielding a crowbar outside the elementary school where his two children are enrolled was fatally shot by a police officer. The principal said the man, who was not immediately identified, had gone to the school to see his daughter's teacher and had been asked to leave. The police were called, and when an officer approached the man charged with the crowbar and was shot.

This discourse contains four paradigm cases of anaphoric definite descriptions: Two occurrences of *the man*, one occurrence of *the school*, and one occurrence of *the crowbar*. Crucially, any correct interpretation of the discourse will establish coreference between the NP *a man wielding a crowbar outside the elementary school where his two children are enrolled* and the two NPs *the man* and likewise between the NP *the elementary school where his two children are enrolled* and the NP *the school* as well as between the NP *a crowbar* and the NP *the crowbar*. The way this is achieved in Heim's system can be described as follows. Consider the very last sentence

(21) the man (charged with the crowbar and) was shot.

It presupposes that there is a man (and that there is a crowbar). A necessary condition for the file to satisfy this presupposition is for it to contain that information. However, it is not sufficient that the file entails 'x is a man' for some variable x; rather, it must entail 'x_i is a man' for just the variable x_i coming with the description. If it does, as it well may if it is correctly constructed from the discourse at hand, the variable of the assertion 'x_i was shot' necessarily attains the same value as some previously introduced variable - the two being one and the same variable.

If anaphoric definite descriptions, analyzed as in Heim (1982) or equivalently, are instances of anaphoric presuppositions, this shows that anaphoric presuppositions are sensitive to variable assignments. The weak requirement that the file entails 'x is a man' for some x corresponds to a traditional concept of entailment: For every world satisfying the file, there is an assignment satisfying it plus the presupposition; and to Karttunen's (1974: 181) definition:

> "Surface sentence A pragmatically presupposes a logical form L, if and only if it is the case that A can be felicitously uttered only in contexts which entail L."

However, the stronger requirement that the file entails 'x_i is a man' for the variable x_i coming with the description corresponds to a strong concept of entailment: Every world and every assignment satisfying the file satisfy (it plus) the presupposition. Sloppily, it means that anaphoric presupposition verification is not just pattern matching but (full) unification.

In her seminal paper (1983), Irene Heim generalized this concept of presupposition in a rather implicit way. Heim (1982) did not focus on presuppositions in general, but Heim (1983) did. On the other hand, that paper did not focus on definite descriptions, or on other typical instances of anaphoric presuppositions, so the capacity of the theory presented there to account for anaphoric presuppositions is only stated implicitly. The definition is (p 117)

> "S presupposes p iff all contexts that admit S entail p."

And as long as contexts and presuppositions are propositions, this is of course more or less the same as Karttunen's (1974) definition quoted above. However, in order to account for presuppositions of phrases with free variables, Heim reidentifies contexts and presuppositions, along the lines of (1982), as sets of pairs of variable assignments and possible worlds instead of just sets of possible worlds (pp 120f). Now in order for a context c to admit

(22) A nation cherishes its king,

represented as 'x_i is a nation, x_i cherishes x_i's king', c+'x_i is a nation' must, informally speaking, 'entail that x_i has a king', and this means that it has to be a context c' such that for every $< g, w >$ in c' $g(i)$ has a king in w. Now the rule that P is a presupposition of S iff for all contexts C, if C+S is defined then C entails P – where C and P are sets of pairs of sequences (variable assignments) and worlds – says this with respect to (21): For (20) to be defined, the set of $< g, w >$ satisfying (20)\(21) must be a subset of the set of $< g', w' >$ satisfying 'x_i is a man' for some fixed index i. This means that for every $< g, w >$ $g(i)$ must be a man in w.

Thus in (1983), Heim actually presents an anaphoric concept of presupposition. She does not apply it to the phenomena she considers in (1987) as rendered in 2.1; but the presupposition of, say, *Sue, too, runs* is, surely, to be represented as 'x_i runs' for some index i (different from Sue's). If what distinguishes the definite from the indefinite article in English is the familiarity condition ("if NP_i is definite and a formula, F entails NP_i"), that is, anaphoric presuppositional status, definite descriptions are represented in the same way as indefinite descriptions, and insofar are apparent indefinites just like the presuppositions generated by *too*. It is important to stress that the apparently indefinite presuppositions become definite through the anaphoric interpretation of the presupposition. Definite descriptions and additive particles alike have apparently existential (indefinite) presuppositions; it is the general definition of presupposition which makes them definite.

And, in fact, in (1992), Heim presents an analysis of *too* which parallels her (1982) analysis of definite descriptions (1992: 189):

> "The general rule for the interpretation of *too* is (21).
> (21) $\phi[\alpha_F]\mathrm{too}_i$ presupposes $x_i \neq \alpha \wedge \phi[x_i]$."
>
> "...I assume that *too* is implicitly deictic or anaphoric, sort of like *in addition to* x, where the intended reference of x is disambiguated at Logical Form by means of a referential index. [...] So the LF of [*John believes that Mary is here, and he believes that Susan is here too.*], under the reading we want to consider, is [*John believes that* Mary_1 *is here, and he believes that* Susan_F *is here* too_1.]."

There are several possible objections to the generality of the "general rule for the interpretation of *too* (21)". The one that needs concern us now is that the rule says nothing about the internal representation of the open carrier sentence (the 'scope' of the particle). As long as properties like 'is here' are considered, it doesn't matter; but once properties like 'respects a Swede' are considered we have to decide whether to represent the presupposition as 'x_i respects x_j and x_j is a Swede' and interpret this in the same way with respect to x_j as with respect to x_i. If we remain in the framework of Heim (1983), I cannot see we have any other choice, and empirical observations (cf 2.1.2 Accommodation Effects) support this: When a presupposition is anaphoric, it is anaphoric not only in the structural variable – x_i in the above rule – but in principle in every variable.

Heim's (1983) framework (in (1992) contexts are again construed as sets of worlds) is very declarative in that every NP comes with a referential index, and in order for a presupposition construed as a set of assignment-world pairs to be satisfied, the context construed as a set of assignment-world pairs must be a subset of it. This is only possible if, informally speaking, the referential indices of the presupposition are all used in the context. For our purposes, it is useful to provide a version of this notion of presupposition interpretation in more procedural terms; a translation into Discourse Representation Theory. This definition assumes that a presupposition trigger and a carrier sentence give rise to two provisional Discourse Representation Structures, a carrier sentence, comprehensive DRS K1, indiscriminate between assertion and presupposition, and a presupposition DRS K, intuitively a proper section of K1.

> **Principle of Presupposition Verification** (modelled on Heim)
> Let K0 be any context DRS, K1 a sentence DRS and K the presupposition DRS of K1.
> K0 + K1 is only defined if there is a function f:$\mathrm{U_K} \to \mathrm{U_{K0}}$ such that K0 entails $\langle$ $\mathrm{U_{K0}}$, $\mathrm{Con_{K0}} \cup$ "$f(\mathrm{Con_K})$"$\rangle$, and if defined, it contains the conditions $x = f(x)$ for every $x \in \mathrm{U_K}$ for some such f.

(The locution that DRS K1 entails DRS K2 is supposed to mean that K2 is a logical consequence of K1.) The presupposition DRS uses fresh discourse referents, just like any 'new' DRS. For such a DRS to be a consequence of the context DRS in the strong sense that for every model M and every embedding f verifying the context DRS in M, f verifies it in M as well, those discourse referents must be replaced by 'old' discourse referents. Under such a substitution, the requirement is sufficient that the merge of the context DRS and the presupposition DRS be a consequence of the former in the weaker sense that for every M and f verifying K0 in M, there is a g verifying the merge of K0 and "the picture of K" under the substitution. To illustrate, reconsider the discourse (20) and (23).

(23) The man was shot.

The provisional presupposition DRS for *the man* will look like this:

$$\langle \{x\}, \{man(x)\} \rangle$$

The context DRS will include

$$\langle \{y \ldots\}, \{man(y) \ldots\} \rangle$$

A function is found mapping x onto y such that the merge DRS

$$\langle \{y \ldots\}, \{man(y) \ldots man(y)\} \rangle$$

is a consequence of the context DRS. In fact, this is the only possible function. The result of updating the context DRS by the sentence DRS can be assumed to be defined and to be

$$\langle\{y \ldots z, x\}, \{man(y) \ldots x = y, shot(z, x)\}\rangle.$$

2.2.2 Accommodation and van der Sandt's anaphoric account

The principle of presupposition verification, modelled on Heim (1983), in the last section is very strict: First, it requires the mapping from the universe of the presupposition into the universe of the context to be total. This means that every discourse referent in the presupposition must be anchored to some familiar referent, so there is no way for the presupposition to introduce novel entities. Second, the (merge of the context and the) presupposition under such a mapping must be a logical consequence of the context, which means that there is no way for the presupposition to introduce novel information. Thus as it stands, the principle does not allow for accommodation, neither with respect to discourse referents nor with respect to conditions. As we know, if a presupposition does not exist just before t, then either it comes into existence at t or it fails to (cf Lewis 1979 "within certain limits"). And Heim (1982) and (1983) is well aware of the need for a mechanism to restore felicity or admittance in the face of violation of a presupposition. In her theory, accommodation takes the form of a repair strategy:

> "Accommodation is an adjustment of the file that is triggered by a violation of a felicity condition and consists of adding to the file enough information to remedy the infelicity." (Heim 1982: 372)

> "... simply amend the context c to a slightly richer context c', one which admits S and is otherwise like c, and then proceed to compute c'+S instead of c+S." (Heim 1983: 119)

The problem is that in some cases, accommodation takes place as a matter of routine while in others, it is practically impossible, and it seems to be very difficult to describe the factors that enhance or impede accommodation, so as to give a complete characterization of the limits to it.

> "Under which conditions is accommodation an available option, and what exactly is added to the file when the option is taken? These questions ... are perhaps the only non-trivial questions that a theory of definiteness faces." (Heim 1982: 372)

> "I am ... stopping far short of a general and precise formulation of the laws governing accommodation ..." (Heim 1983: 120)

As it happens, our example text (20) contains several instances of definite descriptions where accommodation is necessary and possible:

(20) A man wielding a crowbar outside
the elementary school where his two children are enrolled
was fatally shot by a police officer.
The principal said the man, who was not immediately identified,
had gone to the school to see his daughter's teacher ...

The underlined NPs all conform to Heim's **linking** condition (1982: 373f):

> "When a new file card is introduced under accommodation, it has to be linked by cross-references to some already-present file card(s). [...] There seems to be no exception to this requirement. Mere addition of a card ... is never acceptable in accommodation."

Most of the descriptions involve accommodation of both entities (variables, discourse referents) and information (relations, conditions). Two only involve accommodation of entities; *the principal* and *his daughter's teacher*, if the information that every elementary school has a (unique) principal and that every schoolchild has a (most salient) teacher can be assumed to be linguistic knowledge, or at any rate knowledge sufficiently reliable to be in any common ground. None of the descriptions involve accommodation of information only, but such examples are also found (from Zeevat (1992: 407)):

(24) A man died in a car crash yesterday evening.
The Amsterdam father of four was found to have been drinking.

The description *the principal* in (20) is a case of what is known as **bridging**: There is a functional noun or a one-place noun reconstrued as a functional noun where the argument is ellipsed and anaphoric.

Rob van der Sandt has proposed an anaphoric account of presuppositions in a DRT framework on which presuppositions are anaphora with descriptive material. Accommodation is treated not as a repair strategy but rather as another way of presupposition satisfaction: Resolution has two parts, binding and accommodation, where binding has a form of priority over accommodation. DRSs are defined as triples where the third member, encoding the presupposition(s), is itself a set of DRSs, the A-structure (A for anaphora).

> **van der Sandt's presupposition resolution** (1992: 358):
>
> "*Resolution*
>
> Let K be a DRS and let K_s be the source of an anaphoric expression, that is an element of an A-structure of some sub-DRS of K and let $A(K_s)$ be empty. Let its target be a (sub)DRS K_t on K_s's projection line. Let K_s have the markers $y_1 \ldots y_m$ and $Acc(K_t)$ the markers $x_1 \ldots x_n$. Let f be a function from $U(K_s)$ to $Acc(K_t)$, such that the conditions of K_t are compatible with the conditions of K_s under the substitution of $y_1 \ldots y_m$ for $x_1 \ldots x_n$. The resolution of the anaphoric structure K_s with respect to K_t yields a DRS K', which differs from K in the following respects.
>
> *Binding*

(i) $\mathrm{U}(\mathrm{K}'_\mathrm{s})=\mathrm{CON}(\mathrm{K}'_\mathrm{s})=\emptyset$
(ii) $\mathrm{U}(\mathrm{K}'_\mathrm{t})=\mathrm{U}(\mathrm{K}_\mathrm{s})\cup\mathrm{U}(\mathrm{K}_\mathrm{t})$
(iii) $\mathrm{CON}(\mathrm{K}'_\mathrm{t})=\mathrm{CON}(\mathrm{K}_\mathrm{s})\cup\mathrm{CON}(\mathrm{K}_\mathrm{t})\cup\{x=y \mid x=f(y)\}$

[...] Accommodation of K_s into K_t is [...] just like binding with the one exception that no restrictions on compatibility are required and no anaphoric equations are added to $\mathrm{Con}(\mathrm{K}_\mathrm{t})$."

The definition of binding takes height for accommodation of information in that the conditions of K_t are only required to be compatible with the conditions of K_s under the relevant substitution, and accommodation of referents and information is covered under Accommodation. Let us go through an example to see how the theory works. Consider the NP *his daughter's teacher* in (25).

(25) A man came to a school. His daughter's teacher was inaccessible.

DRSs are constructed in two stages. First, a DRS is constructed for the incoming sentence:

$$\langle\ \emptyset, \{inaccessible(x)\}, \{\langle\{x\}, \{teacher(x), poss(y,x)\}, \{\langle\{y\}, \{daughter(y), poss(z,y)\}, \{\langle\{z_{masc}\},\ \emptyset,\ \emptyset\rangle\}\rangle\}\rangle\}\rangle.$$

This DRS is then merged with the main DRS, resulting in a new DRS in which the anaphoric structures still await processing:

$$\langle\{u,v\}, \{man(u), school(v), cometo(u,v), inaccessible(x)\}, \{\langle\{x\}, \{teacher(x), poss(y,x)\}, \{\langle\{y\}, \{daughter(y), poss(z,y)\}, \{\langle\{z_{masc}\},\ \emptyset,\ \emptyset\rangle\}\rangle\}\rangle\}\rangle.$$

Resolution starts with the deepest embedded anaphor, the A-structure set up for the possessive pronoun. Going upwards along its projection line we check whether a suitable antecedent can be found. (There is a technical problem related to the fact that x occurs free in K_t so compatibility is not readily defined.) We do, and identify the anaphoric marker z with the established marker u. Next we repeat the maneuver for the A-structure set up for *his daughter*, but now we cannot find a suitable antecedent, so it will be accommodated, that is, the marker y and the conditions $daughter(y)$ and $poss(z,y)$ will be transferred to main DRS level. The same happens with the A-structure set up for *his daughter's teacher*, and the result is the A-structure-empty DRS

$$\langle\{u,v,z,y,x\}, \{man(u), school(v), cometo(u,v), inaccessible(x), z=u, daughter(y), poss(z,y), teacher(x), poss(y,x)\},\ \emptyset\rangle.$$

The theory of van der Sandt is weak. It does not distinguish between perfect and imperfect resolutions; between binding by entailment and binding by compatibility only, nor too clearly between binding and accommodation. It does not say: If there is an f such that $f(\mathrm{K}_\mathrm{s})$ is a consequence of K_t, that resolution has priority over any f' such that $f'(\mathrm{K}_\mathrm{s})$ is compatible only with K_t, – and this is deliberate, cf (26)-(28).

(26) If John has an oriental girlfriend, his girlfriend won't be happy.
(27) If John murdered his wife, he will be glad that she is dead.
(28) If someone at the conference solved the problem,
it was Julius who solved it.

According to van der Sandt, these sentences have beside their non-presupposing reading also a presupposing reading. But reconsider (20): According to the definition of resolution, it should be equally possible to bind *the man* to *the principal*. The theory is highly nondeterministic. There is a set of possible resolutions from which various factors sort out admissible resolutions and finally single out the preferred interpretation.

When binding is possible, even by entailment, accommodation is still an option: The first occurrence of *the man* in (20) can in principle be interpreted as *some man*. Binding has priority over binding only indirectly; insofar as accommodation is governed by constraints on discourse acceptability and subject to conditions of admissible resolutions (p 367). One is that each provisional update should at least provide some new information – accommodated material must be informative, so that, if I understand van der Sandt correctly, accommodating *the man* in a case where binding by entailment is possible will be uninformative, it would be entailed after *a man*.

What about cases where accommodation is close to impossible, as in

(29) The principal said the woman, ...?

The 'capacity to accommodate' is due to the descriptive content:

> "In fact they [presuppositional expressions] only differ from pronouns and other semantically less loaded anaphors in that they have more descriptive content. It is this fact which enables them to create an antecedent in case discourse does not provide one." (p 333)

By the same token, unlinked definite descriptions like *the woman* are supposedly too poor in descriptive content to be accommodated – *there is a woman* is too trivial a piece of information. But consider (30).

(30) The principal of the school was inaccessible.

Once *the school* has been resolved, indeed bound, *the principal of y* for y known to be a school is routinely accommodated in spite of the fact that the piece of information that the school y has a principal is not more informative than the piece of information that there is a woman. Since it is common knowledge that every school has a principal, this accommodated material should count as trivial. It seems, rather, that what distinguishes *the woman* from *the principal of the school* with respect to the capacity for accommodation is not the descriptive content as such but the plausibility of the assumption that there is one and only one woman (implausible) as compared to the assumption that the school has a unique principal (plausible). That uniqueness plays a role in accommodation is supported by cases like

(31) My distant relative caused a stir
(32) The passenger (on the bus) was severely injured

where in spite of linking accommodation is not so straightforward but binding is easy to imagine.

Zeevat (1992: 381f) reconstructs van der Sandt's theory as set out in (1989) in this way:

> "To develop a trigger T with a presupposition P in a subDRS B in a DRS A, we first test whether P can be found in a DRS C on the accessibility path of B in A. If so, the discourse markers in P occurring in B are replaced by the corresponding markers in C. Or else we proceed from A to B down the accessibility path and try to add P. This fails if adding P to one of the DRSs on the path leads to a conflict with the correctness conditions on the assertion at hand or if formal demands are not satisfied. [...] The process of looking up a presupposition is analogous to answering a question in Prolog: it instantiates variables."

The notion of finding a presupposition P in a DRS corresponds to a notion of consequence, and adding a presupposition corrresponds to accommodation. Zeevat then develops a version of such a theory of presuppositional anaphora and presuppositional accommodation in update semantics in terms of stacks of information states.

In a problem section, Zeevat notes that "the view of accommodation we developed does not lead to the right characterization of the resolution of definite descriptions." Some behave much like proper names and are not meant to be resolved. "But the definite descriptions outside this class do not seem to participate in accommodation at all. They can either be resolved by finding a discourse object that meets the description or one that meets the description well enough or by being functionally related to a high focus discourse object. For the first case compare [(33)]:"

(33) A soldier entered the room. The man asked for a beer.

> "The problem for our accommodation account is that if we do not have antecedents ... the interpretation process is blocked and not as accommodation predicts continued in a routine way. This is not to say that the resolution does not add new information .... We infer that the soldier is a man .... But this is not accommodation proper, which would also create the antecedents themselves. [...] What this comes down to is giving resolution a larger and more realistic role in presupposition, which would decrease the role of accommodation." (Zeevat 1992: 407)

In fact, the theory of van der Sandt can account for such 'anaphoric' accommodation (cf 2.1.2), where the presupposition provides novel information about familiar referents. The conditions of the presupposition are compatible with the conditions of the main DRS, so binding can occur; and the conditions of the presupposition are transferred to the new DRS by the binding rule (iii). However, as we will see in the next subsection, in many cases of anaphoric presuppositions compatibility is not sufficient.

2.2.3 Kamp's & Roßdeutscher's Presupposition Justification

Kamp & Roßdeutscher (1992) treat the presuppositions of the two variants of the German adverb *wieder*, corresponding to English *again*, the 'repetitive' and the 'restitutive' variant, as in (34) and (35):

(34) Der Assistenzarzt hatte diesen Patienten vor einigen Jahren vom Typhus geheilt. Jetzt hat er ihn wieder vom Typhus geheilt. (repetitive)

(35) Der Patient ist vor einigen Wochen an Typhus erkrankt. Jetzt hat der Assistenzarzt ihn wieder vom Typhus geheilt. (restitutive)

Their DRT treatment is similar to the treatment of *wieder* in Fabricius-Hansen (1980) or (1983), with two important differences: They operate with discourse referents for events and states, and they have an anaphoric concept of the presuppositions.

> "... the presuppositional force of (restitutive) *wieder* is not existential but ... anaphoric: in order that the context satisfy the presupposition, it must not only contain the implicit information that there exist states and processes of the kind, and standing to each other in the relations the presupposition demands; it must contain explicit representatives for at least some of those processes and states."

This concept accounts for the inference we are prepared to draw from (35) that the typhoid of which the intern has cured the patient was the same typhoid with which she came down a few weeks ago. Without *wieder* or on a classical account of its presupposition this inference would not be forthcoming; however, since *wieder* requires that the context contain a representation for the state which the described process turns into the result state, the presupposition by accommodation brings about the unification of the two typhoid states.

> "What we see here is a kind of mixture of presupposition verification and presupposition 'accommodation': part of the information contained in the presuppositon is present in the context; the rest has to be assumed." (p 108f)

Let us take a closer look at how this happens. Somewhat simplified for clarity: The first sentence of (35) gives rise to a DRS with an event e1 characterized as a process of coming down with typhoid, resulting in a state s1 of typhoid. The second sentence of (35) without the presupposition, ie. without *wieder*, the assertion part, gives rise to a DRS with an event e2 characterized as a process of cure of typhoid, and a result state s2. These two DRSs are merged into a DRS K with the temporal relations e1)(s1 and e2)(s2 (The relation)(denotes temporal abutment, or abrogation.) Now the presupposition DRS has an event e0 characterized as a process of coming down with typhoid and a result state s0, in the relations e0)(s0)(e2. Presupposition justification now consists in finding an f mapping e0 and s0 onto referents in K such that f(e0))(f(s0))(e2 are conditions of K. An f such that f(e0)=e1 and f(s0)=s1 is a candidate. And although e1)(s1)(e2 are not strictly conditions of K, "intuition tells us that the presupposition can be regarded as satisfied in the present case. Apparently the extra assumption we need to take on board to see the presupposition ... as fully guaranteed ... is one that speakers are ready to make." (p 108) The resulting DRS should have the temporal relations e1)(s1)(e2)(s2.

The authors concede that they are not yet in a position to state a justification procedure precisely. They do, however, propose the following principle in the form of a conjecture (p 120):

> "(**Principle of Presupposition Justification**)
>
> To justify a pair (K,K') in a DRS K_0 find a function f from a subset of $U_{K'}$ into U_{K0}, such that $K_0 \cup f(K')$ is consistent and such that $\mathrm{Dom}(f)$ is maximal among such functions. Extend f to a function g such that $\mathrm{Dom}(g)=U_K$, which is 1-1 on $\mathrm{Dom}(g)\backslash\mathrm{Dom}(f)$ and which maps the discourse referents from this set onto discourse referents not occurring in K_0. Add $g(K)$ to K_0."

A lengthy footnote fills in the picture.

> "The weak point in this formulation is the requirement that $K_0 \cup f(K')$ be 'consistent'. As it stands, this requirement allows for cases where the information that K' contains about a discourse referent x has very little to do with the information which K contains about $f(x)$; all that we required is that there be no logical inconsistency between these two bits of information. In general, however, this won't be enough to rule out presupposition justifications that are intuitively unacceptable. Compare for example the following two sentence pairs:
>
> (i) [German sentence pair] Everyone in the Gertraudenkrankenhaus remembers some child's cure by an intern of a blood disease. Now an intern has once again cured a patient of some pernicious disease.
> (ii) [German sentence pair] Everyone in the Gertraudenkrankenhaus remembers some patient's cure by an intern of a blood disease. Now an intern has once again cured a child of some pernicious disease.
>
> (i) is felicitous, (ii) is not. [...] ... mere consistency isn't good enough. At present we have no clear idea of a suitable stronger condition which will rule out such infelicities."

The Principle of Presupposition Justification as it stands is weak in another respect: The function f is not required to be total on the universe of the presupposition DRS.

> "A second shortcoming of [the principle] is its failure to provide lower limits on the set of discourse referents that must find targets under f in the context DRS K_0. When the context is too meagre, so that too many discourse referents have to be accommodated, the discourse becomes unprocessable and will be rejected as incoherent. To find these lower limits is another task for further research."

And, of course, the Principle is nondeterministic in that it does not require there to be a unique f. This reflects, of course, the resolution problem as it is known from anaphora in the narrow sense.

> "The details of how presuppositions are justified in situations where several parts of the DRS offer themselves as candidates is a matter that will have to be looked into more closely than we have so far done."

All these features the Principle of Presupposition Justification shares with van der Sandt's definition of Presupposition Resolution (though in van der Sandt's theory, accommodation is constrained by admissibility conditions).

As it appears, it is possible to state a precise definition of anaphoric presupposition which is unrealistically strong, imposing determinism (uniqueness of substitution) and disallowing accommodation (totality of substitution and entailment / consequence instead of compatibility / consistency), and on the other hand, it is possible to state definitions which are too weak, such as van der Sandt's Resolution and Kamp's & Roßdeutscher's Justification; but a reasonable middle way is hard to find. The asymmetry between *patient* and *child* in Kamp's & Roßdeutscher's contrast quoted above suggests that the subset relation is relevant: A child to be cured of a disease is necessarily a patient, but not conversely. The following is an analogous contrast with *too*:

(35) ? Mary trusts a Scandinavian. Sue, too, trusts a Swede.
(36) Mary trusts a Swede. Sue, too, trusts a Scandinavian.

As the next two sentence pairs demonstrate, however, it is too simple to suppose that hyponymy is decisive:

(18) Mary trusts Jan Tore. Sue, too, trusts a Swede.
(37) ? Mary trusts a Swede. Sue, too, trusts Jan Tore.

The relation between a constant and a set, as witnessed by (18), is sufficient for the presupposition of a definite description as well:

(38) Chris Patten, governor of Hong Kong, will enter hospital today
for an urgent operation to reduce the threat of a heart attack ....
The former chairman of the Tory party ... will have accretions of fat
removed from two coronary arteries.

But the presupposition of a definite description even accepts the relation between a superset and a subset, or between unrelated sets, as in (24).

(24) A man died in a car crash yesterday evening.
The Amsterdam father of four was found to have been drinking.

(Incidentally, this capacity for identification independently of anything but compatibility definite descriptions seem to share with proper names:

(39) A man died in a car crash yesterday evening.
Mr. Ruud Wolters, 42, was found to have been drinking.)

Presupposition triggers like *too* and *again*, in general, additive triggers, would seem to impose stricter conditions on accommodation of information than definite descriptions. Cases like (24) do seem to require such a weak condition as mere compatibility (consistency). However, so do cases like (16), (17), and (18) (regarding the piece of information that Mary is different from Sue), where what is accommodated is what can be called the structural condition of the presupposition. As we have noted in connection with *too*, *again*, and *stop* (cf 2.1.2), the structural condition, the condition from the general format of the presupposition, is evidently routinely accommodated; compatibility (consistency) suffices. From this angle, it is perhaps not peculiar that definite descriptions should be very flexible with respect to accommodation of information; if the content of the description can be viewed as the structural condition of the trigger *the*.

2.3 Anaphoric Presupposition Construction; Anaphoric Presupposition Generalized

In the framework of the present paper, a nondeterministic rule like van der Sandt's or Kamp's & Roßdeutscher's must serve the purpose of a necessary condition for anaphoric presupposition justification while at the other end, it is useful to state a deterministic sufficient condition. Consider the following tentative definition of the contribution of a presupposition to the update of a discourse by a new sentence, modelled on Heim as regards strength and on Kamp & Roßdeutscher in other respects:

Principle of Presupposition Verification

> Let K0 be any context DRS, K1 an assertion DRS and K the presupposition DRS of K1. K0 + K1 / K is *defined in the first instance* if and only if there is a unique function f:$U_K \rightarrow U_{K0}$ such that K0 entails $\langle$ U_{K0} , $Con_{K0} \cup$ "$f(Con_K)$" $\rangle$; then it is the merge of K0 and "f(K1)".
> (If defined at all, K0 + K1 / K is the merge of K0 and "f(K1)" and "f(K)" for some partial f:$U_K \rightarrow U_{K0}$ such that the merge of K0 and "f(K)" is consistent.)

This definition presupposes that the sentence to be processed is represented in two separate provisional structures, one for the assertion and one for the presupposition. It represents the best case, abstracting away from the resolution problem: There may be more than one such function, in which case definedness requires there to be one most suitable; and from the accommodation problem, which is bipartite: f is not necessarily a total function – we may have to accommodate discourse referents - and, the merge of K0 and "f(K)" is not necessarily a logical consequence of K0 – we may have to accommodate conditions.

The definition raises a number of questions which this subsection is intended to respond to. First, it predicts that the assertion DRS plays no part in the verification process. Specifically, it does not make sense if the presupposition

DRS contains free referents introduced in the assertion DRS, that is, if the set of conditions of K depends on the universe of K1. Indeed, the principle that the presupposition DRS is proper, ie. contains no free occurrences of discourse referents, will play a central role in the sequel. Second, the definition is cast as a general principle valid for all presupposition triggers, but so far we have not considered core cases such as factives and clefts. We have to discuss the legitimacy of these two constructional assumptions.

Let us first apply the definition to two select cases.

(5) The foreman was fired too.

Suppose this sentence is uttered in a context K0 containing the information that John was fired, and that he is not the foreman, represented as[1]

$$\langle\{\ldots x \ldots\}, \{\ldots \mathit{John}(x), \mathit{fired}(x) \ldots\}\rangle.$$

K1, the assertion, could be constructed as

$$\langle\{y\}, \{\mathit{foreman}(y), \mathit{fired}(y)\}\rangle,$$

and K, the presupposition, could be constructed as

$$\langle\{z\}, \{\neg \mathit{foreman}(z), \mathit{fired}(z)\}\rangle.$$

In order for the update of K0 by K1 / K to be defined in the first instance, there must be a unique f from $\{z\}$ to $\{\ldots x \ldots\}$ such that K0 entails

$$\langle\{\ldots x \ldots\}, \{\ldots \mathit{John}(x), \mathit{fired}(x) \ldots\} \cup \text{“}f(\{\neg \mathit{foreman}(z), \mathit{fired}(z)\})\text{”}\ \rangle.$$

Suppose there is, so that $f(z) = x$.[2] Then the update is defined as

$$\langle\{\ldots x \ldots, y\}, \{\ldots \mathit{John}(x), \mathit{fired}(x) \ldots, \mathit{foreman}(y), \mathit{fired}(y)\}\rangle.$$

As we see, the presupposition does not make any difference in the final representation in such a perfect case. The result is the same as if the sentence were to consist in the assertion only; the presupposition is just a check.

That is different in the case of definite descriptions, where a referent in the assertion depends on a referent in the presupposition:

(40) John owns a house and a hotel. The hotel is on a square.

Here, we encounter the mechanism of variable propagation through the presupposition to the assertion. K0 can be constructed as

[1] I ignore resolution or accommodation of definite descriptions and treat the passive of *fire* as a one-place predicate.

[2] Though there is a problem here: There may well be several functions, as indeed there are if the conversation contains in addition the information that the man from New Jersey was fired, cf Soames (1989: 604); in this case, the presupposition is strictly not defined in the first instance, although it does not make any difference to the interpretation, as it will if an accommodation effect is possible, in which case the function yielding the most salient value seems to be selected.

$$\langle \{x,y,z\},$$
$$\{John(x), house(y), hotel(z), owns(x,y), owns(x,z)\}\rangle;$$
K as $\langle\{v\},\{hotel(v)\}\rangle$, and
K1 as $\langle\{w\},\{square(w), on(v,w)\}\rangle$.

The verifying f is such that $f(v) = z$, and the resulting update is

$$\langle\{x,y,z,w\},\{John(x), house(y), hotel(z),$$
$$owns(x,y), owns(x,z), square(w), on(z,w)\}\rangle.$$

As we see, the referent v occurs free in the assertion; because it is introduced in the presupposition, it is replaced by a referent in the context.

The above definition presupposes that the presupposition DRS K is assessed with sole reference to the context DRS K0, and this predicts that there cannot be dependencies from the presupposition to the assertion, that is, there cannot be referents free in K introduced in K1. Is this a realistic assumption? It certainly is attractive in that the presupposition is independent of the assertion and really a pre-supposition, and in many cases, notably (so far) definite descriptions, it is the other way around: Referents free in the assertion depend on the presupposition. However, both van der Sandt and Kamp & Roßdeutscher assume that the assertion is merged with the context prior to processing the presupposition. This may seem plausible for two reasons, one valid and the other invalid. First, the presupposition may be in the scope of some quantifier in the incoming sentence, or more generally refer to another portion of it, as in the following two sentences.

(41) Every man loves his wife.
(42) John loves a woman who also loves a woman.

Second, it is tempting to construe structural conditions of additive presupponents as involving referents introduced in the assertion. As we shall see, however, it creates more problems than it solves to process the whole body of the assertion first or to construct the presupposition in dependency of some referent in the assertion.

Consider first van der Sandt's preliminary DRS for the sentence (41).

$$\langle\ \emptyset,\{\langle\{x\},\{man(x)\}\ ,\ \emptyset\rangle \rightarrow$$
$$\langle\ \emptyset,\{love(x,y)\},\{\langle\{y\},\{wife(y), poss(z,y)\},\{\langle\{z\},\ \emptyset,\ \emptyset\rangle\}\rangle\}\rangle\},\ \emptyset\rangle.$$

The first step in the resolution is the identification of z in the presupposition with x in the assertion. However, at this stage the referent y occurs free in the assertion, so strictly, it is not possible to determine whether the conditions of K_s are compatible with the conditions of K_t (with reference to the definition of resolution, cf 2.2.2). In consequence, the condition $love(x,y)$ must be kept apart after all, so what in fact happens is that the part of the sentence forming the restriction of the quantifier is processed first, merged with the context, while the assertoric material in the nuclear scope awaits processing.

In general, it must be possible to dissect the incoming sentence into parts which are merged with the context and made accessible to presupposition assessment, and parts which are only processed afterwards. This amounts to taking a more fine-grained view of the 'carrier sentence' of a presupposition; it may contain variables bound in the context, as also in (42). This is a necessary proviso to the principle that the presupposition DRS be proper. I return to this issue in 3.5.

Kamp's & Roßdeutscher's treatment of *wieder* has the provisional assertion DRS merged with the context DRS prior to the processing of the presupposition DRS. This is motivated by the structural condition of the (repetitive) presupposition: $e' < e$, where e is the event introduced in the assertion (correspondingly for restitutive). This is plausible enough in connection with cases like (43).

(43) Suddenly the horse bolted again.

But how about cases like (44), where the assertion is negated?

(44) Another lightning pierced the sky, but the horse didn't bolt again.

Then 'the event e' of the assertion is inaccessible. When there is no e accessible in the assertion, e' or s or whatever in the presupposition cannot be related to it. It is better to relate e' in the presupposition to the time of reference.

A similar problem is attached to the focus particle *too*, which according to Heim (1992: 189) is interpreted according to the 'general rule'

$$\phi[\alpha_F]\text{too}_i \text{ presupposes } x_i \neq \alpha \wedge \phi[x_i]$$

or, in a classical notation, there is an $x' \neq x$ such that $S(x')$ where $S(x)$ is the carrier sentence and x is the focus. Such an analysis is plausible for many cases, notably those where there is a definite NP in focus. But what if there is a proportional quantifier in focus?

(45) Most blacks favor the proposal, too.

Here, it is completely unclear what a condition $x' \neq x$ is supposed to mean. Possibly, the correct interpretation for this specific case is that there are some non-Moslems favoring the proposal; in general, it should be possible to construe the presupposition independently of any discourse referents of the assertion, but copying conditions like proper names or other predicates.

Intuitively, factive presuppositions are not particularly anaphoric. For one thing, they are accommodated with great ease; cf. "The management regrets that no responsibility can be taken for coats and other possessions left in this cloakroom" from Delin 1992a. Second, they do not seem to display accommodation effects comparable to those we have observed in connection with *too*, *again*, and *stop* (or to those we will observe in connection with *agree*, *refuse*, and the like in section 3).

(46) There is a bear in the forest. Susan knows there is a wolf there
(so she'll take care).

(47) John is coming. Susan regrets that she has invited a Swede
(but as long as John is coming, it won't matter).

(46) is felicitous, and (47) does not invite the inference that John is a Swede (although if the entire embedded clause is deaccented and topical, (46) is infelicitous and (47) does invite that inference; this, however, is not a property of the factive predicate only). But (46) should be infelicitous and (47) should invite the inference that John is a Swede if factive presuppositions are construed in the way Delin (1992: 58) sketches: She constructs the sentence

(48) Mary regrets that John ran.

as a bipartite structure with assertion DRS

$$\langle\{s, m\}, \{regrets(s, m, e)\}\rangle$$

and presupposition DRS

$$\langle\{e, j\}, \{ran(e, j)\}\rangle.$$

> "Because this third argument [ie. e in the assertion] is also presupposed ... there is a requirement for the acceptability of the sentence that its content be present in the DRS prior to the interpretation of the sentence – that is, its presence is a precondition on the current DRS."

This analysis suggests the following kind of paraphrase for presuppositional constructions featuring *regret*:

> There was an event$_i$ of John running, and Mary regrets it$_i$.

> "For presuppositions to be acceptable ... we are stipulating the following precondition on the DRS into which the ... sentence is to be incorporated: the eventuality index contained in the presupposed clause should already be accessible from the DRS as a marker at the time of interpreting the sentence." (p 59)[3]

Factive presuppositions are hardly anaphoric in the sense that the discourse referents in the proposition presupposed are to be anchored to already-introduced referents. There is, however, theoretically another possibility: The presupposition is anaphoric in the sense that a discourse referent for the proposition is to be anchored to an already-introduced DRS level referent, or to a DRS level referent set up on demand, as independently required for propositional anaphors (*it* etc), cf Asher (1993). Delin & Klein (1990: 5) in fact formulate the semantic force of *Mary regrets that S* in terms of a bipartite DRS structure with the following as the presupposition DRS.

$$\langle\{\pi\}, \{\pi : S, true(\pi)\}\rangle$$

[3] An objection to this condition is that when the embedded sentence is negated, there is no way of retrieving the eventuality referent in the assertion: "Mary regrets that John didn't run."

Now factive presuppositions are not, like the presuppositions we have hitherto been concerned with, apparently indefinite, rather, they are, in a sense, constants. This and the ease with which they are accommodated can be accounted for if we assume that they are not anaphoric in any sense that there are discourse referents in the universe of the presupposition DRS. I propose that factive presuppositions are represented on the following pattern:

Factive Presuppositions
presupposition: $\langle\ \emptyset, \{\mathrm{K}\}\rangle$
assertion: $\langle\{x_1,\ldots,x_n\},\{\mathit{factpred}(x_1,\ldots,x_n,\mathrm{K})\}\rangle$

where K is short for whatever DRS represents the embedded sentence. That is, the fact DRS is a condition in the form of a subDRS in the presupposition DRS. This reduces to Karttunen's pragmatic presupposition, where the presupposition is entailed by the context; but the same general definition applies.

Cleft presuppositions are also, as Delin (1992a: 292f) shows, easy to accommodate. In a majority of cases, the cleft clause, ie. the presupposition, conveys new information. Nevertheless the structure attributed to

(49) It was John who ran.

in Delin (1992: 60) is (in a preliminary version; in the final version, the representation is strengthened to require maximality: 'John and nobody else ran')

precondition: $\langle\{e,x\},\{\mathit{ran}(e,x)\}\rangle$
postcondition: $\langle\{s,j\},\{\mathit{be}(s,x,j)\}\rangle$

What about accommodation effects? Event referents might provide a test:

(50) Jack broke his leg at the age of 15.
It was in July 1933 that he broke his leg.

Intuitions are inconclusive here, I think: Although the inference is licensed that Jack was 15 in July 1933, this may be due either to anaphoricity or to a uniqueness implication. The question is: Is this discourse compatible with Jack having broken his leg several times? If so, the inference requires that the cleft clause is about the same event as the first sentence, in other words, that the e referent of the presupposition is identified with the e referent of the context. But if not, an anaphoric presupposition is unnecessary, since the cleft construction says that Jack only broke his leg in July 1933. Actually, if we assume maximality in the cleft head, anaphoricity in the cleft clause is redundant.

Delin regards cleft presuppositions as anaphoric (1992a: 296f), supplying some indirect evidence for anaphoricity in a loose sense, but since she does not define presupposition, she does not distinguish between anaphoricity in the weak sense that the presupposition be a consequence of the context and anaphoricity in the strong sense of our definition. There is reason to treat the presuppositions of clefts as anaphoric in that strong sense only if in the following dialogue, A is 'right' and B is 'wrong':

A: It was John who ran.
B: No, it wasn't John who ran, John and Mary both ran.
A: Mary ran too, but the running I was referring to
was the running by John.

B interprets the construction maximally, and then there is no reason not to describe the presupposition as

Cleft Presuppositions (instance)
presupposition: $\langle\ \emptyset, \{\langle\{e,x\},\{ran(e,x)\}\rangle\}\rangle.$
assertion: $\langle\{e,y\},\{John(y), ran(e,y),$
$\neg\langle\{e,z\},\{z \neq y, ran(e,z)\}\rangle\}\rangle$

That is, cleft presuppositions are possibly, like factive presuppositions, not anaphoric in the narrow sense that the universe of the presupposition DRS is nonempty.

3 Zero Anaphora

The empirical domain of anaphoric presuppositions would seem to be very limited. The triggers we have identified so far form a closed class: Definite descriptions, more precisely, the definite article, focus particles like *too*, adverbs like *again*, and aspectual verbs like *stop*. But, as this section shows, the concept of anaphoric presuppositions naturally generalizes to a wide range of lexical presuppositions, triggered by words with a full meaning from open classes.

However, it is not the main aim of this section to extend the domain of anaphoric presuppositions quantitatively by showing that anaphoric presuppositions are a pervasive element in discourse, rather, the goal is a qualitative extension to the concept of an anaphoric presupposition. By this I mean that anaphoric presuppositins can be seen to cause more than we have considered so far, which is, basically, to impose strong admittance conditions, give rise to anaphoric accommodation effects, and bind definite descriptions. What they accomplish over and above this is to bind invisible variables in the carrier sentence, thus taking the load off overt anaphors. Specifically, what I have in mind is that the concept of anaphoric presupposisions can be applied to solve the problem of definite ellipsis, as stated by Shopen (1973), Thomas (1979), Pinkal (1980), or Sæbø (1984).

Since Shopen (1973) distinguished between indefinite and definite ellipsis, we have known that missing arguments sometimes have an existential interpretation but sometimes depend on context. The latter case gives rise to so-called zero anaphora, in particular with verbs with sentential or infinitival complements like *agree* or *refuse*. But it has remained a mystery why these zero arguments behave like anaphors, and it has seemed necessary to mark this behavior lexically. My hypothesis is that this phenomenon correlates with anaphoric presuppositions and, crucially, that the context dependence in a missing complement can be independently described as a consequence of presupposition. The point is that the corresponding variable is introduced in the presupposition DRS and that in the updating process, the substituted variable is propagated to the assertion DRS. For instance, the verb *agree* carries the presupposition that the proposition agreed to has been proposed. Thus *Sue agrees*, represented as *Sue agrees that p*, would acquire its interpretation via the presupposition that someone else thinks that *p*. Thus zero anaphors are not really anaphors but epiphenomena of presuppositions, and there will be no need to distinguish between optional complements with an indefinite interpretation and optional complements with a definite interpretation in any other way than through the absence or presence of an anaphoric presupposition, which must be derivable from the lexicon anyhow.

Let us recapitulate what anaphoric presuppositions have been seen to account for so far: (1) The admittance condition imposed by, say, the word *too* requires an alternative to the focus to be represented in the context as satisfying the scope; this accounts for the difficulty of accommodation even when the fact that some alternative to the focus satisfies the scope is common knowledge, but since there is no variable sharing between the presupposition and the assertion (the latter does not depend on the former in any variable) the assertion or the net information effect is not affected; (2) Since presupposition verification consists not only in entailment but also in binding it is possible to differentiate between accommodation of conditions and accommodation of referents, and this accounts for cases where we accommodate logically more than strictly necessary, the noted accommodation effects, where the presupposition yields more information than a corresponding assertion; (3) In the case of definite descriptions, a variable in the assertion occurs free there but not in the presupposition; that is, there is variable sharing between the assertion and the presupposition and the variable is instantiated through the presupposition. The cases to be considered now share this feature of variable propagation through the presupposition to the assertion with definite descriptions. In fact, what distinguishes zero argument anaphora from definite descriptions is that the content of the presupposition does not originate in the argument constituent but in the predicate.

The first subsection 3.1 looks into a preliminary matter, namely VP ellipsis and its interaction with focus particles like *too*, as an illustration of how presupposition can drive implicit anaphora. Subsection 3.2 reviews descriptions of implicit argument anaphora, 3.3 presents hypotheses and principles of a presuppositional account, and 3.4 discusses a variety of applications. Subsection 3.5, finally, confronts a number of problems.

3.1 VP Ellipsis and Stripping

VP ellipsis has been studied intensively, of course, and, indirectly, so has stripping, where the ellipsed material does not necessarily correspond to a VP or indeed to any constituent. However, all studies have concentrated on the resolution of ellipsis and in particular on the problem of predicting strict and sloppy readings, and no attention has been paid to what triggers or drives the resolution process. To put it differently, the fact that some anaphoric element, an anaphor like *so* or a focus particle like *too*, regularly occurs in the 'target' clause has not been seen as significant. Probably it has been taken for granted that the presupposition of *too* in cases like (51) and (52) is verified after the ellipsis is resolved.

(51) John criticizes the report. Sue does, too.
(52) John criticizes the report. Sue, too.

But this is somewhat problematic in the face of the necessity of *too*:

(53) ? John criticizes the report. Sue does.
(54) ?? John criticizes the report. Sue.

It seems prima facie plausible that the particle plays a part in driving ellipsis resolution. On an anaphoric analysis of the presuppositon of *too*, this comes out directly, at least in stripping cases. Let us construct the presupposition DRS and the assertion DRS for the 'target' of (52).[4]

Stripping Presuppositions (preliminary)
presupposition: $\langle\{x\},\{\neg Sue(x), P(x)\}\rangle$
assertion: $\langle\{y\},\{Sue(y), P(y)\}\rangle$

This, however, cannot yet be correct. The presupposition DRS is not proper, in that the property referent P occurs free there. I shall assume throughout that a presupposition DRS must be proper. An assertion DRS, on the other hand, may well depend on the presupposition DRS, as the straightforward analysis of definite descriptions shows. But presuppositions on the contrary cannot depend on the assertion, since under negation, markers there will be inaccessible. So the correct representation of the presupposition will be

Stripping Presuppositions (final)
presupposition: $\langle\{x, P\},\{\neg Sue(x), P(x)\}\rangle$

The alternative to having the particle (or the anaphor *so*)[5] drive ellipsis resolution is to stipulate that anything missing to make a sentence well-formed must be retrieved from context. And I recognize that to account for gapping cases and elliptical answers to questions, this may be necessary anyway. I only want to point out that it is possible to analyze ellipsis by analyzing the presupposition first. The same mechanism will apply when we turn to the analysis of zero anaphora in 3.3: Something is missing from the assertion and from the presupposition and must be represented as a referent free in the assertion but introduced in the presupposition. Only then the presupposition trigger is a full word and the thing missing is an argument of that word.

[4]We have here a discourse referent for an abstract entity – a property. For treatments of abstract entities in general and of properties in particular in DRT, cf Asher 1993 and Klein 1986.

[5]As for cases where the polarity differs from source to target and the particle *but* replaces the particle *too*, I assume that *but* functions as a focus particle, triggering a negative additive presupposition.

3.2 Definite Ellipsis: Background

Tim Shopen (1973) observed that lexically-determined constituent ellipsis can be definite as well as indefinite. Since he drew this distinction, it has become common knowledge that when an optional complement is not realized syntactically, the semantic result is either that the corresponding variable is existentially quantified over, that is, the empty argument is interpreted as though it were an indefinite, or it remains free, that is, the empty argument is interpreted as though it were a definite, an anaphor. For the former case, Shopen cites (55), where the 'source' role is left unexpressed.

(55) - Bill received a letter today.
- Who did he get it from?

> "It is a natural sequence for the second speaker to ask what he does because it does not conflict with any of the presuppositions of the initial statement .... The ellipsed SOURCE of *receive* is interrogated and the meaning of *receive* does not tell us that it should be uniquely identifiable. This is indefinite ellipsis." (p 67)

Thomas (1979) followed up with a similar test for indefinite ellipsis (p 57); the following sequence is acceptable:

(56) - Have you been eating onions?
- I've been eating, but not onions.

Instances of definite ellipsis, on the other hand, are unacceptable in such sequences:

(57) - Do you expect to pass your driving test?
? - I expect to pass, but not my driving test.

(58) - When Mother told him to clean up his room, Bobby refused.
? - What did he refuse to do?

> "The question 'What did he refuse to do?' is an unnatural sequence because it rejects the presupposition of definiteness in 'Bobby refused.'. [...] The definiteness of the ellipsis with *refuse* is due to the semantic structure of that verb (there is a significant relationship at this juncture with the notion of presupposition), as revealed in its lexical entry." (Shopen 1973: 68)

> "More examples of definite constituent ellipsis:
> Ted **agreed**. (promised, insisted, volunteered)
> Alice **disagreed**. (objected, disapproved, dissented)
> Susan **overheard**. (listened in, peeked)
> Helen **understood**. (replied, answered)
> Don **began**. (started, continued, finished, quit)
> Nick **deserted**. (intruded, entered, left, escaped)
> We **suspected** Norma. (blamed, persuaded, forgave, asked)
> We **chose** Lewis. (excused, expelled, rescued)
> Mort was **impressed**. (astonished, surprised, offended)" (p 69)

This list is of course not exhaustive but fairly representative. Let me present a few more instances of zero anaphora complete with a suitable discourse antecedent:

(59) John wants to sell his house.
Sue has **offered** one million, but he isn't **satisfied**.

(60) A sheep has been killed in the mountains.
Environmentalists **suspect** a poacher.

(61) But farmers say it must have been a predator, and the Sheriff **agrees**.

(62) The manager asked the foreman to start the machine, but he **refused**.

(63) We were wondering which track to take to Goatteluobal,
so we **asked** a Lap woman, but she didn't **know**.

(64) On Wednesday, the chief UN negotiator, Thorvald Stoltenberg, met with Mr. Izetbegovic to try and ease those fears. He clearly **failed**.

(65) Don't you kids know it's dangerous to hypnotize people?
You might do it to somebody with a gullible mind sometime,
and that person would never **recover**!

(66) That fall the King left Svearike for Gardarike. In spring he **returned**.

(67) John Sinclair has been building wooden boats for fifty years.
He himself would prefer to **stop** now,
but the County Council is urging him to **continue**.

In (Sæbø 1984) I gave many authentic examples of indefinite as well as definite ellipsis. Two descriptive generalizations made there are that many of the verbs that require a definite interpretation of their missing optional complements express reactions and that in many cases the complements are infinitival or sentential. Cases of definite ellipsis in an individual argument are rare (note, however, verbs like *offer*), as are cases of indefinite ellipsis in an abstract entity argument (note, however, verbs like *think*).

There is reason to assume a semantic basis for the boundary between indefinite and definite ellipsis in an argument. On the other hand, it is not to be assumed that we can predict semantically when ellipsis is possible at all, that is, what complements of what heads are optional. This varies across languages, even among such closely related languages as English, German, and Norwegian. Many verbs with definite ellipsis in English correspond to verbs requiring overt anaphors in German or Norwegian. There are three possibilities, an argument is either obligatory (1) or definitely optional (2) or indefinitely optional (3); and both the boundary between (1) and (2) and that between (1) and (3) may well be partly syntactically determined and subject to parametric variation, partly simply arbitrary. It is for the boundary between class (2) and class (3) that the following sections provide a semantic account based on presuppositions, predicting, specifically, that the anaphoricity in an argument cannot vary across languages; it should not be possible to find two otherwise synonymous verbs where an argument of one is definitely optional but the same argument of the other is indefinitely optional.

3.3 A Hypothesis about the Source of Definite Ellipsis

Shopen's remark that there is a significant relationship with the notion of presupposition (p 68) has not been elaborated on, and he himself writes the definiteness of the "activity proposed by a second party in an offer, a command or an invitation" into the lexical entry for *refuse*: "z =definite when ellipsed" (p 69).

It is unsatisfactory to have to indicate in every single case what intuitively appears as an epiphenomenon of some semantic property which the verbs, and, to a lesser degree, adjectives and nouns, in question have in common and which should be recoverable from the lexical entries anyhow. If it is correct, as Shopen claims, that the definiteness of the ellipsis is due to the semantic structure of the verb, and that there is a significant relationship at this juncture with the notion of presupposition, then that semantic structure and, specifically, its relationship with presupposition, should be explored. And I believe that with the notion of anaphoric presupposition at hand, there is a straightforward way of predicting when optional argument ellipsis is definite and how implicit anaphora works. Provided the argument in question is indeed optional, this account implies that definite ellipsis is possible just in case the head word triggers a presupposition involving the implicit argument, and the zero anaphor is resolved in the same process in which the presupposition is verified. My analysis of *refuse* will assume that this verb triggers the presupposition that, roughly speaking, someone has asked the refuser to do something; and when this something is expressed in the carrier sentence, its presupposition is about that something; when it is not, it figures as a discourse marker in the presupposition on a par with that someone.

Indefinite ellipsis evolves when there is no presupposition involving the relevant referent, so it is introduced in the assertion, because the merge of the presupposition and the assertion must be proper, containing no free occurrences of referents. When, on the other hand, there is a presupposition involving the implicitly introduced referent, that referent is introduced in the presupposition, because the presupposition must be proper. The difference between indefinite and definite ellipsis surfaces in where the referent is introduced; which universe it belongs to, but it originates in the absence or presence of a presupposition involving it.

On this account, in contrast to overt anaphors, zero anaphors do not trigger the introduction of a referent in the presupposition unless the referent is involved in some condition in the presupposition - the zero anaphor does not trigger anything but depends on an independent presupposition. It is not really an anaphor. Thus I put forward the following hypothesis about the distribution and cause of zero argument anaphora.

> **Hypothesis**
> A zero argument is anaphoric iff the lexical head generates a presupposition involving the argument.

The are two directions to this hypothesis: The 'if' and the 'only if' implication. The 'if' claim is theoretical and can be shown on the basis of the following simple assumption about provisional DRS construction.

Principle 1

The presupposition DRS is proper.

That is, the presupposition DRS does not contain free occurrences of referents. If the discourse referent representing a zero argument occurs in a condition in the presupposition, it is introduced in the presupposition, it is in its universe. In other words, the zero argument involved in a presupposition is an anaphoric element, to be instantiated in the process of presupposition verification.

The 'only if' implication, on the other hand, is empirical and must be defended piece by piece. It says, in effect, that a zero argument anaphor depends on an independent presupposition. To first see how the indefinite interpretation can come about, consider the reasonable principle

Principle 0

The merge of the assertion DRS and the presupposition DRS is proper.

Thus if the zero argument referent is not involved in any presupposition, it can belong to the universe of the presupposition DRS or to the universe of the assertion DRS. In the latter case, it is essentially novel; the universe of the presupposition DRS is the only place for an anaphoric element. Now to force an indefinite interpretation of a zero argument not involved in a presupposition, we need the principle

Principle 2

If a discourse referent is in the universe of the presupposition but does not occur in any condition of the presupposition, it originates in an overt anaphor.

That is, a zero argument referent must in order to have an anaphoric interpretation occur in a substantial presupposition; in other words, a zero argument anaphor must be involved in a presupposition.

When a sentence with a zero argument is processed, it is initially represented as a bipartite structure assertion DRS / presupposition DRS where the zero argument is rendered as a dummy referent in the argument places of the relations. On account of Principle 0, this referent must be introduced in the assertion or the presupposition DRS. If it occurs in a condition of the presupposition DRS, then as a consequence of Principle 1 it is introduced in this DRS. If it does not, as a consequence of Principle 2 it is not. Thus, in general, the empty element does not give rise to a discourse referent in its own right; it is only on account of general principles of provisional DRS construction that the effect is the same as with an indefinite or a definite pronoun. An anaphoric element, we might say, is an element which corresponds to a referent in the presupposition's universe, whether this correspondence is direct, as with overt anaphora, or indirect, as with zero anaphora. Let me repeat the hypothesis and the three principles:

Hypothesis

A zero argument is anaphoric iff the lexical head generates a presupposition involving the argument

Principle 0

The merge of the presupposition and assertion DRS is proper.

Principle 1

The presupposition DRS is proper.

Principle 2

If a referent is in the universe of the presupposition DRS
but does not occur in a condition in that DRS,
that referent comes from an overt anaphor.

Principle 2, saying that only an overt anaphor is represented as a referent in the presupposition's universe without occurring in a condition in the presupposition, secures an indefinite interpretation of zero elements not involved in a substantial presupposition. As noted, the 'only if' direction of the hypothesis, encoded in Principle 2, has universal force and depends on showing piece by piece that there really is an independent substantial presupposition involved, and It would go beyond the scope of this paper to deliver a complete defense of this half of the hypothesis. The following sections are intended to show for some select cases that the presuppositional analysis is indeed more than a mere stipulation. Later on, a selection of problem cases will be attended to.

3.4 Applications

Quite many of the verbs where zero argument anaphora is possible describe reactions and generate presuppositions as to the stimulus. The verb *agree* and Shopen's paradigm verb *refuse* are clear cases in point. There are quite a few verbs resembling *agree* and *refuse*; for instance, *approve* and *comply* could be added to Shopen's list. The class of emotive past participle predicates, bordering on passives, like *delighted*, all describing how a piece of information affects the subject and presupposing that the information has reached the subject, can also be subsumed under reaction predicates. These, in turn, are closely related to a group of factive predicates where the fact argument can be a zero anaphor, like *remember*. Implicative verbs like *succeed* also deserve mention, and finally, the presuppositions of state transition predicates like *recover* can be seen to involve optional arguments characterizing precondition states.

3.4.1 Reactions

Let us first consider the verb *agree*. This word has quite much in common with the focus particle *also* or *too*; in fact, apart from an additional intensional element - precisely the reaction element - it can be paraphrased as also believing. It presents a particularly clear case in that it effectively resists accommodation, and the zero anaphor is not the only referent in the presupposition. There are several variants of *agree*, but the one we are interested in here subcategorizes for a *that* clause. We seek a principled way of deducing (69) from (68):

(68) A sheep has been killed in the mountains.
Environmentalists suspect a poacher, but farmers claim it was a wolf, and the Sheriff agrees.

(69) A sheep has been killed in the mountains.
Environmentalists suspect a poacher, but farmers claim it was a wolf, and the Sheriff agrees it was a wolf.

Let us first consider the latter case of what I take to be full match between the presupposition and the context.[6]

(70) Farmers claim it was a wolf, and the Sheriff agrees it was a wolf.

Radically simplified, in particular with respect to the embedded sentence, which is itself anaphoric, we can write:

context: $\langle \{x\}, \{claim(x, \langle \{y\}, \{wolf(y)\}\rangle)\}\rangle$

Or equivalently, as I understand Asher (1993),

context: $\langle \{x, K\}, \{claim(x, K), K = \langle \{y\}, \{wolf(y)\}\rangle\}\rangle$
presupposition: $\langle \{y\}, \{believe(y, \langle \{y\}, \{wolf(y)\}\rangle)\}\rangle$
assertion: $\langle \{z\}, \{believe(z, \langle \{y\}, \{wolf(y)\}\rangle)\}\rangle$

Next, let us consider a case of subsumption:[7]

(71) Farmers claim it was a wolf. The Sheriff agrees it was a predator, but is more inclined to think it was a wolverine.

context: same
presupposition: $\langle \{y\}, \{believe(y, \langle \{y\}, \{predator(y)\}\rangle)\}\rangle$

If we now eliminate the subDRS altogether, initially we have

presupposition: $\langle \{y\}, \{believe(y, K)\}\rangle$
assertion: $\langle \{z\}, \{believe(z, K)\}\rangle$

However, this structure violates the principle that a presupposition must be proper, so the correct result is:

presupposition: $\langle \{y, K\}, \{believe(y, K)\}\rangle$

For *refuse*, consider

(72) The board instructs the management to reduce employment, but it refuses.

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[6]This is not quite accurate, because the analysis presented fails to capture one feature of the presupposition: That the agreer knows that whoever she agrees with believes what she agrees in, as witnessed by the subjunctive locution *Sue would (dis)agree (were she informed).*

[7]Here, in order for the presupposition to be verified in the first instance, evidently we have to assume a semantic rule by which anyone believing it was a wolf also believes it was a predator; that is, a kind of lexical omniscience. Also, we must here be careful not to declare a discourse referent K' in the universe of the presupposition, for the proposition that it was a predator is not present in the context so it would be too strong to require such a K' to find an antecedent.

context:	$\langle\{x,y,P\},\{instruct(x,y,P),$ $P=\lambda y\langle\ y\ reduce\ employment\ \rangle\}\rangle$
presupposition:	$\langle\{v,w,Q\},\{ask(v,w,Q)\}\rangle$
assertion:	$\langle\ \emptyset,\{refuse^*(w,Q)\}\rangle$

Here and in the following, *predicate** is supposed to designate the predicate stripped of its presupposition. It should not come as a surprise that in the majority of cases, there is no straightforward way of identifying the separate presupposition and assertion components of a predicate. Rather, *agree* is a special case in that it is almost possible to transcribe the presupposition and assertion in natural language predicates, but even here, it represents an idealization. In general, what is required is in the presupposition a meta predicate just unspecific enough to cover the range of appropriate contexts, and in the assertion a meta predicate expressing the rest. Implicative verbs, of course, do permit an unambiguous formulation of the assertion:

(73) On Wednesday, the chief UN negotiator, Thorvald Stoltenberg, met with Mr. Izetbegovic to try and ease those fears. He clearly **failed**.

presupposition:	$\langle\{x,P\},\{try(x,P)\}\rangle$
assertion:	$\langle\ \emptyset,\{\neg P(x)\}\rangle$

3.4.2 Accommodation Effects in Intensional Contexts

The above reasoning rests on the assumption that the predicates *agree* and *refuse* do have anaphoric presuppositions associated with them. This, I think, is convincing enough on intuitive grounds, but there is additional evidence. Recall that we have used so-called accommodation effects, where we accommodate more than strictly necessary because we accommodate conditions on old referents rather than accommodate new referents, as a diagnostic of anaphoric presuppositions, where anaphoric presuppositions are, we may say, presuppositions with a nonempty universe. It is a hallmark of accommodation effects that indefinite descriptions are – in the presupposition – really used anaphorically.

(74) John admires Skah. Sue, too, admires an African runner.

A similar effect can be observed in connection with *agree*, *refuse* and other reactional predicates like *surprised*.

(75) John thinks that Skah is on the team. Sue agrees there is an African on the team, but doesn't think it's Skah.

(76) The other athletes want the manager to take on Skah, but he refuses to take on an African.

Although I admit I find these cases difficult to assess concisely, I think we are prepared to conclude that Sue believes that Skah is an African (or: Skah is an African) and that the manager believes that Skah is an African (or: Skah is an African). And it is plausible to hold the presuppositions of the predicates responsible. The problem is that these inferences will not be forthcoming if we construct presupposition and assertion in the straightforward, de dicto way:

presupposition: $\langle\{y\},\{believe(y,\langle\{z\},\{African(z), ontheteam(z)\}\rangle)\}\rangle$
presupposition: $\langle\{y\},\{ask(y,m,\lambda x\langle\{z\},\{African(z), takeon(x,z)\}\rangle)\}\rangle$

Rather, I believe the correct presuppositions are that there is someone y and someone z such that (Sue or the manager believes that) z is an African and y believes that z is on the team or y has requested the manager to take on z. That way, the inferences are available once z unifies with the referent for the proper name in the context. That is, we must read the indefinite NPs (semi) de re in the presupposition, but not in the assertion: It is asserted that Sue thinks there is an African on the team de dicto, and, probably, that the manager refuses* to take on an African de dicto.[8] I think that a complete and satisfactory description of these cases is a topic for research, along the lines of Irene Heim's (1992) work on presupposition projection in attitudes. I do believe, however, that the intuitions can be taken as a clue to the anaphoric nature of the presuppositions of the predicates.

3.4.3 Emotive Predicates and Factives

Zero anaphora occurs regularly with a number of past participle verb forms like *astonished*, *surprised*, *impressed*, *delighted*, *shocked*, *relieved*, *infuriated*. The syntactic category of the optional complement varies, but its semantic type is basically propositional.

(77) Sue told Joe that she was pregnant.
He was surprised that she was pregnant.

The fact that these past participles subcategorize for ia. a *that* clause indicate that they are not true passives. These verb forms show a number of properties distinguishing them from true passives in a range of languages. For instance, in German, the finite verb is not *werden* but *sein* and the preposition governing the *that* clause is not the regular agent phrase *von* but *über*. For ellipsis, the salient fact is that the proposition in the theme role is involved in the presupposition of the predicate. That Joe is surprised that Sue is pregnant presupposes that Joe learns that Sue is pregnant. Thus (simplified with respect to the pronouns):

context: $\langle\{s,j\},\{tell(s,j,\langle pregnant(s)\rangle)\}\rangle$
presupposition: $\langle\ \emptyset,\{learn(j,\langle pregnant(s)\rangle)\}\rangle$
assertion: $\langle\ \emptyset,\{surprised^*(j,\langle pregnant(s)\rangle)\}\rangle$

Now when the *that* clause is omitted, the double occurrence of the constant propositional referent $\langle pregnant(s)\rangle$ is replaced by a variable propositional referent K. The presupposition must be proper, so K is introduced in its universe.

(78) John was surprised.

presupposition: $\langle\{K\},\{learn(j,K)\}\rangle$
assertion: $\langle\ \emptyset,\{surprised^*(j,K)\}\rangle$

[8] Possibly, what the *refuse* case asserts is just that the manager refuses* to take on z where z is presupposed to be believed by him to be an African. Maybe it is relevant that the negative polarity item seems to make a difference: ..., *but he refuses to take on any African.*

This means that it must be mapped onto some propositional referent in the context. Strictly, there is none in the universe of the context, but it must, for independent reasons of abstract entity anaphora (cf Asher 1993), always be possible to declare one for a constant abstract entity referent occurring in a condition.

Even presuppositions which are not anaphoric in the narrow sense that the universe is nonempty can become anaphoric in this sense once the predicate generating them occurs with an empty argument. In fact, this is the case with factive predicates in case the propositional arguments are optional. In English, *know* can be used without an overt propositional complement, along with a range of other factive verbs and adjectives such as *forget*, *remind*, and *remember*, *notice*, and *aware*. Many have presuppositions over and above pure factivity; *forget* and *remember*, for instance, appear to presuppose in addition that the subject has known the proposition or other object, and *notice* appears to presuppose that the proposition or other object (not) noticed is epistemically accessible to the subject.

(79) Scrooge had buried a hoard of nuggets in a cache between four rocks in a square on a knoll at his claim on White Agony Creek, but he had **forgotten**.

Let us see how the zero argument of *know* acquires its anaphoric interpretation.

(80) It is not necessary to tell them the climb is dangerous. Sue **knows**.

presupposition: $\langle\{K\},\{K\}\rangle$
assertion: $\langle\{z\},\{Sue(z), believes(z,K)\}\rangle$

This looks strange, but it makes sense: The propositional variable K occurs in two different roles in the presupposition, both as a referent in the universe and as a condition, a variable subDRS encoding factuality. In the assertion it appears as a referent in a condition. As it appears, in English the factuality condition K is sufficient to justify the referent K in the universe of the presupposition, so that the argument can be suppressed. Now the verb *know* shows a zero anaphor more often when the 'antecedent' is a question than when it is a definite proposition, and then the factive presupposition is in effect analytic. This case is discussed in 3.5.

3.4.4 Phase Presuppositions

State transition verbs like *recover* and verb groups like *stop raining* have traditionally been analyzed in terms of a backward-looking presupposition and a forward-looking assertion, plus, as the case may be, some process of transition as part of the assertion. Thus *a recovers at t* would presuppose that a has been ill up to t and assert that a is well from t on, and that a process of recovery goes on at t. And *it stops raining at t* would presuppose that it rains some time up to t and assert that it does not rain some time from t on. Recall Heim's (1987) Kripke-inspired example

(17) John is cooking.
He will stop (cooking) when tomorrow's football game starts.

The accommodation effect here shows that it is reasonable to interpret the presupposition anaphorically. The state of John cooking lasting up to tomorrow's football game unifies with the state of John cooking now. The interesting thing to note now is that the state type verb *cooking* is enclosed in paranthesis in Heim's formulation. It is omissible, and in fact, its omission can be shown to be a case of zero anaphora via the backward-looking presupposition of *stop*.

Let us look at the analysis of the simple sentence

(81) It stops raining at t

in terms of a bipartite DRS structure:

presupposition:	$\langle\{s\},\{rain(s),s)(t\}\rangle$
assertion:	$\langle\ \emptyset,\{\neg\langle\{s\},\{rain(s),t)(s\}\rangle\}\rangle$

Then consider a case like

(82) It starts raining at t_1. It stops at t_2.

context:	$\langle\{s_1\},\{rain(s_1),t_1)(s_1\}\rangle$
presupposition:	$\langle\{s_2,P\},\{P(s_2),s_2)(t_2\}\rangle$
assertion:	$\langle\ \emptyset,\{\neg\langle\{s\},\{P(s),t_2)(s\}\rangle\}\rangle$

(disregarding the presupposition of the context sentence) where P is a discourse referent at state type level. This analysis should carry over to the discourse

(83) John is cooking. He will stop when tomorrow's football game starts.

The verb *return* describes a change of state insofar as it describes a change of location, and it presupposes the change of location in the opposite order. Consider

(84) That fall the King left Svearike for Gardarike. In spring he **returned**.

Although there may be doubt as to whether the King had Gardarike as his point of departure for his return journey (voyage?), at least the point of destination must be Svearike or some other original point of departure. A strict analysis:

context:	$\langle\{e,l_3,l_4\},\{Svearike(l_3),Gardarike(l_4),$ $travel(e,k,l_3,l_4)\}\rangle$
presupposition:	$\langle\{e_1,l_1,l_2\},\{went(e_1,k,l_1,l_2)\}\rangle$
assertion:	$\langle\{e_2\},\{went(e_2,k,l_2,l_1)\}\rangle$

It should be possible to predict the validity of the inference from (65) to (85):

(65) Don't you kids know it's dangerous to hypnotize people?
You might do it to somebody with a gullible mind sometime,
and that person would never **recover**!

(85) Don't you kids know it's dangerous to hypnotize people?
You might do it to somebody with a gullible mind sometime,
and that person would never **recover from the hypnosis**!

This is strongly reminiscent of a case treated by Kamp & Roßdeutscher (1992: 76), cited here in the English rendering:[9]

> "Our ultimate goal is to account for the validity of the following inference: [...]
> The tourist came down with typhoid.
> After three weeks he was well again. A doctor from Izmir cured him.
> Conclusion:
> The doctor cured him of typhoid."

They reach this goal only by invoking discourse (rhetorical) relations. Let us see how it can be reached with recourse only to anaphoric presuppositions. Simplifying the example and abstracting away from inessentials:[10]

(86) John contracts malaria at t. He recovers at t′.

context:	$\langle\{e,s,y\},\{ANT(HEILEN)(e,j,y), malaria(y), e\ at\ t, PRE(HEILEN)(s,j,y),e)(s\}\rangle$
assertion:	$\langle\{e',s',z\},\{HEILEN(e',j,z), e'\ at\ t', RES(HEILEN)(s',j,z),e')(s'\}\rangle$

The predicate *HEILEN* is primitive, and there are the meaning postulates

1. $s : PRE(C)(u,v) \Leftrightarrow s : \neg RES(C)(u,v)$,
2. $\langle\{e,u,v\},\{C(e,u,v)\}\rangle \Rightarrow \langle\{s\},\{PRE(C)(s,u,v)\}\rangle$ and
3. $PRE(ANT(C)) \equiv RES(C)$ and $RES(ANT(C)) \equiv PRE(C)$.

By postulate 2, the precondition state, intuitively the state of having that from which the *HEILEN* event is a recovery, can be added to the assertion:

assertion:	$\langle\{e',s',z,s''\},\{HEILEN(e',j,z), e'\ at\ t', RES(HEILEN)(s',j,z),e')(s', PRE(HEILEN)(s'',j,z),s'')(e'\}\rangle$

Thus Kamp & Roßdeutscher do not treat the precondition as a presupposition. However, if it is treated as one, we can conclude (87) from (86):

presupposition:	$\langle\{s'',z\},\{PRE(HEILEN)(s'',j,z),s'')(e'\}\rangle$
assertion:	$\langle\{e',s'\},\{HEILEN(e',j,z), e'\ at\ t', RES(HEILEN)(s',j,z),e')(s\}\rangle$,

(87) John contracts malaria at t. He recovers from the malaria at t′.

[9] The German version has *Der Arzt hat ihn vom Typhus geheilt* as the conclusion, that is, with the definite article, corresponding to *the typhoid.*

[10] It should be noted that the framework adopted by Kamp & Roßdeutscher is rather original: They take the transition as basic and derive the states from them, and a typhoid, say, or a malaria, or a hypnosis, is taken to be an individual; typhoid is a set of individuals. To make the analysis conform to the analysis of *stop* above, it seems reasonable to treat a typhoid as a (pair of an individual and a) (maximal) state and typhoid as a set of (pairs of individuals and) (maximal) states.

For now, the precondition state s'' is mapped onto the result state of the *ANT*(*HEILEN*) event and the referent z for the illness is mapped onto the referent y for the malaria. The representation of the sentence *he recovers from the malaria* would be

presupposition: $\langle\{s'', z\}, \{malaria(z), PRE(HEILEN)(s'', j, z), s'')(e'\}\rangle$
assertion: same as above

Manfred Pinkal (1985: 76) noted that the German verb *verkaufen* (*sell*) shows indefinite ellipsis in its indirect (*an* or dative) object but definite ellipsis in its direct (accusative) object, as witnessed by:

(88) Kolumbus hat an Cortez verkauft.
(89) Kolumbus hat die Santa Maria verkauft.

The former sentence can only mean that Columbus has sold it to Cortez, while the latter sentence can only mean that Columbus has sold the Santa Maria to somebody. This asymmetry is prima facie mysterious. But note that the zero theme argument cannot be a zero anaphor with the same antecedence and accessibility conditions as the anaphor *it*:

(90) Cortez hat ein Schiff. Kolumbus hat es ihm / an ihn verkauft.
(91) ? Cortez hat ein Schiff. Kolumbus hat ihm / an ihn verkauft.

Although the antecedent is available in the form of the indefinite *ein Schiff*, the zero anaphor is not resolved. This is indicative of a presupposition, and in fact, on the reasonable assumption that x *verkauft* y *an* z presupposes that x has had y, both the definite interpretation of the direct object zero argument and the indefinite interpretation of the indirect object zero argument are predicted, since the presupposition involves the former but not the latter.

3.5 Problems

The account of argument ellipsis developed in the previous sections can be summed up in a bidirectional implication: Ellipsis is definite iff there is a presupposition involving the argument. This principle rests on two general principles of DRS construction:

Principle 1

A referent occurring in a condition in the presupposition DRS is in the universe of the presupposition DRS; the presupposition DRS is proper.

Principle 2

A referent not occurring in a condition in the presupposition DRS is only in the universe of the presupposition DRS if it originates in an overt anaphor.

Principle 1 ensures that ellipsis is definite if there is a presupposition involving the argument, and Principle 2 ensures that ellipsis is definite only if there is a presupposition involving the argument. To see the latter, recall that on the general picture outlined in section 2, basically van der Sandt's general anaphoric account of presupposition, the only way for a referent to be anaphoric is for it to be in the universe of the presupposition DRS. A referent is anaphoric if and only if it is introduced in the presupposition DRS.

Now both principles are problematic. First, it is unreasonable to require that the presupposition DRS is proper without qualifications. It is necessary to allow for bound variables. This is closely related to another problem: It is predicted that an argument involved in a presupposition cannot be realized as an indefinite description, because if the corresponding referent is introduced in the presupposition this conflicts with the novelty interpretation of the indefinite; yet we find cases where apparently, an indefinite description realizes a presupposed argument. Both problems are solved at once if we assign indefinite descriptions wide scope and let the presupposition and assertion structures contain variables bound in a structure processed prior to presupposition verification. These matters are discussed in 3.5.1.

Second, the other direction of the implication, saying that a zero anaphor depends on a nonempty presupposition, is open to counterexamples. It should not be possible to find a verb with definite ellipsis without being able to formulate a plausible presupposition going with it. Now it should not come as a surprise that many presuppositions will be too vague to formulate in words in a convincing way. After all, they are not meant to be verbalized. But at a minimum, it should be possible to find cases where the presupposition, if there is one, fails even though the relevant referent – a suitable antecedent – is available in the context. And the presupposition and the definiteness of the ellipsis should be persistent across contexts; there should not be verbs where the ellipsis is sometimes definite and sometimes indefinite. I discuss some problematic cases in 3.5.2, and in 3.5.3 I discuss whether it is necessary and possible to describe zero anaphoric arguments of relational nouns, specifically in 'bridging' definite descriptions, in terms of presuppositions.

3.5.1 Presuppositions at Subsentential Level

At first sight, cases like the following would seem to contradict the assumption that the predicates *recover* and *shocked* trigger anaphoric presuppositions involving the state type to recover from and the proposition to be shocked at:

(92) John has just recovered from a serious illness.
(93) John is shocked at something he has heard on the radio.

The indefinite article signals novelty, and novelty is incompatible with the anaphoric presupposition. To be more specific, novelty in a discourse referent an argument of some condition in the presupposition conflicts with the requirement that such a referent be in the universe of the presupposition and thus anaphoric, or familiar. But these cases are reminiscent of cases like the following.

(94) John has written to the author of a book about Schubert.

(95) For hundreds of years, the evidence available consisted of (1) the captain's fragmentary journal, (2) a highly prejudiced account by one of the survivors, (3) a note found in **a dead man's desk** on board, and (4) several second-hand reports.

That is, cases where, contrary to Heim's (1982: 373ff) linking hypothesis, a new file card is introduced under accommodation without being linked by cross-references to some already-present file card(s). Evidently, the indefinite outscopes the definite. The assertion consists of two parts: First, there is a book y about Schubert, and second, John has written to z; and the presupposition is that there is an author z of y. In this way, the sentence is a self-contained unit in the sense that the referent y in the presupposition is bound in a part of the assertion which is processed in advance. To see more clearly that this is a sensible description, consider

(96) John knew the crew on every ship in the harbour.

In her 1983 paper, Heim analyzes

(97) Every nation cherishes its king.

as a tripartite structure: First, the quantifier 'every nation x_i', then the presupposition 'x_i has a king', and then the associated assertion, also containing the variable x_i, which is free here and in the presupposition, but of course bound in the quantifier, which is added to the context first, creating a new local context for the presupposition. There are other cases than quantificational structures, too, where it is too simple to identify the carrier sentence of the presupposition as the entire incoming sentence:

(42) John loves a woman who also loves a woman.

Here, the carrier sentence is the relative clause and the presupposition is 'there is a $y \neq z$ such that y loves a woman u' where z is free but bound in the superordinate clause, which serves as a local context for the presupposition. And with predicates which supposedly trigger anaphoric presuppositions, we also find true quantifiers as optional complements:

(98) John is shocked at something he has heard on the radio; but then, John is shocked at most things he hears these days.
(99) John refuses to do everything he is asked to.

The reasonable approach to these cases as well as the cases with an indefinite description in the relevant position is, then, to dissect the incoming sentence into three parts, that is, to identify some proper part of it as the carrier sentence, thus letting the presupposition and the assertion contain a variable bound in the part of the sentence updating the context prior to presupposition verification. The sentences will presuppose nothing because the presupposition is, so to speak, preempted in the indefinite description or (other) quantifier processed first. The sentence (93) will be analyzed as 'there is something K John has heard on the radio such that: **presupposition:** John has learnt of K; **assertion:** John is shocked* at K'.

What this shows is that we must qualify the principle that the presupposition must be proper. The presupposition DRS must be allowed to contain free occurrences of discourse referents as long as literally the same referents are present in a part of the context DRS representing material in the same sentence.

3.5.2 Elusive Presuppositions

The basically empirical claim that zero anaphora presupposes a presupposition is, of course, vulnerable to facts; and it may just be that it must be abandoned in favor of the weaker hypothesis: If there is a presupposition the zero element will be anaphoric. But this basically theoretical claim loses in explanatory power if it has to stand alone. Even if, as I believe, the presupposition accounts for the bulk of clear cases, eventual counterexamples will have to be explained in another way. So as far as possible, we should try to show that there is a presupposition involved even if it is difficult to identify. Let me comment on a few problem cases representative of subtle presuppositions. As a minimum test for the presupposition, there should be contexts where resolution of the zero anaphor fails even though the antecedent is available, because it isn't available in the right environment (= presupposition).

Consider first a class of predicates identifiable from Shopen's list, describing how agents are ascribed to events, like *suspect (of)*, along with *blame (for)*, *charge (with)* and, in a wider sense, *(hold) responsible (for)*.

(100) A bomb has exploded inside one of the ancient tombs, injuring two workers but causing no damage. Muslim extremists are **suspected**.

At first, it seems obvious that the allocation of responsibility is secondary to the fact, so to speak; which is to say that a sentence with the verb *suspect* presupposes that the property that the subject suspects the direct object of holds of somebody, or involves an actual event. Thus

(101) The police suspect the mafia of having placed the bomb.

would presuppose that the bomb has been placed.[11] However, this presupposition is difficult to maintain in cases like the following.

(102) The press suspects the coaches of having rigged the match.
(103) The police suspect the accountant of tampering with the books.

These two examples do not appear to presuppose that the match has been rigged or that the books are tampered with, nor that the press or the police believe so; they assert that the press believes that the coaches have rigged the match and that the police believe that the accountant tampers with the books. I believe that these sentences have in principle two readings, one presuppositional and one non-presuppositional. By comparison, the verb *blame* appears to only permit a presuppositional reading. To see the difference clearly, consider a case where both readings are equally possible:

[11]Really, due to the intensional character of the verb *suspect* it does not necessarily presuppose more than that the police believe the bomb has been placed, as evident from *The police believe the fire was started by somebody, suspecting Neonazis.* This should be predictable from the general account of presuppositions in attitudes in Heim 1992.

(103) The police suspect Neonazis of having started the fire.

Heavy stress on *started* correlates with the non-presuppositional reading, light stress on *started* correlates with the presuppositional reading. Evidently, the zero argument construction is based on the presuppositional reading. This is not much of an explanation, but it is all I have to offer at present. An alternative analysis of the non-presuppositional cases could consist in invoking the mechanism from the last subsection to say that the description of the property, the *of* complement, is processed first, in the appropriate belief context, thus restoring the presuppositional reading:

(104) The police believe the fire was started by somebody and suspect Neonazis of having started it.

Still another option could consist in interpreting the selectional restriction that the action is immoral as a presupposition.

The verb *result* as occurring in the following sequence also poses a problem:

(105) T ran off the road and hit a lamppost. A damage of 500 DM resulted.

To defend a presuppositional analysis of the zero anaphor, a presupposition must be attributed to the verb; something like: There is a prior event capable of producing the described eventuality. However, there is scarce independent evidence for such a presupposition. The following is a perfectly natural sequence:

(106) A damage of 500 DM resulted from a car accident yesterday.

To salvage the presuppositional account, the mechanism from the last subsection must be invoked: The indefinite description of the cause event is processed prior to the rest sentence. But this appears as a stipulation.

A causal statement is usually assumed to consist of three conjuncts: The cause proposition, the result proposition, and the causal connection between them (cf Sæbø 1991). Normally, intonation serves to identify either the cause proposition or the result proposition as a presupposition. Interestingly, the verb *result* occurs in two different variants, with a *from* complement as above or with an *in* complement, and only the *from* complement is optional:

(107) A car accident resulted *(in the damage of 500 DM).

This may be taken as a sign that this verb selects the cause proposition as a presupposition.

Consider now a family of verbs of information elicitation, possession, and transfer: *ask*, *know*, and *tell*. The verb *ask* can reasonably be assumed to presuppose that the asker does not know the answer to the question, maybe even that she wants to know it:

(63) We were wondering which track to take to Goatteluobal,
so we asked a Lap woman, but she didn't know.

In this way, the argument is involved in the presupposition, and when it is zero, it is introduced in the presupposition.

The verb *know* as occurring with a zero question is somewhat problematic, because the factive presupposition is in effect a tautology:

(108) John will know whether there are wolves in the forest.

presupposes that there are wolves in the forest if there are in fact wolves in the forest and that there aren't wolves in the forest otherwise. The reason is that the question denotes a different proposition from world to world, but always a true one; and such a presupposition could not be anaphoric, as any context will entail it. Thus it cannot be the fact itself which is a zero anaphor; rather, it must be a propositional concept referent involved in some more comprehensive presupposition. This greater presupposition is difficult to formulate in precise terms. In the ideal case, the question has been posed, as in (63). But in many cases, it seems to suffice that somebody wants to know the answer.

(109) It was reported to Welch's office that a thief in the city jail had attempted suicide. Welch wanted to know why. No one **knew**.

It seems correct to say that the presupposition with *know* at question level is that someone wonders wh....

Interestingly, the verb *tell*, which is probably not inherently factive, appears to acquire a factive interpretation when it is used with a zero propositional argument:

(110) John believes that Susan is pregnant. She has told him so / that.
(111) John ?believes / knows that Susan is pregnant. She has told him.

This indicates that the zero argument itself helps bring about the presupposition necessary to propel it into anaphoric position. I am told the same holds for the German verb *gestehen* ('confess').

In German, there seems to be a minimal pair of two verbs which otherwise mean the same but differ in the definiteness of the ellipsis: *telefonieren* (with a *mit* complement) and *anrufen* (with a *bei* or an accusative complement).[12] It is my impression that the definiteness of the zero argument is only apparently the only distinctive property of *anrufen* and that there is here a presupposition to the effect that the referent of the complement possesses information interesting or relevant to the subject referent. Compare the following felicitous sequence:

(112) Otto hat vergessen, wann ihn Anna erwartet. Er ruft gerade an.
('Otto has forgotten when Anna is expecting him. He is just calling')

to the following less felicitous sequence:

(113) ?Anna hat jetzt ein Telefon zu Hause. Otto hat schon angerufen.
('Anna has a telephone at home now. Otto has already called')

[12]Ede Zimmermann brought this to my attention.

Note that even in (113), a suitable antecedent is accessible, but unless we accommodate a suitable context we have difficulty finding it. However, the following sequence is quite felicitous, so again, the presupposition is evidently dependent on the zero argument, and this, of course, complicates the analysis.

Anna hat jetzt ein Telefon zu Hause. Otto hat schon bei ihr angerufen.
('Anna has a telephone at home now. Otto has already called her')

Another problem is that there are verbs which seem to be ambivalent between indefinite and definite ellipsis. The verb *wait* is a case in point. Apparently, when the context entails that something is due to arrive or to happen, as in the following two examples, the ellipsis is definite:

(114) I have to go now. My family is waiting (for ?somebody).
(115) There was no news yet. Everybody was waiting in suspense.

But if this is a presupposition of the verb, it is easily suspended:

(116) He sat down and waited.
And soon, what he was waiting for was brought to his room.
(117) The soldiers were squatting on the ground waiting –
for what, they had no idea.

Of course it is circular to say that if the presupposition is verified, it is there, otherwise it is not. Such cases, however, suggest taking a closer look at standard cases of indefinite ellipsis. It appears that here, too, the interpretation is not always correctly rendered by substituting an indefinite pronoun:

(118) Joe hadn't heard from Sue for months when suddenly,
he received a letter (from ?somebody).
(119) He handed her a double scotch.
She took it and drank (?something) greedily.

An indefinite pronoun, in general, an indefinite description, signals a strong form of novelty: It is necessary in the former case to read *somebody* as 'somebody other than Sue'. I think it is possible to maintain that verbs like *wait* have no presupposition and show indefinite ellipsis, even though an explicit indefinite would make a difference. Relevance considerations may lead to a pragmatic identification of the nonanaphoric referent with a familiar referent, independently of the semantic representation.

To be sure, there are, in addition to the problems left open in this section, several cases of implicit anaphora remaining problematic on the account I have proposed; notably implicitly anaphoric adverbials like *2 hours later* and *50 miles away*, elliptic comparatives in general, implicitly deictic words like *approach*, *come*, *go*, and *fetch* (not, however, *take* and *bring*), and words like *enemy*, where positing a presupposition seems a pure stipulation. It may ultimately turn out that some instances of zero argument anaphora are not presuppositionally but inferentially driven, depending on relevance considerations. Quite possibly, we have to take into account that there are cases of ellipsis where the anaphoricity is due to the fact that the indefinite interpretation is not informative enough.

3.5.3 Nouns and Zero Arguments

From the literature on definite descriptions (Hawkins (1978), Löbner (1987) etc) it is well known that relational nouns show definite ellipsis with the definite article; that is, two-place nouns form definite descriptions with zero possessive or prepositional complements interpreted as zero anaphors. This is the phenomenon known as bridging:

> The author, the captain, the driver, the capital (singular; functional)
> The employees, the passengers, the members (plural; relational)

The question is whether this definite ellipsis subsumes under the definite ellipsis of presupposition triggering verbs. Is it reasonable to suppose that the nouns in question trigger presuppositions involving the argument referent? Such a presupposition for *driver* might be that there is some vehicle, that is, that the function denoted by *driver* is defined; but this presupposition is so insubstantial that the argument risks circularity. Note that as long as the noun phrases are definite, it is not necessary to assume a presupposition for an anaphoric interpretation of the zero argument; given the presuppositional analysis of definite descriptions in general, the zero argument referent is in the presupposition. The 'ellipsis rule' stated by Zimmermann (1991: 199) (if α is a relational noun and $\emptyset$ an empty genitive NP the extension of $\alpha\emptyset$ is the set of x such that (x, y) is in the extension of α where y is relevant in the utterance situation) is redundant as far as anaphoric definite descriptions are concerned. And in fact, as Zimmermann notes, there is in principle the possibility of an indefinite interpretation, when the definite article is replaced by the indefinite:

> An author, a captain, a driver, a capital.

However, there will be reason to assume a presupposition if a relational noun shows definite ellipsis as an indefinite. This case manifests itself:

(120) In the night of the American bombardment, Anna Braun, a **survivor**, and her mother, a **victim**, were asleep in their beds.
(121) It will be difficult to find a **substitute**.
(122) There were two **witnesses**.

The nomina agentis among these nouns tend to inherit the definite ellipsis from the verbs from which they are derived, but *victim* and *witness* may be genuine cases of nouns with zero anaphora due to a presupposition, like: There is some event to be characterized as an accident, an attack, or a calamity; a crime, or the like.

4 Conclusions

In a nutshell, I have tried to describe implicit anaphors not as anaphors in their own right but simply as variables accidentally occurring in an anaphoric presupposition. If the strong hypothesis can be maintained that a zero argument is anaphoric if and only if it partakes in a presupposition, this amounts to a sketch of a theory of null anaphora.

At the outset there are the contours of a theory of anaphoric presuppositions, ranging from narrow-scope proposals by Heim (1982) and Kamp & Roßdeutscher (1992) to a wide-scope proposal by Heim (1983) and the general picture offered by van der Sandt (1992) of presuppositions as anaphora. Although work remains to be done on the demarcation of verification and accommodation, the proposed definitions go a long way towards explaining the anaphoric nature of existential presuppositions and, inasmuch as binding has priority over accommodation in van der Sandt's resolution and by virtue of Kamp's & Roßdeutscher's principle of the primacy of referents in justification, accommodation effects, the observations due to Kripke and discussed by Soames (1989) and Heim (1987).

Now what I have tried to do is not simply apply this model of presuppositions to phenomena not hitherto described from this angle, namely, lexical presuppositions, explaining anaphoric requirements and accommodation effects here, but also to cover an anaphoric phenomenon not recognized as presupposition, and rightly not so, but occurring in conjunction with presupposition, namely, zero anaphora. Unless the connection between definite ellipsis and presupposition hinted at by Shopen (1973: 68) is appreciated, zero anaphora will count as another species of anaphora, and overt anaphors, such as pronouns, are presuppositional in themselves on a theory like van der Sandt's in that they induce referents in the presuppositional part of the representation of the incoming sentence. However, if the presuppositions of the lexical heads are taken seriously, the zero anaphors reduce to argument positions, so to speak; to referents required in the argument structure of the corresponding predicate, and via general properness principles, in particular prohibiting free occurrences in the presupposition, the referents surface in the DRS position of anaphora, in the universe of the presupposition. Thus implicit anaphors come out as truly implicit in that they do not come with an instruction to find an antecedent, instead, such an instruction comes about indirectly through the presupposition of which they form part. In this way, it is not necessary to notate the anaphoricity of certain zero arguments as opposed to others.

Another advantage of this account is that it allows a uniform treatment of null anaphors which have no overt anaphor counterpart because the verb simply has no syntactic argument place to provide. Partee (1991) notes that "not all dependent elements take complements or otherwise offer a 'site' for a 'null pronoun'", as evidence against regarding (primarily deictic) null elements as concealed pronouns. The present account draws a sharp distinction between zero and overt anaphors, and this accords well with cases where it is not possible to substitute an overt anaphor. A clear example is the German verb *nachdrängen* (approximately two-place *replace* with an optional complement) as in

(123) Wenn die persische Produktion für uns ausfällt,
dann drängt Öl aus anderen Bezugsquellen nach.
('If the Iranian supply comes to a halt,
then oil from other sources will replace it.')

This verb takes no complement, but semantically, it is two-place, and the second argument is invariably anaphoric. The anaphoricity comes about through the presupposition of $nachdrängen(x, y)$: y goes away.[13]

The account is crucially supported by two phenomena connected to familiar triggers of anaphoric presuppositions: *too* and *the*. First, accommodation effects in connection with *too* show that the anaphoricity of a presupposition can affect other referents than the primary referent, the one predictable on the basis of the general structure of the presupposition. Recall:

(124) Sue respects Sten. Joe, too, respects a Swede.

In principle, it appears, any referent of the presupposition is anaphoric, which is to say that it belongs to the universe of the presupposition. Second, definite descriptions demonstrate the technique of propagating an instantiated variable - in DRT terms, a substituted discourse referent - through the presupposition to the assertion. The provisional assertion DRS coming from a sentence with an anaphoric definite description is improper, it contains a free occurrence of a discourse referent introduced in the presupposition DRS. When this referent is mapped onto some referent in the context DRS, this latter referent carries over to the assertion DRS.

The analysis of the sentence *Sue agrees* draws on both of these properties: The presupposition is formulated as something like 'there is somebody z other than Sue and there is some proposition K such that z believes K', that is, both z and K are introduced in the presupposition; and the assertion is formulated as something like 'Sue believes K', that is, K is free here. Once K is mapped onto some previously mentioned proposition K', K' replaces K in the update.

Together, the definition of presupposition verification, the principle that a presupposition is proper, and the principle that only an overt anaphor is capable of inducing a discourse referent in the presupposition jointly imply the hypothesis that an omissible argument is anaphoric when omitted if and only if it is involved in a presupposition. If the second principle is omitted, only the weaker hypothesis that an omissible argument is anaphoric when omitted if it is involved in a presupposition is implied. The second principle does not hold, of course, for VP ellipsis (independently of focus particles), gapping, and elliptical response. And it is a question whether it is too strong for some cases of zero argument anaphora as well, notably elliptic comparatives and implicitly deictic words like *approach* and *enemy*.

I do not claim that every form of (definite) ellipsis is presuppositionally conditioned, but I do claim that zero anaphors connected to lexical heads, primarily verbs, are – typically or generally – presuppositionally conditioned. In its weak form, this claim is theoretical: Given a framework of anaphoric presupposition in a dynamic theory like DRT and a couple of simple principles governing provisional DRS construction, it follows that zero arguments of presupposition generating expressions are anaphoric, and this mechanism can be

[13]An English verb with a similar semantics but with a syntactic argument for the corresponding semantic argument is three-place *substitute*: *If the Iranian supply comes to a halt, Germany will substitute oil from other sources.*

shown to account for a considerable subset of zero anaphors. In the strong version, the claim is empirical, predicting that every case of zero anaphora is dependent on an independently motivated presupposition. Here as elsewhere, there are a number of clear cases, but also quite a few less clear cases where the presupposition is subtle, vague and difficult to specify. I have tried to show how in some problematic cases, a case can be made for a presupposition after all. But I leave the possibility open, for future research, that there are cases where positing a presupposition is a mere stipulation and leads to circularity, so that the presuppositional explanation of zero anaphora must ultimately be supplemented by some other principle.

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