Presuppositions
in Spoken Discourse

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Abstract

Naturally produced examples of presuppositions in the London-Lund Corpus of Spoken English are analyzed using the binding theory of presupposition (van der Sandt 1992), which treats presupposed and anaphoric information in the same way. Presupposed information is either bound to a discourse-given antecedent for its interpretation or creates its own antecedent via accommodation.

The corpus data suggests that bound presuppositional expressions are used and perceived similarly to discourse anaphors. Additionally, due to their richer descriptive content, presuppositional expressions referring to abstract objects can fulfill more discourse functions than their anaphoric alternatives, contributing rhetorical effect, referring more precisely to discourse-given information, making conclusions explicit, and serving a summarizing function. These results lend further support to the treatment of presupposed information as anaphoric and confirm the need for a binding analogy to explain their usage in extended discourse.

The corpus data also contains naturally produced examples of presupposition accommodation, which provides an empirical base for the discussion of several theoretical proposals related to the phenomena. Factive presuppositions are overwhelmingly used to communicate information believed to be hearer-new. Previous accounts of what licenses accommodation cannot be applied satisfactorily across the board, and the data does not entirely confirm the proposed preference for higher levels of accommodation. Based on the data, it is instead proposed that preferences for accommodation at a certain level may be dependent on embedding and trigger type.

Finally, presuppositions strongly related to the context but still new cannot easily be analyzed as binding or accommodation. Typical cases are so-called bridging NPs, which are normally treated as dependent for their interpretation on a unique anchor. However, as the corpus data shows, multiple anchors may be available. Also, consistently applying current definitions of bridging to examples within a rich context generates too many bridging relationships relative to interpreters' intuitions. I suggest treating such cases as licensed by the context rather than by a single anchor, and furthermore, considering as bridging NPs only those that 1) introduce a new individual in the discourse 2) are related to the context through some type of inference and 3) are marked as anaphoric. The result is a more homogeneous group treatable by a single method and is more motivated on semantic grounds.

Key words: presuppositions, anaphors, spoken discourse, corpus study, binding, accommodation

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1 Introduction

Presupposition is a central topic in semantics and pragmatics. Even so, we know much more about presupposition in theory than in practice. The ideas put forward in this work are intended to begin narrowing this gap by examining how presupposed information is used by speakers and understood by hearers in spontaneous spoken discourse. The interpretation of presupposed information is context dependent. Examples excerpted from a corpus therefore give us a naturally produced context in which to examine and begin to understand the role of context in presupposition resolution.

There are two main themes in this work. The first is the idea that presuppositions can be interpreted like anaphors. This is the central claim of the binding theory of presupposition (van der Sandt 1992), the theory used here to analyze the corpus data. Presupposed information is either bound to a discourse-given antecedent for its interpretation or it creates its own antecedent via accommodation. The binding theory is sufficiently functional to use to analyze the naturally produced presuppositions in the corpus and the results obtained seem to reflect accurately the understanding of this information by the discourse participants. All the same, there are several differences between pronominal anaphora and presupposition that indicate the greater versatility and functionality of presuppositional expressions.

The second major theme of this work is that the behavior of presupposed information differs according to the triggering expression and the semantic type of the presupposed material. The major difference exists between triggers that presuppose semantically abstract objects, e.g. factives, aspectual verbs, *it*-clefts and *too,* and triggers which tend to presuppose semantically concrete individuals, e.g. definite noun phrases (definite NPs). But even within these groups, trigger type greatly influences differences in how the presupposed information is related to the context. These differences are incompletely treated in most current theoretical

work about presupposition, which has focused on the similarities between triggered presuppositions rather than their potential differences.

I will argue that the corpus data shows that abstract presuppositions seem to be used and perceived by discourse participants in a manner similar to discourse anaphora. I will present cases where the use of presupposed information shares many of the characteristics identified as typical of discourse anaphora. Even in cases where a resolution by binding or a resolution by accommodation would not make a perceivable truth-conditional difference, discourse participants do seem to perceive bound presuppositions similarly to anaphoric expressions.

Additionally, bound abstract presuppositions have a discourse function in addition to their semantic function when they occur naturally produced in context. In cases where the presuppositional expression could have been replaced with a pronominal anaphor, and where the semantic contribution would have been the same, I maintain that an abstract presuppositional expression can have additional communicative utility, either by more precisely referring to an abstract idea present in the earlier context, or by contributing rhetorical effect by emphasizing a feeling of parallelism or contrast. Presuppositional expressions can also help to summarize more precisely information referred to in the discourse and help make implicit conclusions explicit. These are all functions that pronominal anaphor cannot serve or do not serve as well.

The corpus results do not yield evidence that a hierarchical discourse structure constrains the search for antecedents for presupposed information as has been suggested for anaphoric expressions. Presupposed information seems to be able to be used in a freer manner, perhaps because of its greater descriptive content.

The binding theory considers presupposed information to differ from empty anaphoric information such as pronominal anaphors in one important respect: a presuppositional expression can create its own antecedent if the discourse does not provide one via the process of accommodation. The status of accommodated information, when it is used, why it is used, what licenses it, and preferences for its interpretation, is not clear. Most work on accommodation is highly theoretical. Our understanding of accommodation therefore would benefit from looking at naturally produced examples and here I hope to make a contribution.

There is a general misconception that presupposed information will be shared information. However, in the corpus, the majority of the presuppositions triggered by factive verbs that needed to be accommodated were believed by the speaker to be new to the hearer. Often the point of the utterance was the presupposed information. This confirms earlier empirical observations that other presupposition triggers, in particular *it*-clefts (Prince 1978, Delin 1995) and definite descriptions (Fraurud 1990, Poesio & Vieira 1998) can intentionally contribute hearer-new information.

We still know little about what factors make it possible to understand accommodated information, and what affects the speaker's choice of an expression that must be accommodated. I will argue that neither of the two explanations for

what licenses accommodation adequately explains the differences in ability to accommodate between traditional anaphors and presuppositions, the differences in ease of accommodation between trigger types, and the different tendencies to be accommodated found in the corpus data. The proposal from van der Sandt (1992) is that descriptive content licenses accommodation. This explanation is in contrast to the bidirectional optimality based explanation of Zeevat (1999, to appear) and Blutner (2000), who argue that expression alternatives that do not need accommodation will prevent the use of expressions that need to be accommodated. Neither explanation can be easily applied to the data, in part because the basic concepts upon which the explanations are built are not defined well enough that their predictions can be evaluated. Additionally, the degree to which the information to be accommodated is linked to the context seems to play a role in the felicitousness of the resulting interpretation, and this type of linking seems to be frequent in corpus examples.

It is generally believed that higher levels of accommodation will be preferred to lower ones (Heim 1983, van der Sandt 1992). The corpus results are conflicting as to whether or not there is a general preference. Factive presuppositions were the exception, and were accommodated locally as often as globally. The explanations found in the literature for the proposed preference are not convincing.

I will suggest that the tendency with which particular triggers occur under embedding and tendency with which they project out when triggered under embedding is influenced by the type of embedding and the type of trigger. First, not all types of logical operators that create embeddings are the same. In particular, negation seems to be quite different when compared to operators that signal hypothetical contexts such as *if* and modals. Second, the semantic type of the triggered presupposition and the discourse role that the presuppositions induced by certain triggers can have when accommodated, in particular the ability to use the presupposed information as the focus of the utterance, seem to play an important role.

The binding theory of presupposition distinguishes between two main uses of presupposition, but some presuppositions fall into neither category. A clear case is bridging examples. These are definite NPs that introduce a new referent into the discourse that is clearly strongly related to other individuals already in the context.

Normally bridging NPs are treated as having one anchor that licenses their use in the discourse. The corpus examples of definite NPs found in spoken language discourse presented here, as well as other annotation studies on written discourse, all suggest that in cases of bridging we frequently find multiple anchors Additionally, the consistent application of current definitions of bridging to examples within a rich context such as a corpus will overgenerate the number of relationships treated as bridging, compared to the number of relationships perceived by annotators. Current proposals for handling bridging need to be modified to allow multiple anchors, in effect treating these anaphors as licensed by the context in which they occur, rather than by one semantic individual.

There are three core characteristics that bridging anaphora are generally associated with and can be used to delimit the examples we treat as bridging. Briefly, they should 1) add a new semantic individual, 2) be related to the context through some type of inference and 3) be marked as anaphoric. This specification streamlines the set of relationships identified as bridging, and removes some subgroups, such as pronouns and co-referential NPs that are better treated by different means. The resulting group is more homogeneous and can potentially be handled by the same method. I will argue that we need to modify the binding theory to correctly analyze these examples by adding an additional category for their resolution, so that we end up with three resolution strategies, binding, *bridging*, and accommodation.

The rest of the thesis is organized as follows. **Chapter 2** introduces the concept of presupposition with examples, followed by a historical overview. After this, the binding theory of presupposition (van der Sandt 1992) is presented along with an introduction to its competitor, the satisfaction theory. Finally, I will describe some extensions of, and variations upon the binding theory that are referred to later in the thesis. **Chapter 3** presents some of the advantages in using corpus data, especially spoken data, for analyzing presuppositions. Here I also briefly introduce the corpus, how it was analyzed as well as what could not be taken into account in the analysis.

Chapter 4 looks at bound presuppositions in relation to the claim that presuppositions are anaphors. Here, I examine examples from the corpus to see if they display the behavior typical of discourse anaphora.

Chapter 5 discusses the more theoretical claims having to do with presupposition accommodation in relation to the corpus results. **Chapter 6** focuses on definite NPs, especially on bridging NPs, NPs whose referents are discourse-new, but are strongly related to other information in the discourse.

Finally, **chapter 7** draws some general conclusions about the results presented in the earlier chapters, comments on the implications of the results and conclusions in the previous chapter to our understanding of presupposition and discourse. I will also give some ideas for future work, which might be able to answer some of the questions brought up which could only be briefly mentioned in this work.

2 Approaches to Presupposition

This chapter reviews the main points of agreement and disagreement among several of the current theories on presupposition touched upon in this work. Competing approaches to presupposition have yielded different answers to questions such as, what are presuppositions and how can they be analyzed so that they reflect our intuitions about their interpretation? Are they anaphoric? Are they contextual requirements that must be satisfied or are they something else? A discussion of such questions helps put this work into context and constitutes a foundation for the new ideas presented within it.

2.1 introduces the notion of presupposition and shows some of the types of lexical and syntactic structures associated with this type of information. How presupposed information can be identified is also presented by introducing some well-known tests. These tests are then illustrated with the presupposition triggers that were chosen for the corpus work presented later.

2.2 presents a historical background and briefly outlines several of the early theories of presupposition. In 2.3, the binding theory of presupposition (van der Sandt 1992) is introduced. This theory treats presupposed information as anaphoric. How the theory works is illustrated with some simple made-up examples and its two basic resolution strategies are presented, binding and accommodation. This is the theory that will be used in the analysis of the corpus examples. The main competitor to binding theory is the satisfaction theory, which is presented in 2.4. It has a different conceptual view of presuppositions, treating them as constraints on contextual updates. Here it will also be argued that the binding theory and the framework it is an extension of, Discourse Representation Theory (DRT), is a more intuitive choice for analyzing naturally produced examples in unrestricted dialogue.

2.5 briefly outlines several variations of the binding theory that are quite important. These include Zeevat's (1992) version, a proposal for treating presuppositions within Segmented Discourse Representation Theory (SDRT) by Asher & Lascarides (1998b) and finally, recent proposals by Blutner (2000) and Zeevat (1999, to appear) that use a Bidirectional Optimality Theory (Bi-OT) framework. Each of these proposals is closely related to the binding theory and they have all been devised to deal with what they see as shortcomings or omissions in the original formulation of the theory. Because the rest of this work will discuss some of the same problems in relation to the corpus data as well as the solutions proposed by these other proposals, it is helpful to have a basic understanding of their points of view and the ways in which they have modified or extended the original binding theory.

2.1   HOW DO WE IDENTIFY PRESUPPOSITIONS?

Presuppositions are a special kind of information associated or induced by certain lexical items and syntactic structures. Consider the following example.

(1)   <u>Julia's bicycle</u> is new. She is <u>glad</u> that it is red.

This example has two presupposition triggering structures, *Julia's bicycle* and *glad that p*. The first is a possessive noun phrase, that triggers the presupposition that Julia has a bicycle. The second is a factive adjective with a sentential object complement, and it presupposes the truth of its sentential complement, i.e. in this case that the bicycle is red. The easiest and most traditional way to isolate the presupposed information from the asserted information in a sentence is to negate the sentence. This is the well-known *negation test* for presuppositions. The following examples negate the two sentences given in (1) above:

(2)   <u>Julia's bicycle</u> isn't new. It is not the case that she is <u>glad</u> that it is red.

From (2) we still infer that that Julia has a bicycle and that the bicycle is red, despite the fact that both of the sentences are negated. These inferences are called presuppositions. Earlier characterizations of presuppositions have described them as inferences that survive negation. We often say that the presupposed information 'projects out' of the negated context, that is, it is not interpreted within the scope of the negation. This is in contrast with asserted information. Consider the following examples:

(3)   <u>Julia's brother</u> has a bicycle.
(4)   <u>Julia's brother</u> doesn't have a bicycle.

(3) presupposes that Julia has a brother, triggered by the possessive noun phrase, and it asserts that he owns a bicycle. But if we negate the sentence as in (4) then the presupposed information will not be affected by negation but the asserted

information will be; that is, we still infer that Julia has a brother, but we no longer consider it true that he owns a bicycle.

Presupposed information survives negation but asserted information does not. By negating a sentence and seeing what inferences still go through, it is generally possible to distinguish what is asserted from what is presupposed.

The negation test is not the only way to identify the presuppositions of particular utterances, and in fact it is not really sufficient as a sole method for determining presupposed information. This is because the quality that makes presuppositions special, in comparison to asserted information, is that they tend to project out of *all* kinds of embedding, not just negation. For example, presuppositions tend to survive other types of logical embeddings such as conditionals, modal contexts and attitude contexts. If we take the examples above and embed them in different contexts, the presuppositions will still hold. In the examples below, the natural language lexical items which are considered to be functioning as logical operators are given in bold. In (5) the *if-then* creates a conditional statement. In (6) *maybe* and *perhaps* are considered to be modal operators and in (7) *believes* creates a belief context. The presupposition trigger is underlined (for the possessives the entire presuppositional expression is underlined). The b-sentences give the presuppositions of the a-sentences.

(5) a. **If** <u>Julia's bicycle</u> is new **then** <u>Matt's bicycle</u> is old.
     b. Julia has a bicycle. Matt's has a bicycle.

(6) a. **Maybe** <u>Julia's bicycle</u> is new. **Perhaps** she is <u>glad</u> that is it red.
     b. Julia has a bicycle. The bicycle is red.

(7) a. Jennifer **believes** that Julia is <u>glad</u> that <u>her bicycle</u> is red.
     b. Julia has a bicycle. Julia's bicycle is red.

In each case it should be clear that the presupposed information is still considered to be true. Karttunen (1971) was the first to propose testing for presuppositions by using modality and other types of embeddings, instead of relying on negation alone. Since his suggestion, several researchers have also proposed sets of tests for presuppositions. These include the "Presupposition Test Battery" (PTB) proposed in Geurts (1999) and the S-family of tests in Chierchia & McConnell-Ginet (1990). Note that these tests actually have two important functions. They help us see what the presuppositions are for an individual example and they also help us identify what lexical items or syntactic structures should be considered presupposition triggers in general. This is important, as it has not always been agreed upon as to what lexical or syntactic structures trigger presuppositions, and what the presuppositions triggered actually are. Geurts' (1999) PTB is more thorough, so this one is presented here. To test if something is a presupposition trigger we should first test to see if it survives all normal types of embedding. (8) gives a summary of some of the embedded contexts the PTB tests, taken from Geurts

(1999, p. 6). In the following, if φ is an utterance that presupposes χ, we can write this as φ{χ}.

(8) a. not φ{χ}
     b. it is possible that φ{χ}
     c. a believes that φ{χ}
     d. if φ{χ} then ψ
     e. either φ{χ} or ψ

Geurts (1999) points out that some embeddings will make the presuppositional inference seem stronger than others, but that generally presuppositions will project out of negated and modal contexts, e.g. above in (8) a and (8)b.[1]

The easiest way to get the hang of identifying presuppositions is to look at several examples, varying the embeddings and assuring yourself that the presupposition survives. Below examples sentences are given with each of the triggers that are studied later in the corpus: factives, aspectual verbs, *it*-clefts, *too* and definite NPs. First the a-sentences presented the trigger used without an embedding, with the trigger underlined. The b-sentences give the same sentence but in one of the embedded contexts given in (8). The c-sentences give the induced presupposition.

(9) factive verb *matter* with a sentential subject complement
     a. That it is already November <u>matters</u>.
     b. That it is already November doesn't <u>matter</u>.
     c. It is already November.

(10) factive verb *regret* with a sentential object complement
     a. Andy <u>regrets</u> choosing the fish.
     b. Andy <u>regrets</u> choosing the fish.
     c. Andy chose the fish.

(11) factive adjective *glad* with sentential object complement
     a. Henk <u>is glad</u> that Reinhard came to visit.
     b. Rob believes that Henk <u>is glad</u> that Reinhard came to visit.
     c. Reinhard came to visit.

(12) aspectual verb, *quit*
     a. Rob totally <u>quit</u> smoking.
     b. If Rob totally <u>quits</u> smoking, he will probably be in a bad mood all the time.

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[1] Note also that it is well known that some triggers cannot be embedded under all contexts. For example, positive polarity items like *rather* and *too* can't be embedded in negative contexts (see van der Sandt 1988, Geurts 1999). Because of this, the presupposed information of positive polarity items cannot be identified by using the negation test. For example, you can't embed *too* under negation because in a negated sentence you have to use its negative polarity counterpart, *either*, e.g. **I don't like fruit too,* vs. *I don't like fruit <u>either.</u>* *Too* is the only trigger studied in the corpus work that fails the negation test because of polarity.

    c. Rob smoked before the time of the utterance.

(13)   aspectual verb, *continue*
        a. Bart can <u>continue</u> to eat so much chocolate.
        b. Bart can't <u>continue</u> to eat so much chocolate.
        c. Bart has been eating a lot of chocolate up until now.

(14)   *it*-cleft
        a. <u>It was</u> Jip <u>who</u> fell in love with Janneke.
        b. If my information is correct, <u>it</u> was Jip <u>who</u> fell in love with Janneke
        c. Someone fell in love with Janneke.

(15)   *too*
        a. Hanneke likes cookies and Noor likes cookies <u>too</u>.
        b. Hanneke likes cookies and it is not the cases that Noor like cookies <u>too</u>.
        c. Someone other than Noor like cookies.

(16)   definite NP
        a. <u>The dissertation</u> has to be handed in before Christmas.
        b. If <u>the dissertation</u> has to be handed in before Christmas, I'll never finish.
        c. There is a dissertation.

In all the above examples the presupposition projects out. But actually presuppositions are not this simple. They do not always project out. For example, in a complex sentence such as (17) the presupposition that Julia has a bicycle will not project out. The same would be said about (18), taken from Geurts (1999, p. 7).

(17)   If Julia has a bicycle then <u>Julia's bicy</u>cle is red.

(18)   It's possible that Fred kissed Betty, and that he <u>regrets</u> that he kissed her.

(17) doesn't imply that Julia has a bicycle and about (18) doesn't imply that Fred kissed Betty. Note that if the consequent of the conditional in (17) was given in isolation, e.g. *Julia's bicycle is red,* the sentence would induce the presupposition that Julia has a bicycle.

    These two examples illustrate of one of the most well known problems in presupposition theory, *the projection problem.* viz. how we can determine what presuppositions of simple sentences project to become presuppositions of complex sentences. Much of the work on presupposition has been geared at trying to solve it.[2] The obvious reason the presupposition doesn't project out of example (17) above is because its truth is actually questioned in the antecedent of the conditional. The same reason applies to (18).

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[2] For example Karttunen (1973, 1974) Karttunen & Peters (1979), Stalnaker(1973,1974) Gazdar (1979).

Because true presuppositions should display this kind of context dependent behavior we need to test proposed triggers for this property as well. This second part of Geurts (1999) PTB tests for context dependence in complex sentences. If a sentence can be embedded in one of the patterns given in (19) below *without* having the induced presupposition project out, we can be even more certain that it is a true presupposition trigger. (Taken from Geurts, 1999, p. 6)

(19)   a. if χ then φ {χ}
        b. it is possible that χ and φ {χ}
        c. either not χ or φ {χ}

Example (17)a actually illustrates an utterance with the pattern in (19)a and example (18) illustrates the pattern in (19)b. It is fairly easy to modify the earlier examples to test for the other two and that is left to the reader. When presuppositions are triggered in these contexts they do not project.

It was many years until it was recognized that difficulties in interpreting the triggered presuppositions of complex sentences just hints at a much bigger issue. Whether or not presuppositions project depends on the information in the context in which they are used. The problem is not how to interpret presupposed material in complex sentences but how to interpret presupposed material in context. Much of the early work on presupposition has tried to handle projection at a sentence level, perhaps because most semantic work was at that time only equipped to deal with sentence level phenomena. But to correctly interpret presuppositions we need a way to account for the effects of the discourse context[3] on their interpretation, i.e. we need a framework that can manipulate or represent the information contributed by the entire discourse.

The third and final part of the PTB tests if presuppositions can, given the correct context, be denied or cancelled.[4] One of the examples he gives is presented below (taken from Geurts 1999, examples 20, p. 7)

(20)   a.   It isn't Betty who kissed Fred – in fact, Fred wasn't kissed at all.

        b.   It's possible that it's Betty who kissed Fred, but it's also possible that he wasn't kissed at all.

Examples (20)a and (20)b illustrate *it*-cleft presuppositions. The presupposition is denied in a-sentence, and it is embedded in a modal context in b-sentence, both

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[3] By discourse context I mean the information contributed before the utterances to be analyzed is made, that is the linguistic information that is considered to be part of the discourse record.

[4] Wilson (1975)and Kempson (1975) have argued that presupposition as a semantic relationship actually doesn't exist. What people have termed presuppositions are just the entailments of simple sentences that in complex sentences are no longer entailed. They argued that this is easy to see because they can always be cancelled, and that the reason why we tend to understand presupposed material as projected out of different types of embeddings is because of other pragmatic factors.

contexts from within which the presupposition should have no trouble in projecting out. But because of the contextual information given in the second half of the sentence the presupposition does not project out. The general idea is this, for any induced presupposition, we should also be able to, with enough contextual manipulation, prevent it from projecting.

Semantically, the status of presupposed information differs according to the theory that is used to analyze them. Traditionally, presuppositions were considered to be other sentences that are entailed by the sentence with the trigger or propositions that are implied by an utterance or by a speaker. Factives with sentential complements presuppose the truth of their complement, or in other words presuppose a *fact*, which is an abstract object. Factive adjectives with sentential complements presuppose their complements as well and this presupposed information is also a semantic *fact* introduced by the linguistic expression in their complements. Aspectual verbs or change of state verbs (COS) presuppose *states*. Exactly what particular *state* in relation to the asserted material differs by each aspectual trigger. For example, *begin to x, begin x-ing* both presuppose states that the subject of the verb was not in the state described by **x** before the reference time of the utterance. This is the same presupposition for *start to x, start x-ing*. This is the opposite presupposition of what you get for *stop, quit* or *finish*.

For *it*-clefts the presupposed information is the content of the relative clause with the relative pronoun exchanged for an indefinite noun of the appropriate type.

Definite NPs presuppose the existence of an individual of the same type denoted by the head noun plus any additional descriptive information. For possessives, the presupposition is the existence of an individual of the same type as the noun phrase plus the information of who owns the referent of the noun.

Finally, the presupposition induced by the particle *too* is somewhat complex. Let's look at an example.

(21)   Hanneke likes cookies. Noor likes cookies <u>too</u>.

The presupposition induced by *too* has two requirements, First, there should be a shared element between the event or situation referred to in the utterance with the trigger and the presupposed information. This is called the *theme* by Asher (1993) and I will also use this term. The theme above is 'liking cookies'. Then there must be two elements of the same type, but which are contrasted, called the *focus*. In the example above Noor is the focus in the expression with the trigger and Hanneke satisfies the focus in the presupposition. The utterance presupposes that there is someone other than Noor who likes to eat cookies which is then satisfied by the first sentence.

What are presuppositions in terms of information? They can be both given and new. What is important is that they are always meant to be treated as if they were given, as if their truth can be taken for granted when they are presented. This is what the speaker is taken to be signaling to the hearer when he uses a presuppositional expression. The speaker doesn't have to believe that the

presupposed information is true, only commit to pretending it is for the duration of the dialogue.

These are just a sample of the lexical and syntactic items that have been associated with the term presupposition. There have been many different proposals for analyzing the triggers and the presuppositions they induce. The next section briefly presents some central earlier proposals that laid the foundations for current theories.

2.2 EARLIER ANALYSES OF PRESUPPOSITIONS

Two major problems in analyzing presuppositions were discussed in the early literature on this subject.[5] The first is the problem of presupposition failure, and has to do with what happens when a sentence presupposes something that isn't true, and the second is the projection problem, already mentioned in the previous section. The first problem was originally noticed by Frege (1892) and introduced as follows in "Über Sinn und Bedeutung."

"If anything is asserted there is always an obvious presupposition that the simple or compound proper names used have reference. If one therefore asserts 'Kepler died in misery.' there is a presupposition that the name 'Kepler' designates something; but it does not follow that the sense of the sentence 'Kepler died in misery' contains the thought that the name 'Kepler' designates something. If this were the case the negation would have to run not

Kepler did not die in misery

but

Kepler did not die in misery, or the name 'Kepler' has no reference.

That the name 'Kepler designates something is just as much a presupp*osition for the assertion*

Kepler died in misery

as for the contrary assertion."

An important point here is that Frege makes a distinction between presupposed information and asserted information, and points out that presupposition has to hold both for affirmative as well as the negated version of the sentence. Frege then remarked that

"A logically perfect language (Begriffsschrift) should satisfy the conditions, that every expression grammatically well constructed as a proper name out of signs already introduced shall in fact

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[5] For a more detailed summary of the history and development of theories of presupposition see van der Sandt (1988) or Beaver (1997).

designate an object and that no new sign shall be introduced as a proper name without being secured a reference. The logic books contain warnings against logical mistakes arising from the ambiguity of expressions. I regard as no less pertinent a warning against apparent proper names having no reference."

Frege analyzed the meaning of sentences according to his principle of compositionality, where the meaning of a sentence is a function of the meaning of its component parts and the way in which these are combined. One of the consequences of this analysis is that if any term in the sentence is non-denoting, the entire sentence is not able to have a truth value. Thus, if something is presupposed that is not true, because of the principle of compositionality the whole sentence will have a truth-value gap, a result which Frege thought to be unfortunate and sought to avoid by arguing that speakers should avoid using non-denoting terms in the first place.

Russell (1905) was faced with the same problem as Frege. He too did not want to allow language to contain empty names which would result in truth-value gaps. Therefore, he developed his famous theory of definite descriptions where he reanalyzed names as descriptions which in turn were not analyzed as referring expressions but instead as quantified expressions. To represent this he introduced the iota operator. The example (22) below is the representation Russell gives to the definite description "the king of France."

(22)   ιx KofF(x)
(23)   Bald (ιx KofF(x))

When a definite description occurs in a sentence, such as 'The king of France is bald", it will be given the representation shown in (23). This formula entails three things, 1) that there is some x which has the property of being the king of France, 2) that there is no other x which has the property of being the king of France and that 3) x has the quality of being bald. The second clause is the uniqueness requirement for definite descriptions. The form using the iota operator can also be expanded into a sentence like the one given below:

(24) $\exists$x(KofF(x) & $\forall$y(KofF(y) $\rightarrow$ x = y)) & Bald(x))

When (23) occurs in the scope of some logical operator, this way of expanding the abbreviated form allows the logical operator to have different scope taking properties and allows us to capture the ambiguity present in, for example, a negated sentence with a definite description. Thus $\neg$ Bald (ιx KofF(x)), the representation of "The king of France is not bald" is ambiguous without some type of scope indicating device, such as bracketing. Representing this by means of bracketing we get $\neg$ [Bald (ιx KofF(x))] and [$\neg$ Bald] (ιx KofF(x)). $\neg$ [Bald (ιx KofF(x))] will be expanded to give negation wide scope as in (25) below, which has the reading that it is not true that there is a king of France and that he is bald. [$\neg$ Bald] (ιx

KofF(x)) will be expanded to given negation narrow scope, as in (26) below, a reading says that there is a king of France and he is not bald.

(25) $\neg$ $\exists$x(KofF(x) & $\forall$y(KoF(y) $\rightarrow$ x = y)) & Bald (x))
(26) $\exists$x(KofF(x) & $\forall$y(KoF(y) $\rightarrow$ x = y)) & $\neg$ Bald (x))

Because there is no present king of France the first sentence will be considered true, and the second sentence will be considered false. Note, however that with Russell's representation it is not possible to isolate the information contributed by the definite description from the rest, which means his analysis does not make a distinction between presupposed information and asserted information.

Strawson (1950) disagreed with Russell's analysis and believed that considering such sentences to be neither true nor false would be more consistent with our general intuitions. The truth of the presuppositions of sentences should be thought of as requirements for the sentence to get a truth-value, which means that Strawson supported allowing truth-value gaps. A logical account of his analysis requires a non-classical logic, which, though formally feasible, yields a number of empirical problems.[6] However, this analysis did bring back the distinction between information that is presupposed and information that is asserted.

Frege, Russell and Strawson were all concerned with the problem of non-denoting terms. Non-denoting terms in sentences lead to presupposition failure. Most major work on presupposition since the 70's has focused on the problem of presupposition projection, trying to find a method to determine what the presuppositions of a complex sentence will be, given the presuppositions of the simple sentences from which it is made.

It was observed early on that presupposition projection was partially related to the type of predicates and logical operators in the scope of which the presupposition as triggered. This lead Karttunen in (1973) to develop his famous theory of *holes, plugs*, and *filters*. Basically, Karttunen classified different predicates and sentential operators according to their tendency to allow presuppositions to project through. For example, *holes,* which include negation, modal operators and factives, always allow projection, whereas *plugs,* which include verbs of reported speech such as *say, state,* or attitude verbs such as *think,* never do. Karttunen noted that logical connectives sometimes allow presuppositions to project out and sometimes don't, and he therefore called them *filters*. In addition, Karttunen also

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[6] There has been much work on trying to treat presuppositions within some kind of non-classical logic, such as a three-valued logic or one that allows truth-value gaps, or for example the system of supervaluations such as that suggested by van Fraassen (1969), or a free logic. See Martin (1987) for a comparison of these different systems. But even if these systems can correctly model simple examples, they are not able to take contextual factors into account, and because presuppositions are so context dependent, trying to analyze them within a system that cannot model context will fail to correctly capture their behavior, and cannot be considered a viable alternative treatment to other, more general theories. For well-known examples why such systems will not work to analyze presupposition see either Gazdar (1979) and van der Sandt (1988) or alternatively see Kempson (1975) and Wilson (1975).

described how contextual information will influence presupposition projection, discussing several examples where world knowledge affects presupposition projection. Thus both world knowledge and information contributed by other clauses can affect projection. The following example illustrates how intra-sentential information may affect the behavior of presuppositions. If information in one clause entails presupposed information in another clause the presupposition will not project.

(27)　　If there is a king of France then the king of France is bald.

In Karttunen's system *if-then* is a filter that will let all presuppositions in the antecedent project out. It will also let all presuppositions of the consequent project as long as they are not entailed by the main context or the conjunction of the main context and the antecedent (i.e. not the antecedent alone). So in this example, the elementary presupposition of the consequent, that there is a king of France, is entailed by the antecedent and will therefore not project to become a presupposition of the complex sentence.

　　Karttunen's (1973) solution to the projection problem treated presuppositions as relationships that hold between sentences and contexts. Stalnaker (1973, 1974) was one of the first to develop an idea of presupposition that gave the speaker's attitude to the presupposed information a central role. Stalnaker argued that presupposition is a pragmatic phenomenon, and that "it is persons, rather than sentences, propositions or speech acts that have or make presuppositions," (1974, p. 200). What semantically is a presupposition is spelled out at a semantic level, but what is actually presupposed by speakers when they use utterances with presuppositions is at a pragmatic level and can therefore differ from the semantic presuppositions.

　　This is a very different view of the projection problem for presuppositions. Because presupposition is viewed as a pragmatic contribution made by a speaker, it is no longer surprising to find that the presuppositions of a complex sentence with a conjunction are not necessarily the same as the sum of the presuppositions of the simplex sentences which compose it. The reason is that the presuppositions made by the speaker are done against the backdrop of the information he is currently contributing. If information asserted in the first conjunct of a complex sentence entails a presupposition in the second conjunct, it is natural not to consider this presupposition as being a something that the speaker is presupposing, because he is already asserting it with his current utterance. All information contributed by the speaker during the discourse can be considered presuppositions of the speaker for the remainder of the discourse, both those which were introduced by assertion and those which were introduced by presupposition. In example (28) below Stalnaker would say that the speaker is not presupposing that there is a king of France with the utterance of the full sentence because he is asserting it in the first conjunct. In example (29) however, Stalnaker would say that the speaker is presupposing that there is a king of France when uttering the second sentence.

(28)   There is a king of France and the king of France is bald.
(29)   There is a king of France. The king of France is bald.

Stalnaker's analysis lets sentences joined by conjunction to be semantically symmetrical, but pragmatically asymmetrical in the way the information contributed by speakers is understood, keeping standard semantic definitions of logical connectives but changing their effect with regard to presupposition by defining them from the perspective of the speaker's intended contribution. One of the nice things about his analysis is that many of the predictions about presupposition projection that are stipulated without a clear motivation in Karttunen (1973) and others become natural consequences of dealing with presuppositions as assumptions made by the speaker.

Karttunen (1974) offered a solution to the projection problem which is close to the ideas present in Stalnaker (1973, 1974). Rather than asking what presuppositions of a sentence will be projected to be part of the context, he asked instead what the context would have to be like to satisfy or admit the sentence with its presuppositions. Contexts should be appropriate for the presuppositions of the utterances that speakers use, and he defined admittance conditions on contexts for complex sentences with presuppositions joined by different logical connectives. He associates with each sub-clause of a sentence a so-called local context. The local context is the context plus the contribution of the earlier analyzed clauses. For example, the local context of the consequent of a conditional is the main context, i.e the context where it is used, plus the information contributed by the antecedent of the conditional. The local context of the second part of two simples sentence joined by conjunction is the main context, plus the information contributed by the first conjunct. The local context should satisfy the presuppositions of the clause with the presupposition triggering expression, that is, elementary presuppositions should be admitted by the local context in which they are used. Sentences with presuppositions are thus interpreted using a recursive contextual update mechanism that calculates what the context must be like for update to occur. For example, when interpreting the presuppositions of two simple sentences joined by conjunction, the sentence can only update the context if two things are true. The original context, which is the local context for the first conjunct, has to admit the presupposed information in the first conjunct by entailing its presuppositions. Additionally, the context that admitted the first conjunct together with the first conjunct makes up the local context for the second conjunct and also has to admit the latter by entailing is presupposition. Otherwise the context does not admit the sentence as a whole. For example, in (27), if we begin with an empty context c, this context must admit the presupposition of the first conjunct of this sentence. In this case there isn't one and the context can simply be updated with the asserted information. The updated context must then admit the second conjunct by entailing its presupposition, which it does, i.e. there is a king of France already given in the context, and this context can then be successfully updated with the

information that this individual is bald. Karttunen (1974) laid the foundations for the satisfaction theory, one of the two main theories of presupposition discussed in greater detail in section 2.4.

Gazdar (1979) is another theory that also takes the effect context has on presupposition projection seriously. For Gazdar, the context is the sum of all the information contributed by the speaker. Each new utterance updates the context but the contribution of each particular utterance as a whole may be different than the information contributed by its component parts. What the utterance does contribute is determined by an incremental updating mechanism. First, all the entailments, potential presuppositions and potential implicatures of an utterance are generated. Gazdar calls these potential presuppositions 'pre-suppositions' and the potential implicatures are called 'im-plicatures' to distinguish them from the presuppositions and implicatures of the utterance that is the presuppositions and the implicatures that survive the updating mechanism. Contextual update takes place in a specific order depending on the type of information. No information can be added to the context if it would result in inconsistency. Because each step in the update process should maintain consistency with the information already processed, information added first can in some cases block the addition of other information at a later step. This is called cancellation. Entailed information is added first. Then scalar and clausal im-plicatures are tested for addition, controlling however, that this information is consistent with the context and the entailed information. Finally, pre-suppositions are added. If a pre-supposition should happen to conflict with the context, which now includes those entailments and implicatures which were consistent with the context at the time in which they were processed, then these pre-suppositions will be cancelled and will never become presuppositions of the utterance as a whole. This theory makes very correct predictions for presupposition projection, and also takes the context of the sentence seriously in determining presuppositions. Unfortunately, it is unintuitive that conversational implicatures should be able to cancel presuppositions, and that the presupposed information is the last information contributed by an utterance.

A theory that avoided this latter problem was van der Sandt's (1988) work. Van der Sandt treats presuppositions as a three-place relationship between sentences, presuppositions and contexts. He solves the projection problem by defining what an acceptable discourse would be. A well-formed discourse is constrained by requirements of informativity and consistency. Projection is only allowed if adding the presupposition to the incoming discourse would not violate conditions of informativity or consistency. If the sentence to be processed can be interpreted in the context which already contains the presupposition induced, that is if the incoming discourse and the presupposition followed by the sentence to be processed forms an acceptable discourse, the sentence is predicted to be presupposing. If the discourse resulting from adding the induced presupposition would not be informative or consistent, then the presupposition cannot project. In this way clausal implicatures never have to be evoked to cancel presuppositions,

because constraints on the acceptability of the discourse do the same task that clausal implicatures did in Gazdar's approach.

Since this earlier work there have been some new developments in semantics and semantic theories. Earlier theories of presupposition explained their approaches in terms of semantic theories that treated meaning in a static way. Current popular approaches to presupposition are dynamic in that they use theories that consider meaning to be the way information changes the context. The two main theories of presupposition popular today, the binding theory and the satisfaction theory, are extensions of dynamic theories of meaning, i.e. Discourse Representation Theory and Context Change Semantics respectively. These dynamic frameworks help to solve some of the problems with earlier theories of presuppositional projection. The following two sections introduce these two central theories, and the extensions of them for treating presupposition, the binding theory and the satisfaction theory.

2.3   PRESUPPOSITIONS AS ANAPHORS

The basic claim of the binding theory of presupposition, first developed in van der Sandt (1992), is that presuppositions and anaphors are the same kind of thing and can be resolved by similar methods. Other developments of the theory are Geurts (1999) and (Kamp & Rossdeutscher, 1997). The theory extends Discourse Representation Theory (DRT, Kamp & Reyle 1993) with a mechanism for resolving presuppositions and many of the ideas in the binding theory are intimately connected with the philosophy behind DRT. In the next section, I first briefly present DRT followed by a detailed presentation of the binding theory.

2.3.1   Discourse Representation Theory

DRT differs from earlier semantic representations such as predicate logic and Montague Grammar in that it is able to represent extended discourses because it permits a sentence by sentence incremental update of the representation. In DRT we create a representation from the discourse and then we interpret this representation with respect to a model. The process by which the representation is created and the process by which it is interpreted are separate. The representation is thus essential for interpretation. This is one of the key ways DRT differs from e.g. Montague Grammar and Context Change Semantics, which do not need an intermediate level of representation in order to be interpreted.

The key components of a DRT representation are - discourse representation structures or DRSs. Linguistic expressions in a discourse are decoded into elements in the DRS representation. DRSs are made up of two types of objects, reference markers, which represent individuals in the discourse, and DRS-conditions which encode descriptive information about the individuals in the discourse, and look quite similar to predicates with the reference markers serving as arguments. A DRS can also be a condition.

In interpretation, the reference markers in the representation are associated with individuals in a model and the DRS-conditions in the representation represent

different relationships which must hold between the different individuals in a model. The DRS-conditions are considered to make up an unordered set. DRSs are commonly represented as split boxes, where the top part of the box contains the reference markers and the lower part of the box contains the conditions that hold for the reference markers. Let's look at an example of a sample discourse and how it would be incrementally represented in a DRS:

(30)   Julia has *a bicycle*. It is red.

(31)

x   y
Julia(x) bicycle(y) x owns y

The name 'Julia' in the first sentence introduces a reference marker into the representation. We add a reference marker **x** into the top part of the box. Names thus add new markers the first time they are mentioned. Additionally, a condition is introduced that tells us that the reference marker **x** is associated with the individual Julia, **Julia(x)**, and this is added to the lower part of the box. At this point in analyzing the sentence we also know that the individual represented by **x** owns a bicycle. 'A bicycle' is an indefinite noun phrase. In DRT indefinite noun phrases also introduce new reference markers, in this case **y**, and a condition that **y** is a bicycle, **bicycle(y)**, is also added to the DRS conditions. We can then complete the representation by adding a final condition, a condition that tells us what relationship holds between Julia and the bicycle, **x owns y**. We then arrive at the representation in (31).

Now we can proceed to update the representation with the next sentence, *It is red*. This sentence starts with a pronoun. Pronouns need to find an already given reference marker as an antecedent. We can first introduce a new reference marker **z,** and then proceed to look for a suitable reference marker for it to be bound to. *It* is only compatible with a reference marker that represents something inanimate and singular, and the only reference marker in our representation with these features is **y** (**x** is animate as well as female.)[7]. We can then bind it to **y,** adding the condition **z = y** as well as the new descriptive information about the color of the bicycle to the discourse representation, i.e. **red(z)**.

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[7] Information about the different features of each reference marker are also coded in DRS-conditions but this information is usually omitted from the DRS for simplicity.

(32)

```
┌─────────────────────────┐
│          x  y  z        │
├─────────────────────────┤
│                         │
│        Julia(x)         │
│        bicycle(y)       │
│        x owns y         │
│        z = y            │
│        red(z)           │
│                         │
└─────────────────────────┘
```

In the representation in (32) we resolved the pronoun in two steps, by first introducing a reference marker, and then stipulating what other reference marker in the representation it is identical with. What we can then later do is replace all instances of **z** with **y**, and then remove **z** from the list of reference markers. We end up with a DRS that will have the same truth conditions as (32) above but one that is easier to read. In the following I will use the more direct method of immediately resolving pronouns and other anaphoric expressions to the reference marker they are binding with. Only where it is necessary for clarity will I show the step-by-step process of identifying an antecedent.

What are the truth-conditions of (32)? This DRS is true if there is a function between the reference markers in the DRS and a model of interpretation such that the reference marker **x** is mapped onto an individual **j** in the model, and the reference marker **y** is mapped onto another individual **b** in the model, and **j** is Julia and **b** is a bicycle and **j** and **b** are related in such as way that **j** owns **b** and **b** is red. The DRS in (32) therefore has the same truth-conditions as its translation into predicate logic, which would be the following:

(33) $\exists x \, \exists y \, (\, Julia(x) \wedge bicycle(y) \wedge owns(x, y) \wedge red(y))$

The important difference between the predicate logic formula and the DRS-structure is that the DRS-structure can be updated further with more information. The predicate logic structure cannot be incrementally changed because the variables in the structure are sealed off. DRT also has a semantics that allows its representations to be given a model-theoretic interpretation. DRSs are interpreted as partial models of the world. A DRS is true in a model if we can find real individuals in that model that are in the relationship coded by the conditions given in the DRS being evaluated.

There is a way to write DRSs in a linear format. This makes the representation a little more difficult to read but it takes up much less space and contains the same information so I will use the linear format in the following. Example (34) illustrates this format for the DRS given in (32), but with **y** substituted for **z**.

(34)   [x,y : Julia(x), bicycle(y), owns(x,y), red(y)]

From the above example it should be clear that different NP types affect the discourse representation in different ways. Proper names always introduce a new reference marker the first time they are used and they are always placed in the main DRS as well. Indefinites also introduce a new reference marker. Pronouns need to bind with an already given reference marker. Proper names also need to be identified with an already given reference marker after their initial introduction. Finally, definite NPs, like pronouns, also need to be bound with an already given reference marker. Reference markers are then variables in the representation that keep track of the descriptive information communicated about real world referents through linguistic expressions. Using reference markers to organize information stems from Karttunen's (1976) paper on discourse referents

How does DRT get from a sentence to a representation? There is a DRT-*construction algorithm* that takes the syntactic parse of a sentence and adds information to the discourse representation. This is explained in detail in Kamp & Reyle (1993) and the reader is referred there. In the following the exact method by which we get from syntactic structures to a certain representation is not relevant. Instead we are more interested in what type of representation an utterance in a context will be given, and how its addition will affect the rest of the representation, and its interpretation.

It was mentioned before that a DRS can also function as a condition within another DRS. Such embedded DRSs are called complex conditions. In DRT most of the logical connectives, quantifiers and other operators are expressed as complex conditions. The exceptions is conjunction, which is expressed simply by adding the information contributed by each conjunct to the DRS. The simplest example of a complex condition is negation. Consider the following example:

(35)   Julia doesn't have a bicycle.

(36) $[_1 x : \text{Julia}(x) \ \neg[_2 \ y : \text{bicycle}(y), x \text{ owns } y]]$

With embedded DRSs we can have more than one DRS in a representation. To make it easier to refer to them, I will number them, following Geurts (1999). Complex DRS are prefixed with the type of embedded context they are, as in (36) where the embedded DRS, DRS_2, is prefixed with a negation sign. We say that the embedded DRS_2 is *subordinate* to the main DRS_1 and we can also say that the main DRS_1 *superordinates* the embedded DRS_2.

Note first that **Julia(x)** is part of the main DRS, DRS_1, also known as the main context. Reference markers for proper names and the conditions that identify them, e.g. here **x** and **Julia(x)**, are always put in the main DRS. But the information about her owning a bicycle gets embedded in a second DRS, DRS_2. The bicycle itself introduces a new reference marker (it is an indefinite NP), but within the embedded context of the negation. The information that Julia owns this bicycle is also placed in the embedded DRS. So within the DRS_2 itself we have the

information that there is a bicycle and Julia owns it, and the entire content of DRS_2 is negated, so it is interpreted as saying "it is not the case that there is a bicycle **y** that **x** owns." Note that we are able to use the reference marker **x** in our conditions within the embedded context, even though **x** does not appear as a reference marker in DRS_2. This is because **x** is accessible to the embedded context. A DRS has access to all reference markers in DRSs it is subordinate to, which for DRS_2 in (36), this is only DRS_1.

Conditionals create complex conditions, which we write as two DRSs joined by an arrow. Information in these embedded contexts has access to all information in contexts that it is subordinate to. Additionally, the consequent of a conditional also has access to the reference markers in the antecedent of the conditional. The following example illustrates how this works.

(37) a. If Julia has a bicycle, it is red.
(38) b. $[_1$ x : Julia(x), $[_2$ y : bicycle(y), x owns y$] \Rightarrow [_3$: red(y) $]$

Here again, a proper name 'Julia' introduces a reference marker **x** into the main DRS, that is DRS_1. *If* creates an embedded DRS for the antecedent. Because 'a bicycle' is an indefinite NP, it introduces a new reference marker into the DRS that it is a part of, i.e. in the antecedent of the conditional. Here is where the condition that **x owns y** is added. The consequent of the conditional contains a pronoun which needs to be bound. It can be bound to a reference marker in a position accessible from where it is introduced. Here this means every DRS that DRS_3 is subordinate to, i.e. DRS_1. Additionally the antecedent of a conditional is also accessible to the consequent. Here this means that DRS_3 also has access to DRS_2. This means both **x** and **y** are accessible for binding, but because the pronoun *it* is only compatible with an antecedent that is inanimate, **y** is the only possible choice.

Disjunction creates two contexts,$[_1 \ [_2\phi] \ \lor \ [_3\psi] \ ]$ both of which are subordinate to the main DRS. Unlike conditionals however, there is no accessibility relationship between $[_2 \ \phi \ ]$ and $[_3\psi \ ]$ themselves, so $[_2 \ \phi \ ]$ doesn't have access to things in $[_3\psi \ ]$ and $[_3\psi \ ]$ doesn't have access to things in $[_2 \ \phi \ ].$[8] Modal verbs and attitude verbs all create modal contexts and attitude contexts that are written as embedded DRSs prefixed with the operator of their particular type. For example, a modal context is represented as a $[_1\Diamond \ [_2$ x : something(x) $] \ ]$. DRS_2 has access to reference markers in DRS_1 but not vice-versa.

Accessibility is the crucial notion in DRT, especially for understanding anaphoric relationships. This is because accessibility is what defines what reference markers will be available for anaphoric reference. Accessibility is defined in terms

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[8] This is actually a problem because we can have antecedents introduced in ϕ and then picked up with an anaphoric expression in ψ without infelicity. For example: *Either Julia's bicycle is red or it is blue,* is perfectly fine and there is no problem in understanding that *it* refers to Julia's bicycle. But in my data and in the following there are no examples where the special problems of disjunction need to be addressed so the interested reader should see the discussion in (Geurts 1999).

of subordination. A DRS is subordinate to another DRS if the first DRS is a condition of the second DRS. Subordination is a relationship between DRSs but accessibility is a relationships between reference markers. We can therefore define accessibility as a relationship between reference markers. A reference marker occurring in a condition has access to reference markers in the universe of all DRSs it is subordinate to and its own DRS (each DRS is subordinate to itself). Additionally, reference markers occurring in the consequent of a conditional have access to reference markers occurring in the antecedent of the conditional. If a DRS K_1 is subordinate to a DRS K, then all reference markers in K will be accessible to K_1 but not vice-versa. Embedded contexts only have access to reference markers that are found in contexts that they are subordinate to. Reference markers introduced in an embedded context are also not available for anaphoric reference from outside that particular context. Consider the following two examples:

(39)   a.   Julia doesn't have a bicycle. *It is red.

       b.   [₁x : Julia(x), ¬[₂ y : bicycle(y), x owns y], red(z) z = ?]

(40)   a.   Julia might have a bicycle. *It is red.

       b.   [₁x : Julia(x), ◊ [₂ y : bicycle(y), x owns y], red(z) z = ?]

In (39)a, the sentence cannot continue with *It is red* because the pronoun isn't able to pick up an antecedent. We can see this also in the discourse representation of the discourse in (39)b. If we let **z** be the reference marker for *it,* we need to bind **z** with some compatible reference marker that is accessible. But from the main context the only accessible reference markers are other markers in that context, for which there is only one, **x**, which is female and animate. The other reference marker **y** is compatible but it is not accessible, because it is subordinate to DRS_1 where **z** is introduced.

The same problem arises in example (40). The bicycle is only hypothetical, so we have no information that it actually exists. In the representation in (40) b we see this in that the bicycle is a reference marker in the modal context. Reference markers introduced within the modal context are not available for reference from DRSs that are superordinate to this context. i.e. reference markers introduced in DRS_1 cannot bind with reference markers introduced in DRS_2. The representations reflect our intuitions. It is not possible to bind *it* in either example with the bicycle.

DRT is a dynamic theory that considers meaning to be the change that information makes to the context. DRT doesn't assign truth conditions to sentences in isolation, but to full discourses. Meaning is associated with the change made the DRS is updated with the information contributed by each sentence in discourse. In DRT we can think about input contexts and output contexts when sentences are interpreted. The input context is the DRS before the information contributed by the sentence is integrated into the representation. After it is added and all the anaphoric relationships have been resolved, the output context is

reached. The meaning of the sentence is then the effect it has had on the discourse representation.

This section should have given the reader a good idea of how DRT works when resolving anaphors in extended discourse. The next section explains how DRT has been extended by van der Sandt (1992) to deal with presuppositions.

2.3.2 The Binding Theory

The standard binding theory is explained most thoroughly in van der Sandt (1992) but was first presented in van der Sandt (1989) and van der Sandt & Geurts (1991). This theory argues that presuppositions and anaphors are the same kinds of things and the binding theory extends DRT in order to deal with presuppositions and anaphors at the level of representation in a similar way.

By anaphors I mean pronominal anaphors and ellipse. Definite NPs have been treated as presupposition triggers in the previous sections. At the same time, definite NPs have long been considered to be anaphoric expressions, and additional confusion arises because often researchers have attributed them with a presuppositional aspect in addition to their anaphoric properties (see e.g. Heim 1982, 1983). I will treat them as presuppositional expressions, and because the binding theory analyzes presupposed information in the same way it analyzes anaphoric information, the analysis that results when they are bound will be the same as if they were considered to be anaphoric expressions.

Can presuppositions be considered to behave like anaphors? As the following examples seem to illustrate, we can find cases where the use of an anaphoric expression and the use of a presuppositional expression in the same position will have the same truth-conditions. In the four examples below, the a-sentences have an anaphoric expression that binds to an intra-sentential antecedent, a pronoun in (41)a and (44)a, *did* plus a pronoun in (42)a and an ellipse in (43)a. The b-sentences are identical except that they each have a presuppositional expression in the same position, but the induced presupposition does not project.

(41) a. If Frank flirted with Mary, Mary's husband <u>noticed</u> it.

     b. If Frank flirted with Mary, Mary's husband noticed that Frank flirted with Mary.

(42) a. If someone told our secret then <u>it</u> was Allison <u>who</u> did it.

     b. If someone told our secret then <u>it</u> was Allison <u>who</u> told our secret.

(43) a. If Emar used to smoke then he quit $\varnothing$.

     b. If Emar used to smoke then he quit smoking.

(44) a. There is not a King of France and he is not bald.

     b. There is not a King of France and the King of France is not bald.

The binding theory argues that the induced presuppositions in the b-sentences do not project because they were bound to the information in the first part of the sentence– just as the anaphoric expressions in the a-sentences are bound to antecedents in the same sentence. It is this similarity in behavior that is the basis of the binding theory's claim that presuppositional expressions are actually anaphoric.

As noted above, this claim is not very controversial for definite NPs. However, it is important to note that the binding theory does not view definites as being anaphoric and being presuppositional at the same time, instead considering these two characteristics to refer to one and the same attribute. Van der Sandt (1992) writes "The claim that definites are anaphoric is thus seen as a special case of a more general phenomenon that all presuppositions are anaphoric expressions." (p. 342). Thus, the binding theory considers all induced presuppositions to be anaphoric, and to be resolvable by similar methods. The differences we find between, for example, the presuppositions triggered by factives and pronominal anaphors, have to do with the descriptive content associated with the induced presupposition. This means that if we have a way to resolve anaphoric expressions, with a little modification we should be able to extend it to deal with presuppositions.

Van der Sandt (1992) extends DRT's treatment of anaphors to presuppositions. DRT treats anaphors on a representational level by identifying the reference marker introduced by an anaphoric expression with a reference marker already given in the discourse representation. The anaphoric expression *needs* an antecedent to link up with to get an interpretation.

Generally, pronouns[9] are related to their antecedents by a relationship of identity. In DRT, anaphoric binding, that is when an anaphoric expression is resolved by identifying it with an antecedent, occurs at the level of discourse representation. The anaphoric expression is associated with a reference marker that needs to find a compatible reference marker with which it can be identified. The descriptive information associated with the anaphor is then associated with the reference marker in the representation when the anaphor is replaced with the reference marker of the identified antecedent at each instance of predicated information where it served as an argument in the linguistic expression. Binding has been performed correctly if the descriptive material associated with the reference marker in the DRS-representation can be verified as holding in a model for the semantic individual, which will only be the case if the referent of the anaphoric expression identified is the same semantic individual. The concept of binding in DRT covers a very broad set of relationships, much broader than the use of this term in the linguistic literature. Basically, binding merely describes the association of descriptive information with the correct semantic individuals in the representation, or binding describes the identification of descriptive information communicated by a linguistic expression as already part of the discourse

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[9] This is not true of quantified pronouns.

representation in some cases. It can therefore be extended to cover other relationships if they are of a similar type.

Van der Sandt (1992) argued that the procedure for resolving presuppositional expressions can be seen as parallel to anaphoric binding. First, the presupposed information as it is understood without a context or without embedding is identified. This information is stored in a temporary DRS, called an *alpha-structure*. Information in the alpha-structure is information that has to be processed, and one way for it to be processed is to find an antecedent. If an antecedent that is compatible is found, then the presupposed information in the alpha-structure is bound with this information. The descriptive information associated with the presupposed information is then moved to the binding site. The alpha-structure then becomes empty, and can then be removed from the representation.

Let's look at one of the earlier examples with a definite NP and see how this would work. (45)b below shows the representation of the first sentence in (45)a. The alpha-structure is written as an italicized DRS prefixed with *α,* e.g. here *α[z : bicycle(z), z =?]*. In (45)c we can see the alpha-structure with the presupposed information triggered by the definite description in the second sentence. The reference marker **z** in the alpha-structure can be identified with the reference marker **y** in the main DRS. Then the descriptive information associated with the presupposition can be moved as well. Finally, as seen in (45)e, the redundant information in the representation can be removed.

(45)   a.   Julia has a bicycle. <u>The bicycle</u> is red.[10]

   b.   [x, y : Julia(x), bicycle(y), x owns y]
   c.   [x, y : Julia(x), bicycle(y), x owns y, *α[z : bicycle(z), z =?],* red(z)]
   d.   [x, y, z : Julia(x), bicycle(y), x owns y, bicycle(z), z = y, red(z)]
   e.   [x, y : Julia(x), bicycle(y), x owns y, red(y)]

Note that the representation in (45)e is *the same* as the representation we got for (34) above, i.e. we cannot tell from the final representation whether the new descriptive content that the bicycle was red was able to be associated with the bicycle introduced in the first sentence because it was linked to it via a presuppositional expression as in (45)a or via an anaphoric expression as in (34). But this shouldn't be a problem because we understand (34) and (45) a to communicate the same information, both should be true in the same situations, and this is correctly reflected in that they are both given the same representation. There is however a difference between the two cases in *how* this representation was reached. In some cases, the input context will differ, but the resulting representation, the output context, in both cases will have the same truth-conditions. Note that because

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[10] Examples like these described in the earlier literature on presupposition would be spoken about in different terminology. We would say that the presupposition does not project, and the reason for this in e.g. Karttunen (1973) would be because the presupposition of the second conjunct is entailed by the first conjunct.

meaning is a function from input contexts to output contexts in DRT, presuppositions and anaphors cannot be said to mean the same thing, because the inputs contexts in which they can be felicitously used will sometimes differ. But they are often interchangeable in that we will end up with the same output context whether we chose to use a presuppositional expression or an anaphoric expression.

Binding for induced presuppositions in simple sentences is different than binding for presuppositions that are triggered in complex sentences. If a presupposition is induced in an embedded context, we begin our search for an antecedent in the DRS where the presupposition was triggered, which we can call its 'home DRS.'[11] If we fail to find a suitable antecedent in that particular DRS we continue our search to the next highest level along the accessibility path. The accessibility path of a DRS is all the contexts that are accessible to it, which are all the DRSs that it is subordinate to, as well as the antecedent of a conditional which is always accessible to the consequent. We start searching on the accessibility path and continue searching until we either find an antecedent or we reach the main DRS. If we find one, we can then bind the reference marker in the alpha-structure to this antecedent and associate the descriptive content in the alpha-structure contributed by the presupposition with its reference marker. In the following example we can see how the definite NP *the bicycle* triggers the presupposition that there is a bicycle, which is represented in the consequent of the conditional as an alpha-structure in (46)b. This information cannot be bound in the DRS where it has been triggered (i.e. the consequent of the conditional) so we look in the next DRS along its accessibility path, which is the antecedent of the conditional. This DRS does contain information about a bicycle, and the presupposed information can bind with it. We then identify the reference markers in the presupposition with the reference marker of the bicycle in the antecedent.

(46)   a.   If Julia has a bicycle, then <u>the bicycle</u> is red.

       b.   [x : Julia(x) [y: bicycle(y), x owns y] $\Rightarrow$ [: *α[z : bicycle(z), z = ?]*, red(z)]]

       c.   [x : Julia(x) [y: bicycle(y), x owns y, *α[z : bicycle(z), z = ?]]* $\Rightarrow$ [: red(z)]]

       d.   [x : Julia(x) [y: bicycle(y), x owns y, z = y] $\Rightarrow$ [: red(z)]]

       e.   [x : Julia(x) [y: bicycle(y), x owns y] $\Rightarrow$ [: red(y)]]

It is fairly simple to treat presuppositions triggered by definite NPs in the same way as pronominal binding in DRT. For the other triggers, the actual resolution procedure is more complicated. Below is an example of binding with the presupposition trigger *too.* Following van der Sandt & Geurts (2001), the presupposition of *too* $\phi(a)$ is treated as being of the following form: $α[: \phi(x), α[x : x \neq a]]$, where $α[x : x \neq a]$ is a pronominal element[12] that makes up

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[11] Term introduced by Geurts (1999).

[12] Van der Sandt & Geurts (2001) consider this to be a pronominal element because it does not contribute descriptive content.

part of the presupposition. *x* and *a* must be of the same type, but different, and these are the *focus* elements discussed earlier. φ represents the *theme* shared by the two expressions. The following examples shows how the resolution would proceed if the expression with *too* is found in the consequent of a conditional. Note that in resolving presuppositional expressions that are embedded within other presuppositional expressions, the most embedded element is always resolved first, which in this case is the pronominal element α[x : x ≠ a].

(47) a.   If Bart eats chocolate, Jennifer eats chocolate *too*.
      b.   [x, y : Bart(x), Jennifer (y), [: x eats_chocolate] ⇒ [: y eats_chocolate, *α[: z eats_chocolate, α[z : z ≠ y]]*]]
      c.   [x, y : Bart(x), Jennifer(y), x ≠ y, [: x eats_chocolate] ⇒ [: y eats_chocolate, *α[: z eats_chocolate]*]]
      d.   [x, y : Bart(x), Jennifer(y), x ≠ y, [: x eats_chocolate] ⇒ [: y eats_chocolate]]

What if the previous discourse context doesn't contain an antecedent that is compatible and accessible? When the presupposed information is not given in the previous context, it is assumed that the speaker's use signals his desire that his audience treat the information as already given in the discourse. Cooperative speakers will then accept the presupposed information and treat it as if it were already given, adding it to their discourse representation. This process is called accommodation, and idea introduced in Karttunen (1974) and Stalnaker (1974) and given its name by Lewis (1979). What accommodation does is provide us with an antecedent, or in other terms, helps us change a context to one that satisfies the presupposition. The original formulation found in Karttunen is the following:

… I think we can maintain that a sentence is always taken to be an increment to a context that satisfies its presuppositions. If the current conversational context does not suffice, the listener is entitled and expected to extend it as required. He must determine for himself what context he is supposed to be in on the basic (sic) of what was said and, if he is willing to go along with it, make the same tacit extension that his interlocutors appears to have made. (Karttunen 1974, p. 191)

Karttunen talks of accommodation in terms of the hearer inferring a context, containing certain information that the speaker is tacitly asking the hearer to interpret his utterances with respect to. In the binding theory, we think of accommodation more as an adjustment to our representation, which is our context, by adding an antecedent when needed. It works like this. If we have searched all contexts along the accessibility path from the home DRS to the main DRS for a suitable antecedent, and we haven't found one, then we need to add the same information as in the presupposition to the discourse representation in a DRS accessible from the home DRS of the presupposition triggered. This creates an antecedent that the presupposed material can now bind with. Presuppositions are

able to create their own antecedents because they have descriptive content and this is what distinguishes presuppositions from empty anaphors. Let's look at a very simple example where a definite description induces the presupposition that there is a bicycle, but because the context is empty, there is no reference marker to bind with.

(48) a. The bicycle is red.
      b. [: *α:[x : bicycle(x)],* red(x)]
      c. [x : bicycle(x), red(x)]

The presupposed material in the alpha-structure will create its own antecedent by adding itself to the main context and then binding with this added information. For simplicity I only show the result of this process in (48)c. When presupposed material is accommodated in the main DRS, it is called *global accommodation.* Accommodation is considered to be a process that revises the context in which the utterance is interpreted so that we have a context which contains a suitable antecedent. In the revised context the presupposed information can be interpreted by binding. Binding the presupposed material in the new context and updating with the asserted material then results in a new output context. Accommodation affects the context in a way different from the way asserted information affects it, revising it so that the presupposed information can be given an interpretation, rather than updating it.

Things become slightly more complicated when there is more than one level of embedding. When a presupposition is triggered in the scope of an operator that introduces an embedded DRS, accommodation also involves determining in what DRS the presupposed information should be added to, which in turn means determining how accessible the presupposed information will be to the rest of the discourse.

The procedure for determining the level of accommodation is constrained by the need to have a coherent representation. A very basic constraint on accommodation is therefore that the resulting DRS must be well-formed, in that it must be able to get an interpretation, e.g., there shouldn't be any unbound variables or unresolved alpha-structures. If a presupposition is prevented from being accommodating at a certain level because a variable would become unbound, it is called *trapping.*

Van der Sandt (1992) gives two other constraints on determining level of accommodation based on constraints on well-formed discourse developed in van der Sandt (1988). These are *consistency* and *informativity.* Accommodating the presupposed material at a certain level of embedding should also not make the representation inconsistent and it should not make the interpretation of the asserted information in the sentence where it is triggered uninformative. Looking at several examples may make things clearer.

(49) a. Julia doesn't have a bicycle. If Julia had more money, her bicycle would be red.

   b. $[_1$ x : Julia(x), $\neg[_2$ y : bicycle(y), x owns y], $[_3$ z : x had money] $\Rightarrow [_4$ z : [bicycle (z), z = ?, x owns z], red(z)]

   c. $[_1$x : Julia(x), $\neg[_2$ y : bicycle(y), x owns y], $[_3$ z : x had money, bicycle (z), x owns z] $\Rightarrow [_4$: red(z)]

   d. $[_1$x : Julia(x), $\neg[_2$ y : bicycle(y), x owns y], $[_3$: x had money] $\Rightarrow [_4$ z : bicycle (z) , red(z), x owns z]

In this example, there is no accessible reference marker for a bicycle that the induced presupposition can bind with. Because binding is not possible, we have to accommodate. In the example above, the presupposition occurs in the consequent of a conditional, which means that three levels of accommodation are possible because there are three structural positions that are accessible, e.g. at (49)b_1, (49)b_2 or (49) b_3. Global accommodation would add the presupposed information to the main DRS_1. This is what we try first. But accommodation in the main DRS, DRS_1, would make the discourse inconsistent. The discourse would read, "Julia has a bicycle. Julia doesn't have a bicycle. If she had more money, it would be red." This is not a well-formed discourse. Instead we have to try to accommodate in the next highest level of embedding accessible from the home DRS of the trigger. This is the antecedent of the conditional. If the presupposed information is accommodated here then the discourse reads "Julia doesn't have a bicycle. If Julia had more money and had a bicycle, then her bicycle would be red." This is not inconsistent, and the discourse is well-formed. Accommodation can therefore add the presupposed information to the antecedent of the conditional. Because this is between the home DRS and the main DRS it is called *intermediate accommodation*. It is also possible to accommodate the presupposition in the home DRS where the presupposition was triggered, i.e. in the consequent of the conditional. The result, represented in (49)d, would mean something like "Julia doesn't have a bicycle. If she had more money, she would have a bicycle and it would be red." This is called *local accommodation*. This is also consistent and informative with respect to the discourse, and we would consider the discourse above ambiguous between the two readings. Now consider another example of local accommodation.

(50) Because John is a bachelor, his wife isn't coming to the party with him.

John doesn't have a wife. However, the possessive NP, *his wife* triggers the presupposition that John does have a wife. This information contradicts the information in the first conjunct of the sentence. Therefore, the induced presupposition cannot be accommodated in the main context, and we have to try accommodation at the next lowest DRS on the accessibility path between the main context and the home DRS. This *is* the home DRS, embedded under negation. We can accommodate here and the meaning we then get is something like "Because

John is a bachelor, it is not true that he has a wife and that this individual is coming to the party with him."

Informativity is based on a general principle of communication which argues that assertion should communicate new information. If asserted information is contained or entailed by the local context where it is used, no new information is contributed and the asserted information is considered uninformative. If accommodation of presupposed information in a certain context would lead to asserted information in the same utterance being uninformative when interpreted, because the revised context with the presupposed information now entails it, accommodation at that level is blocked. For example (taken from van der Sandt 1992, p. 368, example (69)):

(51)   If John is married, <u>his wife</u> is happy.

Accommodation of the triggered presupposition, "John has a wife" in the main context will make the antecedent of the conditional uninformative in the revised context because it is already entailed. Therefore global accommodation is blocked and the presupposition is accommodated locally.

In addition to requirements that DRSs after accommodation must be well-formed, and that the resulting discourse needs to be consistent and informative, van der Sandt (1992) has also proposed that there is a preference for higher levels of accommodation over lower levels. This preference is related to the tendency for presuppositions to project out, though we now speak of accommodation rather than projection.

Note also that when presupposition triggers have other presupposition triggers embedded within them, each triggered presupposition could need a different type of resolution. The following example of an *it*-cleft contains an embedded definite NP which will have to be globally accommodated. The *it*-cleft itself, on the other hand, will be bound with the information in the first sentenced of the discourse.

(52)   a. Someone fainted. It was the Duchess who fainted.
        b.   [x : x fainted]
        c.   [x, y : x fainted, x is y, y = ?, α:[z : z fainted, α:[u : Duchess]]]
        d.   [x, y, u : x fainted, Duchess(u), x is y, y = u, α:[z :z fainted]]
        e.   [x, y, u : x fainted, Duchess(u), x is y, y = u]

One of the predictions made by the binding theory is that there may be examples that are ambiguous between an interpretation of binding and accommodation. An example where such ambiguity arises is given below (taken from van der Sandt 1992, p. 342)

(53)   If John has grandchildren, <u>his children </u>are happy.

Does John have children or doesn't he? It is possible to bind the presupposed information in the antecedent of the conditional, if we interpret it as compatible with the idea that having grandchildren can serve as a kind of anchor for having children because it entails having children. We then get an interpretation that John doesn't have children. On the other hand, we can globally accommodate, in which case the sentence will mean "John has children and if he has grandchildren, then his children are happy". Example (53) *is* ambiguous and the fact that this ambiguity can be straightforwardly explained in the binding theory by the availability of two resolution strategies is a plus.

In van der Sandt's (1992) article, he makes two suggestions for determining binding. The first is to begin in the home DRS where the presupposition originated and then to check each DRS in the accessibility path upwards for a potential antecedent, searching for a compatible antecedent by checking each context on the accessibility path. If no suitable antecedent has been found and we have reached the main DRS, we need to accommodate the presupposed material. If it isn't possible to accommodate in the main context because it would lead to inconsistency, uniformativity of the asserted material, or because the presupposed material itself contains a bound reference marker, this level of accommodation will be ruled out. We then test the next lowest context on the accessibility path until we reach the home DRS again. This search makes a kind of loop from the home DRS to the main context and back to the home DRS. If it is not possible to accommodate the presupposed information in any context on the accessibility path by the time the loop is completed, then the material is always able to be accommodated in the home DRS where it was triggered.[13]

The second algorithm treats presuppositions as underspecified objects and is further developed and elaborated on in Geurts (1999). Presupposed information is associated with an underspecified DRS that will be resolved in some DRS that is accessible to its home DRS. This is in line with the current trend in computational semantics of using underspecified representations (e.g. see van Deemter & Peters 1996, Blackburn & Bos, 1999a, 1999b, Pinkal, 1999, Cooper et al. 1995, van der Sandt, et al., 1997). It also allows for easier incremental processing, something that is advantageous for a computational implementation, and should also help when a presuppositional expression has other presuppositional expressions embedded in it, and where it may be necessary to wait until the resolution of one before analyzing another.

This first characterization of the algorithm fits nicely with a preference for global accommodation because the alpha-structures with their presuppositions have been moved up to the main DRS during its search for a potential antecedents.

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[13] Beaver (1997) has called this the move-alpha for presuppositions, and compared it to Russell's analysis of definite descriptions. This is because the presupposed material is moved about until it reaches a level of embedding where it has the right 'scope' in a sense.

If this search fails, global accommodation is tested first and the presupposition will be accommodated most easily there. The second algorithm is more neutral and preferences have to be defined by different means.

There are two developments of the standard binding theory that are worth mentioning here. Kamp's (2001) recent work has dealt with the problem of several triggers occurring in the same utterance. Kamp has proposed using stores to keep the presupposed and anaphoric information together in an underspecified structure. Because one presuppositional expression may have other presuppositional expressions embedded in them, it may be that they need to be resolved in a certain order depending on the characteristics of each trigger and the sentence in which they are triggered. For example, *again* is a trigger that often cannot be resolved until after the sentence has been processed at least partially. The correct order may sometimes only be apparent when the entire sentence has been analyzed. In order to make sure that the presuppositions get resolved in the correct order they are kept in a storage structure until they are needed or can be resolved.

In the above discussion, I have sidestepped the actual representation of abstract objectss at the level of discourse representation. In order to accurately handle many of the presuppositions induced by the triggers studied here, we would need a version of DRT that incorporates reference markers to states and events, as well as an extension of DRT that incorporates propositional reference markers. It is possible to represent and resolve the presupposition triggers studied here in standard DRT as I have done, and still illustrate approximately how it will work. This avoids many technical details and the general idea is much clearer. However, I am aware that this method is not quite correct and also obscures the idea of the information triggered being a unified object because abstract object presuppositions are instead treated as DRS-conditions and associated discourse referents, depending on the trigger.

The reader can find a detailed extension of DRT that can handle abstract objects in Asher (1993). For a conservative extension of DRT with propositional reference markers that also illustrates their use in resolving presupposed information, see Geurts (1999). Geurts' (1999) work also extends the binding theory to deal with two other classes of examples, presuppositions triggered under propositional attitude contexts and presuppositions triggered in modal contexts, two very interesting problems in presupposition theory.

At the beginning of this chapter the question was asked what presuppositions are. The binding theory answers this question by arguing that they are anaphors, or that anaphors are presuppositions depending on how you wish to describe it. Presupposed information differs from anaphoric information in that the former can be felicitously used to introduce discourse-new information through accommodation, but otherwise presuppositional expressions can be treated like anaphoric information. Now let's look at another popular theory that has a very different answer to the question, considering presuppositions to be constraints on contextual update.

2.4   THE SATISFACTION THEORY

The main competitor of the binding theory is the satisfaction theory. The satisfaction theory's roots go back to ideas first presented in Karttunen (1974) and Stalnaker (1974) and was developed later most completely by Heim (1983). Others who have worked to develop the theory further are Beaver (1992, 1997). The satisfaction theory needs a very different kind of semantics than the binding theory, a semantics that allows for contextual update in a very different way than DRT, and this semantics actually grew out of the desire to try treat presuppositions. Examples of semantic systems with these properties include File Change Semantics (Heim 1982), Veltman's Update Semantics (Veltman 1996) or Dynamic Predicate Logic (Groenendijk & Stokhof 1991).

In these semantic theories the meaning of a sentence is the way in which it affects its context; i.e. the potential a linguistic expression has to affect the context in which it is used. This is very different from the standard static truth-conditional approach to meaning where the meaning of a sentence is its truth conditions; that is, knowing what must hold for it to be true. Context change semantics also allows information update on a context without using any intermediate representation before interpretation. Note that in this way it differs substantially from DRT, where a representational level is considered essential, and the representation is then interpreted in a model. It also means that a context change semantics doesn't leave a derivational record of how the context was previous to each update. Each unit of information contributes to the already given context by updating it to a new context which contains the information, and no record of the derivation is kept because the theory doesn't have a level of representation, and in fact considers it unnecessary. However, the lack of a level of representation is one of the reasons why the theory has certain problems in dealing with presuppositions and also one of the main reasons why it is not an intuitive choice for analyzing presuppositions in natural discourse with an eye to eventually automating this process.

The satisfaction theory as presented in Heim (1983) works in the following way, a context is a set of worlds and the meaning of a linguistic expression is its context change potential, its CCP. How does a sentence affect a context e.g. how will it affect this set of possible worlds when the sentence is added? Some worlds will be removed, i.e. all those worlds which are not compatible with the information contributed by the sentence and we end up with a new set of possible worlds, e.g. a new context. Given a context **c**, and a simple sentence **S**, then updating **c** with **S**, **c + S = c'**, where **c'** is the new context containing only those worlds where **S** is true. Look at one of the earlier examples again, given as (54) below:

(54) S_1: Julia has a bicycle. S_2: Julia's bicycle is red.

If we begin with an empty context **c** (i.e. the set of all worlds) and update this with the content of S_1, (removing all possible worlds where Julia doesn't exist and where Julia doesn't have a new bike from the context) we end up with a new context **c'.**

In all the worlds in **c'**, **S₁** is true; that is in all worlds in **c'** Julia exists and Julia has a red bike.

We then proceed to update the next sentence. But here Julia's bike is a definite description that presupposes that the propositional information that Julia has a bike is already part of the context in order for the update to be defined. This is because presupposition triggers add an additional meaning component to the CCP of the expression by which they are triggered – they specify the requirements on the context for the use of the sentence.[14] We can write the presupposition of a sentence in curly brackets, as in **[S{p}]**. In order to update **c'** with the sentence **S₂**, we first check that its presuppositions are satisfied**.** We do this by checking that the presupposition **p** is already satisfied in the **c'**, the context being updated. To be satisfied means to be true in the context. We know that **c'** satisfies **p** because we know that we were successful in updating sentence **S₁**. So we know that in **c', p** is satisfied, that is, in all worlds in **c'** Julia does have a bike. Then contextual update just proceeds as normal, by removing all worlds where this bicycle isn't red from **c'** and we get a new context, **c''**.

In this way, the satisfaction theory treats, presuppositions as requirements placed on contexts. Presupposition triggers require that the information they presuppose is already satisfied in the local context in which the carrier sentence is used. In other words, the sentence is not felicitous if the presupposed information is not already true before the carrier sentence is interpreted. So when a sentence **S,** which presupposes **p** is going to update **c, p** must already be satisfied in **c** for the update to be defined. This is unproblematic as long as the presupposed information is satisfied in the context, as in the example above.

The example above was simple in that it didn't contain any embedded contexts. Modeling embedded contexts in context changes semantics is more complicated. Below are rules for the interpretation of each of the major logical connectives and their CCP properties, using the notation system used in Heim 1983).

(55)   a. $c + [\ S\ ] = c' : \{\ w \in c \mid S$ is true in $w\ \}$, if S is a simple sentence.
        b.   update c with $\neg S : c - (c + [\ S\ ]) = c'$
        c.   update c with $S_1 \vee S_2 : \ c + [\ S_1\ ] \ \cup c + [\ S_2\ ] = c'$
        d.   update c with $S_1 \wedge S_2 : c + [\ S_1\ ]\ [\ S_2\ ]\ ($ e.g. $c + [\ S_1\ ] = c', c' + [\ S_2\ ] = c'')$
        e.   update c with $S_1 \rightarrow S_2 : \ c - (c + [\ S_1\ ]\ - (c + [\ S_1\ ]\ [\ S_2\ ]))$
        f.   update c with $S_1\{p\} : c + [\ S_1\ ]$ if p is satisfied in c

How would update proceed if S_1 is *Julia doesn't have a bicycle?* To determine the CCP for a negated sentence, the context updated with the sentence, and then this

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[14] This is actually because Heim's CCP is a synthesis that captures two of the kinds of meanings that lexical items have in Karttunen & Peters (1979) paper, the content information and the so-called heritage conditions which determine the potential projection properties of lexical items and are based on Karttunen (1973). See Heim (1983) and Karttunen & Peters (1979) for more information.

updated context is subtracted from the original context. In this example, we first update **c** to obtain all worlds where Julia does have a bicycle and then we subtract this context from the original **c.** The result is all worlds where Julia does not have a bicycle.

If a presupposition is not defined in the context then trying to update will result in undefinedness. But fortunately the satisfaction theory has a way to get around this by using some additional rules that allow for presupposition accommodation. Let's pretend we need to update an empty context with the following sentence:

(56)   Julia's bicycle is red.

We start with an empty context **c.** The sentence we want to update with contains the information contributed by the definite NP *Julia's bicycle* and this presupposes that Julia has a bicycle, **p.** So updating **c** become **c+[S{p}]**. First we have to test if the presupposition is satisfied in the context. Because the context is empty the answer must be no; **c** still contains worlds where Julia doesn't have a bicycle. But we can pretend that the context already included the presupposed information by revising the context **c** to a context that satisfies the presupposition by taking on those worlds where Julia has a bicycle, a revised context we can call **c'.** Then we update with **S** using **c'+[S{p}]** rather than **c.** The presupposition is satisfied in the revised context and the sentence can be processed without any problems.

Accommodation is less straightforward in the satisfaction theory when dealing with presuppositions triggered under embeddings. If we take an example where a presupposition is triggered under negation, we can illustrate both local and global accommodation. Look at the following example:

(57)   **S**: Julia's bicycle is not red.

We start with a new context **c** and then we analyze the sentence **S. S** induces the presupposition **p** that Julia has a bicycle. Because we have an empty context we know that the context we are dealing with contains not only the worlds where the presupposition is true, but also where it is false (e.g. because an empty context contains all possible worlds, it contains worlds where the presupposition is both true as well as those where the presupposition doesn't hold). We want to evaluate our sentence only in those worlds where the presupposition holds so we have to first remove the worlds where the presupposition is not true. Note that according to the rules of embedding given above the update of the context **c+[¬S{p}] = c − (c+[S{p}]) = c'**. We can accommodate the presupposition globally or locally. Global accommodation of the presupposition in   **c − (c+[S{p}])** amounts to revising both contexts, in effect **c+p − (c+p+[S{p}])**. Thus, contextual update with **S** is then performed only on the set of worlds where the presupposition is satisfied. In our example this would amount to first taking only the worlds where Julia has a bicycle, and then updating with the information that the bicycle is not

red, which is achieved by taking all the worlds where the bicycle is red and removing them from the set of worlds where Julia has a bicycle.

We can get local accommodation by insuring that the presupposition is satisfied in the second **c**. We do this by removing all the worlds in this **c** where the presupposition doesn't hold. We then have in effect **c − (c+p+[S{p}])**. We then subtract the result of these operations from **c**. In our example this amounts to first taking all the worlds where Julia has a bicycle and this bicycle is red and removing them from the set of all worlds. The result is the set of worlds where Julia doesn't have a bicycle, where this bicycle certainly cannot be red because it doesn't exist. It should be clear that this is actually not the most natural interpretation of the sentence and that global accommodation is strongly preferred.

Accommodation as described above works with embeddings like negation, where it makes the same predictions as the binding theory. But it gives the wrong predictions however for conjunctions and conditionals because it always predicts that we accommodate a conditionalized presupposition. This problem is well known (see e.g. Karttunen 1974 and Karttunen & Peters 1979) and is termed "the proviso-problem" by Geurts (1999). When presuppositions are triggered in the consequent of a conditional, or the second part of a conjunction, the presupposition of the entire utterance is predicted by this theory to be a conditionalized presupposition, which is too weak compared with our intuitions. Examine example (58).

(58)   If Julia is bakes cookies, then her brother will steal them.

The most natural interpretation is on which means Julia has a brother and if Julia bakes cookies he will steal them. This is where the presupposition that Julia has a brother, triggered by the possessive noun phrase in the consequent of the conditional, is globally accommodated. But the presupposition accommodated in a context change analysis will be conditionalized, and rather than accommodating that Julia has a brother, we accommodate the less intuitive weaker presupposition that if Julia bakes cookies, then she has a brother.

The reason for this is that the interpretation of the second conjunct in conjunction and the interpretation of the consequent of the conditional both are interpreted in a context that has already been updated with the first conjunct and the antecedent of the conditional respectively. For the above example it means that we first update the context **c** with the information in the antecedent of the conditional, by taking only those worlds where Julia bakes cookies, to **c'**. But we want to first only have those worlds where if Julia bakes cookies her brother steals them. Because the presupposition that Julia has a brother isn't already satisfied in the context **c'** we need to accommodate it. We will then accommodate it in the context **c',** by revising this context to those worlds where Julia has a brother. But the set of possible worlds in **c'** is already limited to only those worlds in which Julia bakes cookies. Because we have already updated **c** we can't get back to it to revise it to only those containing Julia's brother. So we end up removing the worlds where

Julia doesn't have a brother from the set of worlds where Julia bakes cookies, rather than removing it first from all the world, and then taking only the worlds where Julia bakes cookies.

In some examples the presupposition is related to the information in the antecedent of the conditional. For these examples some researchers have argued (Beaver, 1992, to appear) that a conditional presupposition is actually the correct prediction, and they have argued that the binding theory fails in that it can't account for these conditional presuppositions, for example:

(59)   If Fred is a scuba diver, then he will bring his wet suit.[15]

Here it seems that it is more likely that we *want* a conditionalized presupposition, that is that Fred has a wet suit *is* contingent on him being a scuba diver. However, these counterexamples all seem to share an intuition that there is a potential entailment relationship or an anaphoric relationship between the antecedent and the presupposition, and that this relationship makes the presupposition already satisfied in the antecedent, preventing the presupposition from being globally accommodated.

Intermediate accommodation is also a problem for the satisfaction theory because in this theory there is no mechanism for representation. For example, consider how updating proceeds with a conditional of the form $S_1 \rightarrow S_2\{p\}$. If the presupposition needs to be accommodated in the antecedent of the conditional we run into problems. According to the update rules given in (55), $c+[\ S_1 \rightarrow S_2\{p\}]$ is the same as $c - (\ c+[\ S_1\ ] - c+[\ S_1\ ]\ [\ S_2\{p\}])$. First, the context is updated with the information in S_1, i.e. $c+[\ S_1]$. This results in a context we can call c'. Now our expression is $c - (\ c'-c'+[\ S_2\{p\}])$ and our next step is to update c' with $[\ S_2\{p\}]$, i.e. $c'+[\ S_2\{p\}]$. But first we have to make sure that the presupposition p is satisfied. Because we began with an empty context, we will need to accommodate p.[16] Local accommodation would be possible because we could revise the second c' to one that satisfies p. But there is no context in our current expression that can be revised to result in intermediate accommodation. For intermediate accommodation we need to "back up" to the second c in our original expression, i.e.: $c - (c+p+[\ S_1\ ] - (c+[\ S_1\ ][\ S_2\{p\}])\ )$ But because contextual update proceeds incrementally we will never know if we need to intermediately accommodate until after we have made a contextual revision that prevents intermediate accommodation. That is, at the point in time where we realize that we need intermediate accommodation our expression is $c - (\ c'-c'+[\ S_2\{p\}])$. And because we don't keep a derivational history (which would in effect be a level of representation, something CCS argues is unnecessary) we can't get back to the

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[15] This example is from Geurts (1999), p. 97, and he attributes it to Manfred Krifka.
[16] If p had been part of the information in S_1 then p would already be satisfied.

expression we need. Because of this, intermediate accommodation cannot be handled in the satisfaction theory.

Notice that in order to allow for any level of accommodation in the satisfaction theory meta-rules have to be added that aren't part of the original context change semantics, rules that allow us to manipulate the context. This is also a disadvantage because it means that the original tidy treatment doesn't cover all the ways presuppositions are used and is one objection against the satisfaction theory.

In summary, the satisfaction theory's approach to accommodation is rather unclear, in that we need meta-rules in order to accommodate.[17] It will in some cases make predictions that are too weak, e.g. the proviso problem. Finally, it isn't obvious how we can ever get intermediate accommodation. All these problems are serious, but most important is how intuitive it seems to use the satisfaction theory to analyze real data, and in this endeavor the binding theory is conceptually easier to use.

It may *seem* as though examining a context to see if presupposed information is satisfied and examining a representation to see if a suitable and accessible reference marker is present are similar tasks, regardless of which theory the results are described in (cf. Zeevat 1992, also briefly mentioned below). But the difference is actually crucial. It is the difference between conceiving of presuppositions as linguistic objects that can be manipulated and interpreted or as informational requirements on contexts.

More important are the differences in the theories of meaning they are used with. Building a representation incrementally is straightforwardly adapted to an automatic setting. To even begin to make some sort of analysis using a context-change semantics we will need some sort of initial representation of the empty context to start with. But the empty context in context change semantics is the set of all worlds, and it is unclear exactly how this could be generated or defined in a way that will work for a practical implementation. Additionally, it is not clear how we can use a context-change semantics for discourse interpretation that evaluates meanings in relation to possible worlds rather than manipulating representations. At the least we will need a definition of what exactly we are assuming is in **c** at each point in the analysis, and that amounts to a representational level being necessary.

Also the anaphoric theory is agreed by many (Beaver 1997 and Asher and Lascarides 1998b) to have the best empirical coverage in that it gives correct predictions for most of the examples in the classical literature on presuppositions. The theory is formulated in a very procedural way, making it easy to use when doing corpus analysis. It is implemented in DRT as is a large amount of work anaphor resolution, making it easier to relate the results of this other work to the current study, a clear plus when evaluating the idea that presuppositions are anaphoric. Without further provisions the CCS cannot keep track of effects of

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[17] But see Beaver's (1992) filtering approach to accommodation, as well as the modifications made to the theory by Zeevat(1992), which is explained briefly in the following section.

saliency on antecedent availability for anaphoric expressions are. This information would have to be represented someplace else, which would then seem to destroy the elegance of the framework. Finally, the anaphoric theory has a more developed and functional set of guidelines for determining binding and level of accommodation than the satisfaction theory has for determining satisfaction and accommodation because the binding theory is used within a framework that supports more representation and analysis.

The satisfaction theory only requires presuppositions to be satisfied within the context, but how, or what the satisfaction is based on is not relevant for contextual update to be possible. As van der Sandt (1992) has pointed out, it does not take into consideration the possibility that hearers may have more than one reason to consider a presupposition satisfied, i.e. there may be more than one potential antecedent. It will certainly have trouble dealing with ambiguous examples where there is more than one potential antecedent. The binding theory can deal with this, because the resolution process itself demands that the right antecedent is identified. In this fundamental way the anaphoric theory aims to relate the presupposition to the rest of the discourse more explicitly than the satisfaction theory and it is this type of representation that will be most useful for applications.

2.5 VARIATIONS ON THE ORIGINAL BINDING THEORY

2.5.1 Zeevat (1992)

Zeevat (1992) argues that the binding theory and the satisfaction theory are actually not as different as the frameworks which they are extensions of. In order to show this he modifies the satisfaction theory so that it can keep track of its derivational history by saving intermittent contexts in a stack. This allows his version to model intermediate accommodation. This, and some other modifications, make the similarities between the binding theory and the satisfaction theory more apparent.

However, the main reason why this article is relevant for the current work is because Zeevat makes a distinction between two different types of triggers, argued to behave in different ways with respect to both binding and accommodation. The first group of triggers is given the name **resolution triggers**, and these are exemplified by *definite descriptions, when* and *after* clauses and potentially also *it-clefts*. According to Zeevat, the presuppositions induced by the triggers in this group behave most similarly to anaphors. The presuppositions induced by these triggers therefore are also those most easily handled by the binding theory. They have the function of "collecting entities from the environment to say new things about them", (Zeevat 1992, p. 394). The second group, called **lexical triggers**, are presuppositions associated with lexical items which have applicability conditions. An applicability condition is when 'the application of a concept is only an option if certain conditions are already met' (p. 397). An example of a lexical presupposition is a word like *bachelor,* which presupposes that the referent of the word must be an individual who is male and unmarried. Aspectual verbs also belong here, in part

because most actions and states have pre-conditions associated with them, similar to the sortal restrictions associated with other lexical triggers. Zeevat argues that presuppositions induced by these triggers behave more like the characterization of presupposition given in Karttunen (1974) and Heim (1983) in that they need to be satisfied in order to allow information update. Zeevat also mentions a third group of triggers that should perhaps be treated differently, and the relevant examples are *too, also, another* and *again*. The presuppositions of these triggers perform more of a bookkeeping functions, i.e. "the bookkeeping that prevents similar objects from being confused with each other"(p. 399).

2.5.2 Asher & Lascarides (1998b)

Asher & Lascarides (1998b) is a variation of the binding theory that makes more explicit the role of world knowledge and rhetorical relationships in presupposition resolution. They treat presuppositions within segmented DRT, or SDRT. SDRT was first presented in Asher (1993) and in Lascarides & Asher (1993). SDRT extends DRT by incorporating an additional level of analysis that takes rhetorical relationships and coherence relationships into consideration. Segmented DRSs add another level of structure on top of the logical structure of DRT which makes explicit rhetorical or coherence relationships that can hold between the propositions in the discourse. Examples of include *Explanation, Narration* and *Result.* An example of the latter two are given below (taken from Lascarides & Asher, 1993, p. 437). In (60), the event described in the second sentence is considered to be a consequence of the event described in the first sentence and is therefore related by the rhetorical relation *Narration.* The example given (61) in illustrates a rhetorical relationship that will be interpreted as a *Result*, where the second sentences is a state or event that is the result of the event presented in the second sentence.

(60)   Max stood up. John greeted him.

(61)   Max switched off the light. The room was pitch dark.

Each proposition expressed in a discourse needs to be related to the rest of the discourse representation by a rhetorical or coherence relationship. So each new proposition is considered to be underspecified for two values, the value of the relationship, $R = ?$ and the attachment site in the discourse representation, $u = ?.$ These values are determined in part by using a separate glue logic, DICE (Discourse in Common Sense Entailment) which only performs deductions on propositions, not on the semantic content of the DRSs. DICE is called a glue logic because it only determines what propositions are related via what relationship, thereby linking propositions together based on conclusions made from its set of deductive rules, and at the same time adding additional information. DICE takes temporal information and to some degree world knowledge into account in

describing defeasible inference rules, i.e. rules that generate inferences that may later be revised or abandoned because of additional knowledge.

Asher & Lascarides (1998b) treat presupposition resolution as an integrated part of the task of building a discourse representation. They believe that the original binding theory cannot properly deal with all examples of presupposition because it lacks a richer representation of discourse structure which place a part in some examples. They consider one of the biggest problems with the binding theory to be its treatment of accommodation. Accommodated information is not related to the discourse in any principled way, it is merely added. That there is a need for accommodated information to be integrated into the discourse representation is often noted in binding theory literature (e.g. van der Sandt, 1992, Geurts 1999), but how and to what degree this integration should proceed is not discussed in any detail, if at all. Asher & Lascarides' (1998b) proposal eliminates the need for pure accommodation by instead treating all cases that would be accommodated in the original binding theory as binding to a rhetorical relationship. This is one of the important ways in which their treatment of presupposition differs from the original binding theory. They also believe that they can explain more easily why some uses of accommodated presuppositions result in infelicitous discourses, an explanatory ability that they see as a definite advantage over van der Sandt's (1992) account which would treat these examples as normal, permissible adjustments of the input context by accommodation.

In their account, binding and accommodation are both treated by the same method — by binding via a rhetorical relationship to the rest of the discourse representation at some accessible attachment site. Because they also consider non-identity relationships such as the relationship between inferred information, such as bridging NPs, to a be related by binding to other objects in the discourse, basically all information is resolved by the same method. At first glance this seems to blur the distinction between assertional meaning and presuppositional meaning. However, when the resolution process begins, the presupposed information and the asserted information are separated. In resolution, presupposed information is treated differently than asserted information in two important ways.

First, presupposed information is generally related to the discourse by the rhetorical relationship of *Background,* where the presupposition is considered to be background information to the proposition to which it attaches. Alternatively the presupposition can be related to another proposition by *Defeasible-Consequence* or *Def-Con,* where the proposition to which the presupposition is bound is considered to be a defeasible consequence of the presupposition. The majority of triggers are rhetorically related via *Background* or *Defeasibile-Con* and this is meant to capture the intuition that presupposed information is backgrounded or taken for granted. Some triggers however, particularly particles, are treated differently, associated with a particular rhetorical relationship almost exclusively. Asher and Lascarides mention *too* in particular, where the presupposition it triggers is always rhetorically related via the *Parallel* relationship to another proposition. The induced presupposition of *because* is always related via the relation of *Explanation* to an earlier proposition in

the discourse. Thus, presupposed information distinguishes itself from asserted information in the way in which it is rhetorically related to the discourse.

The second way in which presupposed information is treated differently is in the resolution of the attachment site, i.e. *u = ?*. Presuppositions are permitted to be attached to any SDRS on the accessibility path from the SDRS where they were introduced, whereas asserted information is confined to the site where it was introduced. This is necessary in order to account for the projection behavior of presuppositions.

Let's look at an example. Some of the rules for identifying a *Background* rhetorical relationship are given below (taken from Asher & Lascarides, 1998b, p. 261-262) to make the discussion more concrete:

(62)   **Background:** $(\langle \tau , \alpha, \beta \rangle \wedge \text{state}(\beta)) > \text{Background}(\alpha, \beta)$

       Axiom on Background: $\text{Background}(\alpha, \beta) \rightarrow \text{overlaps}(e_\alpha, e_\beta)$

The *Background* rule requires that the information treated as background to another proposition must be stative. The *Axiom on Background* adds the additional information about the temporal relationship between the events involved. If a proposition β is related by *Background* to α, then the event associated with α and the event associated with β must overlap temporally. This type of information can be used to help identify the attachment site as well as insure that the correct relationship is identified. Let's take one of the earlier examples where the presupposition would be accommodated to illustrate how Asher & Lascarides system would work. :

(63)   <u>Julia's bicycle</u> is red.

In Asher & Lascarides system, Julia's bicycle wouldn't be accommodated to the main DRS as in the binding theory, but instead would be bound with a rhetorical relation *Background*. Because this presupposition occurs in an empty context, we only have the rest of the asserted context of the presupposition to serve as an attachment site, e.g. *it is red.* In a case like this the main SDRS for the entire discourse is first updated with the asserted information that something is red, and then the presupposition that Julia owns the bicycle is able to be attached to the asserted information via the rhetorical relationship, so *u* is resolved to the proposition 'it is red' *,* and *R* is resolved to *Background.*

2.5.3 Bidirectional OT

There has been some recent work on modeling presuppositions in a Bidirectional Optimality Theory version of the binding theory developed by Blutner (2000) and Zeevat (1999, to appear). Optimality Theory is a paradigm that incorporates the

effects of alternative candidates on the winning output, and a good introduction can be found in Archangeli & Langendoen (1997). Other frameworks generally treat candidate expressions or interpretations in isolation. Blutner argues that an awareness of alternatives in both production and interpretation can in part account for cases where a presuppositional expression is felt to be somehow pragmatically anomalous.

Basic OT has three key components, **Gen**, **Con**, and **Eval**. **Gen** generates all potential candidate outputs for a given input. **Con** is a ranked set of constraints that **Eval** then uses to evaluate each candidate to determine the optimal output for the given input. OT constraints are soft constraints, meaning they can be violated. OT-syntax and OT-semantics are uni-directional forms of OT. OT-syntax takes a given meaning and then evaluates candidates to determine the optimal form for expressing this meaning, i.e. taking the perspective of the speaker in production. OT-semantics takes a form and then evaluates candidate meanings to determine what would be the best interpretation, i.e. taking the perspective of the hearer in comprehension. The evaluation process is represented in a tableau where candidate outputs are listed along with the constraints relevant to their evaluation.

Blutner (2000) proposes a bidirectional version of OT where form-interpretation pairs are evaluated in relation to other candidate form-interpretation pairs. A superoptimal pair $\langle A, \tau \rangle$ is a pair where a given form A is always optimally interpreted as leading to an output τ, and vice versa, e.g. generating an expression to reach an output context τ is always optimally done with form A, and vice versa. Two constraints cover the main needs of presupposition interpretation, AVOID ACCOMMODATION (AVOIDA) and BE STRONG (explanations given below adapted from Blutner, 2000, p. 209).

> **AVOIDACCOMMODATION (AVOIDA)**: Count each discourse marker that must be accommodated as a violation.
> **BE STRONG** : Evaluate pairs $\langle A, \tau \rangle$ with stronger outputs τ higher than pairs with weaker ones.

The first constraint captures the preference for binding over accommodation, and the second captures the idea that speakers will prefer stronger interpretations over weaker ones, believed by some to be at the root of a preference for higher levels of accommodation, over lower ones, discussed in more detail in section 5.4. AVOIDA is ranked higher than BE STRONG.

Tableau 1 illustrates a simple example of an OT interpretation of a presupposition triggered in the consequent of a conditional in an empty context. This example is based on Blutner's 2000, example (17), (p. 209). There are three candidate interpretations, global, intermediate and local accommodation for one form, (here we are not comparing form-interpretation pairs but only uni-directionally what interpretation would be optimal).

Tableau 1 interpret : If Julia bakes cookies, <u>her brother</u> eats them.

input: if a then b{p}	AVOIDA	BE STRONG
⟫→ 1. p, a ⇒ b (global)	*	
2. (a ∧ p) ⇒ b (intermediate)	*	*(1 >2,3)
3. a ⇒ (b ∧ p) (local)	*	*(3 >2)

All three interpretations demand accommodation, violating AVOIDA. Thus, the constraint that determines the winning candidate is BE STRONG. Because candidate 1 is semantically stronger than both candidate 2 and candidate 3, the winning interpretation is candidate 1, i.e. global accommodation. The winning candidate in interpretation is always marked with an arrow (⟫→).

Blutner (2000) developed Bidirectional Optimality Theory to account for several well known pragmatic problems, arguing that taking the perspective of both the hearer and the speaker at the same time offers a solution. His treatment of presupposition projection is meant to illustrate how Bi-OT can be applied to structural underspecification. Bi-OT takes the position of radical pragmatics, treating meaning as underspecified for interpretation. Only by applying pragmatic principles to meanings to resolve this underspecification can we get an explanation for preferences in interpretation.

The pragmatic principles in bidirectional OT that constrain interpretation as well as production are based on neo-Gricean principles of cooperation. Blutner (2000) uses the pruned Gricean principles introduced by Atlas & Levinson (1981) and Horn (1984), generally known at the Q-[18] and I-principles. Examine the following definitions:

> **Q-principle**:   *Say as much as you can (given I)* (Horn, 1984)
> **I-principle:**   *Say no more than you must (given Q).* (Horn, 1984)
> *Read as much into an utterance as is consistent with what you know about the world* (Levinson 1983: 146-147)

In general, Bi-OT uses the Q-principle to constrain generation and the I-principle to constrain interpretation. But the way they are defined makes them dependent on each other as well. In Bi-OT the optimization of interpretation and optimization of generation constrain each other. Presuppositional binding is argued to be a direct effect of fully complying to the I-principle in interpretation; that is, not interpreting more than is necessary. Blutner also argues that the blocking of accommodation in some cases can then be explained as a consequence of the Q-principle, in that speakers should not say more than they can. A bidirectional perspective can then

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[18] Horn uses the term the 'the R-principle' rather than 'Q-principle' but I will follow Atlas and Levinson (1981) and Blutner (2000) and use the term 'Q-principle'.

account for one of the problem examples brought up by Asher & Lascarides and repeated here (Asher & Lascarides, 1998b, p. 247, example 3).

(64)   a.   Speaker A: Did you hear about John?
       b.   Speaker B: No, what?
       c.   Speaker A: He had an accident. A car hit him.
       d.   Speaker A: He had an accident. ??The car hit him.

Asher & Lascarides have argued that the binding theory fails to explain the difference in acceptability between (64)c and (64)d, because both will be given the same end representation. But (64)d is clearly worse than (64)c in a neutral (empty) context.

Blutner points out that (64)c and (64)d can be considered to be expression alternatives for generation, because both of them *will* generate the same output context. What distinguishes them is the complexity of the processing necessary to get to that output context. Processing (64)d will demand accommodation of *the car,* which involves first adjusting the input context (in the binding theory process of interpretation, not the Bi-OT input context) by accommodating the presupposition and then processing the rest of the sentence. This means that the interpretation process necessary for (64)d is more complex than for (64)c and speakers will prefer to generate (64)c in a neutral situation. The form in (64)d will then generally be blocked because of the Q-principle, which encourages choosing the simplest procedure to get to the desired output context, which is (64)c. Because Bi-OT predicts that hearers are conscious of the generational candidates available to speakers, we can explain the anomaly felt in (64)d as being the result of our awareness that the speaker could have chosen another, simpler form, i.e. (64)c. There are no competing interpretations that do not need accommodation so the only way to interpret (64)d, so the anomaly felt can only be explained if hearers are believed to be aware of other generational alternatives.

The effects of AVOID A also has been used to account for when accommodation is licensed, and Zeevat (1999, to appear) has argued that it accounts for why pronouns do not accommodate, i.e. there will always be a candidate for generation that doesn't demand accommodation. Forms that require accommodation will never be generated by speakers if there is an equivalent form that does not require accommodation. This account of what licenses accommodation is discussed in much more detail in 5.3

Zeevat has also used and expanded on Blutner's version of the binding theory in Bi-OT in Zeevat (to appear). In this recent article, Zeevat continues his heterogeneous treatment of triggers, combining ideas from several earlier articles (e.g. Zeevat 1992, 1994, 1999). He identifies three main groups. The **referential anaphoric triggers** contain "referential devices such as name, pronouns, definite descriptions, demonstratives and others" (Zeevat, to appear, p. 69). He has argued that they may not themselves carry an existence presupposition but that the existence presupposition we generally associate with them is actually contributed by

the predicates in which they appear as arguments. The second category is the **non-anaphoric referential triggers** that includes particles like *too, also,* and *even* as well as intonationally marked topics. These triggers generally do not accommodate easily. The third category are the **lexical presupposition triggers** which includes lexical items that are associated with requirements, and would include words like *bachelor.* Zeevat (to appear) also expands on Blutner's (2000) Bi-OT treatment by giving a more detailed explanation of what types of constraints will be necessary in order to predict the form of generated NPs for referring to semantic objects with different statuses in the discourse, for example if the referent is old, salient or unique. He also discusses at length the explanation that accommodation is only licensed when there is no non-presupposing alternative.

2.6 SUMMARY

This introduction should give the reader enough background information to understand the rest of the dissertation. The corpus data is used to evaluate the practicality of using the binding theory to analyze naturally produced examples and to discuss some of its claims about the behavior of presuppositions, as well as other claims in the literature. We have already seen in the last section where variations of the binding theory were discussed that there are several problems and unanswered questions about the function of presuppositions. Here, naturally produced examples of presupposition in context can perhaps give us some additional data with which to discuss these problems.

A note on terminology for the rest of this work. Throughout I will talk of analyzing an inference triggered by a presuppositional expression as *resolving* it. I refer to an inference triggered by a presuppositional expression in a particular utterance as the *triggered presupposition,* or *induced presupposition.* An induced presupposition is only considered a *presupposition* of a particular utterance if it has been resolved by global accommodation; that is, it has been projected. Resolutions that lead to globally accommodated presuppositions result in a *presupposing* reading of the utterance, whereas resolution by binding or by local or intermediate accommodation leads to a *non-presupposing* reading. I will use the terms *bound presuppositions, accommodated presuppositions* and e.g. *factive presuppositions* as abbreviated forms for *induced presuppositions that are resolved by binding, induced presuppositions that are resolved by accommodation,* and *presuppositions triggered by factives* respectively. I will also talk of *presuppositions* in general, by which I mean the inferences triggered by presuppositional expressions regardless of the resolution. This use of terminology is not ideal, but it is consistent with the earlier literature while still allowing me to address categories and resolution strategies used in current theories.

3 Data and Method

Existing work on presupposition has mainly dealt with made-up examples that could illustrate their logical properties. Looking at naturally produced examples in a context yields new information about well-known difficulties and presenting some previously unseen problems. Also, presuppositions are a context-dependent phenomenon and using spoken corpus data in particular has the tangible advantage that it allows the communicative effect of the use of a presupposition to be gauged by observing the linguistic reactions of the other discourse participants.

Currently, there is very little corpus work on presuppositions, and most of it has been on written discourse. The only corpus studies I am aware of have focused on it-clefts (Prince, 1978; Delin, 1995; Collins, 1991) and definite NPs (Fraurud, 1990, Poesio & Vieira, 1998), though few of these studies have looked at these items from a presuppositional perspective and only two of these looked at spoken language examples (Collins 1991, Prince 1978) Also, almost all of this research was done before the development of the binding theory, and none of the work evaluates the idea of treating presuppositions as anaphors.

In this chapter I introduce the London-Lund Corpus of Spoken English (LLC) from which the corpus examples in the study were taken, including information about the corpus, how it was collected and the type of annotation that is available with it. Studying transcripts of multi-speaker discourse is not completely straightforward. There are interruptions, unclear syntactic structure, and overlapping speech, all of which complicate analysis. Some examples have to be excluded because it is impossible to analyze them in a satisfactory way based on information in the transcript alone. But I think the advantages outweigh the difficulties. In the concluding section I present how these difficulties will be dealt with as well as details of the discourse segmentation, and prosodic features coded

in the corpus as well as the terms used to refer to them throughout the rest of the thesis.

3.1   WHAT CAN WE LEARN FROM CORPUS DATA?

Most work and literature on presuppositions had studied them using the method common to formal semantic work. Researchers create examples sentences that illustrate the use of the presupposition trigger and then examine how the presupposed information in the sentence is affected or alternatively affects different contexts, in the form of different types of logical embeddings in complex sentences or made-up discourses manipulated so that different logical relationships will hold. This kind of research was introduced in the last chapter. This is very important work and has given us a great deal of information about what logical properties presuppositions have and what other linguistic and contextual properties interact with and affect presuppositions.

However, there are many aspects of presupposition that this method can say very little about, but which natural language examples taken from a corpus can contribute to our understanding of what presuppositions are and how they are used. Corpus work can tell us about preferences for using presuppositions with different resolution properties. Presuppositions induced by different trigger types do have similar logical properties, and similar potentials to use these properties, but we cannot learn anything about whether or not these potentials are actually utilized as a major function of the presuppositions induced without studying presupposition in context, and looking at the frequencies of the resolutions categories. We can't actually be sure either if the logical properties that theoretically are found with each trigger type actually occur. For example, do all presuppositions actually occur under all types of embeddings? There may be subgroups of triggers that induce presuppositions that behave quite differently than others. Many of the classic examples may have special properties we are unaware of. Another advantage to using corpus data in general is that we should be able to disambiguate usages that in isolation would allow several resolutions. We can also see what it is in the message *and* the context that allows us to disambiguate.

Corpus data can help us say something about what kind of thing presuppositions are for language users. What does the ability to use presupposition allow a speaker to communicate that other linguistic devices do not, and what contribution does the presupposition make to the hearers understanding of the message? These are questions that I would like to at least partially answer in this work.

Certain aspects of the corpus analysis might have been simpler if I had chosen to use written data rather than unrestricted dialogue. But spoken data has two advantages over written data that I think are particularly relevant to presupposition. First, spoken language in contrast to written language allows us to see the effects of memory or processing limitations on the use of presuppositions. By looking at spoken dialogue we can also see if the induced presuppositions serve

the communicative role we want to attribute to them given the processing limitations and memory limitations present in spoken discourse. Speakers may need to be more conservative in their estimation of what is salient to listeners at the time of speaking, unlike writers who can count on earlier statements being available for looking up in the earlier context if the reader should need to refer to them.

Second, we can really say something about the function of presuppositions by seeing how they dynamically contribute to communication in a setting where there is also a receiver that can react to the information. Looking at written work we can only take our reaction into account, whereas by looking at spoken dialogue we can immediately observe the reaction of the other participants in their linguistic behavior and make conclusions as to whether or not this communication was successful. It is this ability to see the reaction and counter-reaction to utterances that induce presuppositions that allows us to see if the presupposed material in context has achieved the communicative effect we would theoretically attribute to it in isolation. This is what makes spoken dialogue so exciting for studying presupposition.

3.2 THE LONDON LUND CORPUS

The corpus study was done using the London-Lund Corpus of Spoken English. This is a computerized transcribed corpus of spoken British English that grew out of a joint project between the University College of London and Lund University The LLC is composed of 100 spoken texts that were collected as part of the Survey of English Usage (SSE) and it is publicly available.[1] The corpus was recorded for the most part surreptitiously either at the University, or in the homes of some of the members involved in the project. See Svartvik (1990) for more information about the corpus. In many cases one of the discourse participants is aware that the conversation is being recorded but the others are not. Discourse participants who are aware of the recording are given lower case letters as Speaker names, and participants who are not aware have upper cases letters as Speaker names.

For the study here only a subset of 50 of the multi-speaker dialogues in the LLC were examined. The excluded dialogues differed in that they were not conversations, but instances of spoken monologue, prepared speeches, telephone conversations or radio programs. The selected dialogues were spontaneous and unrestricted, with 2-7 participants. Twelve of the dialogues were so-called 'conversations between disparates' while the remainder were 'conversations between equals.' For each dialogue there is also information about the age, sex and level of education of the speakers. In total they contained approximately 233,000 words. Tone units have often been considered a kind of sentence like unit for spoken language and the selection contained 36,432 tone units.

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[1] The London-Lund Corpus of Spoken English can be obtained at
http://www.hit.uib.no/icame/icame.html

The transcripts were taken from one of three sets of conversations. Each sample dialogue is labeled with the number of the set, 1,2 or 3, the number of the dialogue, the number of the subdialogue, if there is one, labeled with a,b,c or @, followed by the line number of the first line given in the example. Thus, for example the number '3-1b 700' refers to dialogue set 3, dialogue 1, subdialogue b, line 700.

Because much of the transcript was recorded surreptitiously without the knowledge or permission of the participants, the recordings are *not* publicly available. However, the transcript is marked up with limited prosodic information, including tone units, onsets, location of nuclei, direction of nuclear tones, relative pitch and two degrees of pause. This makes the LLC unique in that it is one of the few larger spoken corpora with some type of prosodic coding, but the coding is perhaps not the most suitable for examining the interaction of prosody and presupposition, for which it would be more appropriate to have access to actual audio files. It is beyond the scope of this first work to look at this, especially when we still know so very little about the frequency and function of presuppositions. Instead only prosodic information that was highly relevant to the analysis of the triggered presuppositions studied here were taken into account, e.g. tone units, subordinate tone units, onsets and overlapping speech. Below is an excerpt from the corpus. The end of a tone unit is marked with #. Overlapping speech is marked by asterisks or other diacritic marks on either side of the overlapping sequence. In the example below Speaker A's first statement '*and *' overlaps with Speaker B's '*[m] *'. Speakers identified with lower-case letters were aware that they were being recorded. Speakers identified with upper-case letters were not aware that they were being recorded.

Excerpt from the London-Lund Corpus, recorded in 1975

Speaker A   *and* he hadn't the slightest idea where the .#|
Speaker c   *[m]*~|
Speaker A   M twenty-three .#
                new M twenty-three was .# in relation to Gatwick .#|
Speaker c   [m]~|
Speaker A   and he knew that it had been opened only within . within the . the
                fortnight we'd been away *skiing* pretty well#|
Speaker B   *yeah* .#   so they hadn't put up +any+ signs .#|
Speaker c   +[m]+~|
Speaker A   and so he he *.* [tsh@uks] it -#|
Speaker B   *[m]*#
                and where does the M twenty-three . happen#
Speaker A   well it happens you see#
                directly north south#|
Speaker B   yeah# *yeah*#|

From the biographical information we know that Speaker A is a female housewife, 60 years of age, and the mother of Speaker c, as well as the future mother-in-law of

Speaker B. Speaker B is a male computer specialist approximately 30 years old, and Speaker c is a female researcher approximately 20 years old.

In the rest of the dissertation many of the examples have been simplified. Tone unit marking has been removed, as well as pauses. In their place I have added more normal punctuation. Overlapping speech is marked the same way as in the original. These changes have been made to increase the readability of the examples that would in many cases be unduly complicated by the presence of many of the diacritic marks. When this information seemed to have affected the interpretation I have left it in.

Spoken dialogue is not as tidy as we would perhaps wish it to be, it is incomplete, it is often difficult to determine the syntactic structure that is intended by speakers and it is often difficult to determine their meaning. People speak in ungrammatical sentences, they interrupt each other, they use body language and common private knowledge to support their communication, things which are not available to a researcher reading the transcript. The dialogues themselves are often incomplete. Many were made when two or more individuals who were already discussing something wandered into a room where there was a hidden recorder. For this reason some of the transcripts start in the middle of the actual conversation so it is difficult to resolve some anaphoric references and presuppositions, as well as the more general problem of determining the topic and the relationships between the speakers. Because most of the dialogues are informal, it is often difficult to follow certain passages. The people in some of the dialogue are old friends, and the sometimes refer to individuals not present whose relevance can only with great difficulty be understood by the annotator. There are frequently references to things and events that cannot be fully understood by a non-participant.

Many of the dialogues are between more than two discourse participants. This means that there is a great deal of overlapping speech, and when there are more than three participants there can be more than one exchange going on at the same time. It is sometimes difficult to tease apart what is going on.

Using transcribed dialogues is problematic in that speakers can refer to four types of information that are difficult for the reader of the transcript to fully understand. The first is deictic references to things in the discourse participants' immediate surroundings. Using videotaped material rather than recordings would help in giving these particular examples a more correct analysis. However, this type of reference rarely affected understanding the presupposed information, so I do not believe it has any great effect on the analysis presented. Also, when these references do occur, most of the time examining the entire context of the utterances, including the utterances with the presupposition, it is possible to make some sort of guess about what the reference is being made to. Nevertheless, I will still try to point out these cases when they occur and comment on how they affect the analysis of the presupposition. Even if this information was available, I am unaware of any proposals in the current literature that integrate it in a comprehensive way with a discourse representation and the other semantic

information. There do not seem to be any specific proposals for DRT either. This is an area that needs further study to at least give guidelines on how the contribution of this information could be partially represented.

The second kind of information that is difficult to handle is temporal and spatial references whose exact values can only be calculated with access to the location and time of the dialogues. The information provided with the corpus contains only the year of the recording, and no information about season, time of day or location. This means that these types of references, which can however often be understood by reading the entire transcript, cannot be properly modeled or taken into account in an explicit way in the analysis. For the most part they do not affect the analysis. Generally, what is important are the times and locations of described events in relation to each other and not the actual time of the conversation. There is some work on integrating this type of information into DRT because it affects many different types of linguistic phenomena. For example, Krause et al. (1999) in their work on the representation of localization dialogues attempt to integrate spatio-temporal knowledge into the DRSs. Again, when it seems to affect of the analysis of the presupposition, I will point this out.

The third type of information is the common ground shared by the participants. There are frequent references to individuals, events, places, and even procedures that are completely foreign to a transcript reader. This has a large effect on the analysis of the presupposed information, especially for those examples that are considered to be accommodated. I have tried to point out where there are problems in completely interpreting the work as often as it arises. Exactly how common ground or shared information contributes to dialogue is something for which there are many proposals, and much theoretical discussion. The interested reader can look at Zeevat (1997, ms; 1998). I will point out in the analysis of the examples cases where the shared information between the participants has made full understanding of the presupposition difficult.

Finally, general world knowledge is continually being used by speakers to support their communication, and while a great deal of this world knowledge is fortunately something I share with the discourse participants, there is much that is unclear and sometimes difficult to interpret without carefully reading the entire transcript several times. Some of these difficulties have to do with the fact that most of the recordings were made in the late 60s and early 70's in England. They therefore contain references to things that are not part of my world knowledge, as an American of a younger generation. But for the most part I don't believe this has affected the analysis of the presuppositions more than making studying the transcripts more of a challenge than they would perhaps be for a British researcher from the same generation as the recordings. I have tried to obtain help from someone more familiar with this dialect and the references made by the speakers for problem examples. If I was unsure about an analysis, I will point this out.

3.3 THE EXCERPTED EXAMPLES AND ANALYSIS

In doing the corpus study, I have tried to avoid trigger types where there is some sort of dispute about their status as a presupposition trigger and about what they presuppose.[2]

In Table 1 the trigger types and the specific lexical items excerpted from the corpus are presented. The basic method for analyzing the examples was to first do a Key Word in Context (KWIC) excerption of each of the triggers using PCBETA, a text processing program developed by Benny Brodda at Stockholm University.

The excerption of the abstract presupposition triggers[3], e.g. aspectual verbs, factives, *it*-clefts and *too*, was done on the entire 50 dialogues. For the definite NPs the excerptions was only done on a subset of three interviews. Excerptions were limited to declarative forms. Some of the trigger types did not appear once in the corpus, for example there were no examples of factive verbs with subject sentential complements. These triggers are therefore only discussed with made-up examples in the remainder of the thesis. The actual number of each trigger type found, the categories are given in Table 2. The method of identification follows the procedural looping algorithm given in van der Sandt (1992) and described in chapter 2. Below I give a simple step-by-step explanation of how this was done. More detail is given in the later chapters where examples are discussed in more detail. But in general the following procedure was use:

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[2] Except for, of course, *too* which I will argue presupposes something quite different from what it generally believed, and *possessive noun phrases* where there are some differences in what people have considered them to be presupposing, but where the differences aren't that important.

[3] Term from Asher & Lascarides (1998b) where they use it to refer to triggers that induce presuppositions that are propositional or factive.

What is the triggering expression and what is the presupposition it induces?

Is the information triggered already given in the discourse, i.e. can the presupposition be bound?

Examine the transcript from the beginning of the recording until the occurrence of the trigger for information similar or identical to the presupposed material. Is the information given?

If yes,

the presupposed material needs to be bound at the site linearly closest to the utterance with the trigger.

If no,

there is no potential antecedent. The information triggered needs to be accommodated

If the presupposed material is added to the main context is the addition

- informative, consistent with the information already there, and will it result in a well-formed DRS (e.g. there are no variables that will become unbound?)

If yes,

the presupposed material is globally accommodated in the main context

If no,

try the next level of embedding under the main context on the accessibility path of the context in which the presupposition was triggered. Repeat this procedure until either

the presupposed material can be accommodated or

the level of embedding reached is the same context where the presupposition was induced by the trigger. The material must be accommodated locally.

For the study, embeddings were considered to be shown by modal verbs, e.g. *can, could, would, may, might,* deontic verbs, e.g. *should, supposed to, must, have/has/had to*, negation, adverbs such as *possible,* or *maybe, if,* then in *if-then* complex sentences.

Factive adjectives and verbs are those identified by Karttunen (1971), and Kiparsky & Kiparsky (1970). Only *it*-clefts where the clefted constituent was a noun phrase, verb phrase or adverb were analyzed. Definite NPs could also be modified by relative clauses, prepositional phrases or adjectives.

Additional excerptions where made from the corpus in order to make comparisons with the behavior of some of the triggers. These are presented in the sections where it is relevant to the argument. These included a double annotation of the definite NPs, which was done with several additional categories than just binding and accommodation. There was also a second annotator for the examples in *too*. Also, an additional excerption was done for abstract anaphoric reference from the complement of factive verbs and this is presented in chapter 4 and 5 where it is discussed.

The numbers of examples of each construction I found are probably not exhaustive. Finding every example is always a problem with corpus work, in particular when using an untagged, spoken language corpus. I am however confident that I have found the majority of tokens of each type.

I have been conservative in my identification of examples of triggered presuppositions. For factives, if there was no *that* signaling the sentential complement, and if the factive verb was at the end of a tone unit, then the example was not treated as a triggering expression. This is because it is not possible to distinguish these examples from factives without complements followed by a new sentence. Also, a large number of examples of *you know* without a *that* marking the sentential complement. The number of these examples found are given in Table 2 but are not taken into account in the rest of the thesis. This is because it was not possible to distinguish these structures from an emphasizing *you know* from the surface form, and I also was not able to find reliable patterns in the prosodic coding of the corpus to allow me to make a distinction.

In general, I will be illustrating interpretation in the theory by showing the original transcript, with the original linguistic expressions but discussing its resolution at the level of discourse representation. When necessary for clarification, I'll give the a simple DRT representation of the information relevant for the example. But in general we will be looking at the original linguistic form, but the process of resolving the presupposed material and the level of the discourse representation, and discussing the interpretation it will get by discourse participants based on this form.

Presupposition trigger	Excerpted types
factive verbs	
with sentential subject complement	count, make sense, suffice, amuse, bother, matter
with sentential object complement	know, realize, resent, find out, discover, see, notice
factive adjectives	
with sentential object complement	glad, proud, lucky
with sentential subject complement	significant, odd, tragic, exciting, relevant
aspectual verbs	begin, start, stop, finish, cease, continue, carry on, avoid, force, prevent, hesitate
***it*-clefts**	it is/was C_i which/whom/that S-C_1
definite NPs	
definite NPs	the N, 'dhi' N
demonstrative NPs	this N, that N, those N, these N
possessives	genitive's +N, possessive pronoun + N
too	Jennifer likes to eat chocolate too.

Table 1 Excerpted Triggers

Trigger type	annotator	Total number of tokens		Binding		Accommodation	
		1st	2nd	1st	2nd	1st	2nd
factive verbs	subject complement	0					
	object complement	109 {47}[1]		28 (26%) {9}		81 (74%) {38}	
factive adjectives	subject complement	0		0			
	object complement	0					
aspectual verbs		1st		10 (15%)		58 (85%)	
***it*-clefts**		31		19 (61%)		12 (39%)	
definite NPs[2]		411	390	137 (33%)	113 (30%)	115 (28%)	155 (40%)
	the NP	248	235	78 (31%)	67 (28%)	56 (22%)	82 (35%)
	demonstrative NPs	53	47	27 (50%)	16 (34%)	9 (19%)	10 (21%)
	possessives	110	108	32 (29%)	30) (28%)	50 (45%)	63 (58%)
too		45		43 (96%)		2 (4%)	

Table 2 Number of tokens of each trigger type, number of tokens for each lexical item of each trigger type

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[1] The number given in curly brackets is the number of present tense *know* with *you* as their subject. These examples are not given again in later tables because it was not possible to reliably determine their form.

[2] 411 and 390 were the total number of NPs annotated by each annotator. Accommodation included only examples that were considered new by both annotators, and binding includes only those considered to refer to be co-referential by both annotators. Not shown are the figures for 130 bridging NPs (see chapter 6) and 29 deictic NPs for the first annotator, as well as for 90 bridging NPs and 32 deictic NPs for the second annotator. See Table 13 for more information.

4 Anaphors and Bound Presuppositions

The main claim of the binding theory is that presuppositions and anaphors are the same kind of things, with the primary difference being that presuppositions can be accommodated but anaphoric expressions cannot because they lack the descriptive content to do so. In this chapter, I evaluate this claim in relation to corpus examples of bound presuppositions. I will present evidence that in discourse, bound presuppositions show the same type of behavior as their anaphoric counterparts. Examples from the corpus illustrate that these bound presuppositions are used by speakers and perceived by hearers in a similar way as discourse anaphora, supporting the claim that they are two of the same kind. I will also present several examples that show that bound presuppositions can generally fulfill more discourse functions than anaphoric expressions. These results are perhaps not so controversial for definite noun phrases, which have long been recognized as having an anaphoric component, but are more controversial for many of the other triggers, in particular the triggers that presuppose abstract objects such as aspectual verbs, factives, *it*-clefts and *too*. For this reason the main discussion will focus on illustrating that presuppositions induced by these particular abstract triggers function like discourse anaphors.

It is not always easy to determine if an abstract presupposition has an antecedent in the discourse and because accommodation is also an option, it is not always absolutely necessary to identify the antecedent. For many of the examples in the corpus it is difficult to have clear intuitions as to whether two linguistic expressions refer to the same event, situation or fact. However, other evidence often signals that the speaker intends the hearer to recognize an anaphoric relationship. This link is often necessary, not for determining the truth-conditional meaning of the discourse, but for its rhetorical or communicative effect, for correctly understanding the speaker's attitude to the message and for correctly

perceiving the coherence of the discourse. These additional functions make presuppositions much more than long-distance anaphors. This is seen in a closer examination of cases where an anaphoric expression would be able to pick up the same antecedent in the same context, but where a presuppositional expression was used instead. These examples show that the use of a presuppositional expression contributes additional meaning. This point will be illustrated by contrasting bound factive presuppositions with several examples from the corpus of abstract object anaphors in the object complement of factives, an anaphoric alternative to factive presuppositions. This comparison illustrates that, while the abstract object anaphors and the bound factive presuppositions function similarly, the bound presuppositions add additional meaning in part because they have descriptive content that can in a more refined way pick up a specific part of earlier given information. One example also suggests that hearers seem to perceive even long-distance relationships between presupposed information and potential antecedents, accessing the earlier context where the antecedent was introduced in a way similar to the interpretation of long-distance anaphoric relationships.

Some observations are also made about hierarchical discourse structure and its relationships to anaphoric and presuppositional information. The corpus data does not support the proposal that a hierarchical discourse structure limits availability of antecedents for bound presuppositions.

Finally, I will discuss how the results relate to the view of presupposition as anaphora, other characterizations of presuppositions and the functions of the presuppositions induced by different triggers in discourse.

4.1 ANAPHORS AND ANAPHORIC BINDING

One of the claims of the binding theory is that presuppositions behave like anaphors. Later, in a stronger claim, Geurts (1999) argued that pronominal anaphora are actually a form of presupposition. In section 2.3.2 we saw that locally, they seem to function the same as anaphoric expressions. But are induced presuppositions used and perceived by speakers and hearers in a way similar to pronominal anaphora in extended discourse? To examine this question in relation to the corpus data, we need to first identify what characteristics have been associated with discourse anaphors in extended discourse.

The discussion will focus on pronominal anaphors that can be used to refer to the same types of things that the triggered presuppositions studied in the corpus can be used to refer to. The class of anaphoric expressions that has all these characteristics is pronominal anaphors. For the most part, we will also compare abstract object pronominal anaphors with triggers that induce presuppositions of abstract objects. However, we will also compare pronominal singular anaphors with definite NPs, [1] which are treated here as presupposition triggering expressions.

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[1] Here definite NPs refers to definite descriptions which are singular and plural NPs introduced by *the* or other conversational variants of *the* (here *dhi*), demonstrative NPs modified by *that, this, these, those,* as well as all NPs modified by possessive pronouns and noun phrases in genitive case (e.g. with genitive 's).

Both pronominal singular anaphors and definite NPs are usually used to refer to concrete discourse-given individuals. Because the idea that definite NPs are anaphoric is generally accepted, the discussion throughout the chapter will focus on the more controversial claim that the presuppositions triggered by abstract triggers, here factives, aspectual verbs, *it*-clefts and *too*, are also anaphors.[2]

In their survey article on anaphora, Sells & Wasow (1997) offer the following definition:

"The term 'anaphora,' as it has come to be used in modern grammatical theory, encompasses the phenomena of pronominal reference and various kinds of ellipsis. What these have in common is that an element or construction is dependent for its interpretation on being associated with something else in the context." (p. 207)

This definition of anaphora emphasizes its dependence on the context for its interpretation. This dependence often is a direct effect of anaphoric expressions being less specific in form than the construction upon which they depend for their interpretation. One of the reasons anaphoric expressions are so common is their low-effort and high-return when used to refer to known and salient information.

Much work on anaphora, especially work within computational linguistics, has been concerned with the problem of finding the correct antecedent, as well as accounting for preferences for antecedents in examples that seem to otherwise be ambiguous. Different pronouns are marked for different features, such as number or genus of the referent. This provides information that will help the interpreter to choose a compatible antecedent, but there may be more than one candidate in the context.[3]

The descriptive content associated an anaphoric expression when introduced, e.g. in a matrix or subordinate clause, or information predicated about the anaphor, will also aid in the identification of its antecedent. In general, the less information that is coded on the anaphoric expression itself, the more dependent the identification of the antecedent will be on the surrounding context in which the anaphoric expression is being used. The information predicated about the referent of the anaphoric expression is often a particularly good clue for identifying antecedents in cases where there is more than one compatible antecedent by making one interpretation more likely. For example:

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[2] Some of these results are also discussed in Spenader (to appear).

[3] Note that anaphors cannot always be used appropriately in all their different forms and in all syntactic roles and there are a great number of well-known syntactic constraints on their usage, discussed at length in e.g. Reinhart (1983). These syntactic constraints affect the choice of anaphoric forms within sentences, e.g. the antecedent of a reflexive pronoun must generally be the subject of the sentence in which it is used, and an object pronoun can generally not have the subject of the same sentence as a potential antecedent. Syntactic constraints function intra-sententially and are not relevant for the discussion here where we are concerned with what has been called *referential discourse anaphora,* which are mainly inter-sentential anaphoric relationships.

(1)   The doctor and the patient were discussing a method of treatment. <u>He</u> tried to explain everything in layman's terms.

World knowledge tells us that doctors usually explain and that the layman is most likely the patient, so the most likely antecedent for *he* based on this information is the doctor. The information predicated about the referent of *he* helps us determined its antecedent.

The following example shows how rhetorical relationships about what is most likely can also help disambiguate between two potential antecedents.

(2)   The mother$_1$ helped her daughter$_2$ pick out a dress.

   a.   <u>She$_2$</u> wanted to look nice.

   b.   <u>She$_1$</u> wanted her to look nice.

In both the a-sentence and the b-sentence it would be possible to resolve *she* to the mother or the daughter. However, because the previous discourse is about a mother choosing a dress for the daughter, the *she* in the a-sentence is most plausibly resolved to the daughter, because the daughter is the one who is getting a new dress, and this gives us a coherent explanation for what is going on in the first sentence. In the b-sentence the most likely interpretation is that *she* refers to the mother, who is helping the daughter to look nice. This also gives us an explanation for the event in the first sentence. In each case, the most plausible resolution is the resolution that gives us the most coherent discourse. In this way identifying antecedents is guided by the interpreter's desire to choose antecedents that make sense in the discourse.

Additionally, identifying antecedents is sometimes aided by the information predicated about the anaphor, or because in the context only one individual has been discussed as performing a certain action.

Another way in which the number of potential antecedents may be limited is by the form of the anaphoric expression. This may also reflect how activated its referent is in the discourse. This view of anaphora is present in the work of Ariel (1991) in her accessibility hierarchy and Gundel et al.'s (1993) givenness hierarchy. Generally, the less descriptive content an anaphoric expression has, the more salient or activated the information it is referring to is considered to be and will be considered after the referential act. Therefore pronominal anaphors are believed to be, with their limited descriptive content, most likely to have been used to refer to salient individuals and also most influenced by linear recency.

The relationship between activation and anaphoric reference has led to an alternative characterization of the role of anaphoric expressions in discourse, one that emphasizes their discourse structuring function. This view is advocated most clearly in the work of Sidner (1983), and Fox (1987). In this perspective, anaphora is seen as serving a greater role than just identifying referents in an efficient manner, attributing them with the ability to actively contribute to a hierarchical discourse structure.

Fox (1987) discusses these two perspectives on anaphors describing them as being used in one of two modes, the "context-determines-use" mode or in the "use-accomplishes-context" mode (p. 16). "Context-determines-use" reflects the examples where the appropriate form of a referential expression is limited by the particular context where it is used. The "use-accomplishes-context" mode is where the use of a particular form actually creates discourse structure either by signaling the beginning of a new discourse segment, or signaling the end of one, e.g. the use of a full form reference to an already given discourse individual may signal a change in structure, or the use of a highly reduced anaphoric expression may signal the continuation of a discourse segment. Anaphors and discourse structure are considered to be in a co-dependent relationship, and it is possible to talk of the same example from the perspective of both modes. This is often necessary as well, because it is quite difficult to say if it is the use of an anaphor for reference in the context that increases the salience of the context or if the activation of the context by other factors that increases the salience of the referent.

Anaphoric relationships between concrete individuals that are co-referential are fairly straightforward. But we can also have relationships of non-identity, including, quantified noun phrases, plural pronouns, subset relationships, summarizing relationships, and relationships where the anaphoric expression refers to more than one semantic individual. Knowing specifically how these relationships are resolved is not necessary for understanding the further discussion. Procedures for handling these kinds of anaphoric reference in DRT are spelled out in van Deemter (1992) as well as in Kamp & Reyle (1993), for the interested reader.

In the further discussion, the great number of problems associated with pronominal reference to abstract objects are very relevant, because a majority of the triggers studied here presuppose what semantically are abstract objects (e.g. aspectual verbs, *it*-clefts, factives and *too*). This type of anaphor has been called many different things in the literature, e.g. discourse deixis (Webber 1991, Eckert & Strube, 2000), situation anaphora (Fraurud, 1992), and abstract object anaphora, by Asher (1993). All these terms are used to refer to anaphoric reference to situations, facts, events, propositions, specific utterances, as well as more deictic functions referring to the information contribution of a discourse segment (particularly common with the term 'discourse deixis'). Unfortunately, many of these theoretically distinctive uses are difficult to distinguish in practice. Additional complications result because these anaphoric relationships often involve what is called *type-coercion* or *type-shifting*. This is where an abstract object of one semantic type, for example an event, serves as an antecedent for an anaphoric reference of an abstract object of another semantic type, such as a fact, a phenomenon well known from Vendler (1967) and later Asher (1993). Consider the following example where a semantic event is later referred to with an abstract object anaphor in the complement of a factive, which should be considered to take a fact as an antecedent. However, this fact is derived from the event introduced by the underlined sentence.

(3)　　<u>Gudrun spent the entire day playing with her son</u>. Later that evening when she realized how much work she had yet to do, she regretted <u>it</u>.

The semantic type of the anaphoric expression is usually coded in the predicate of the sentence in which it functions as an argument, such as above where the factive verb *regret* signals that the anaphoric expression refers to a fact. This observation is made by Asher (1993), and Dahl & Hellman (1995), and is one of the many clues used in distinguishing concrete reference from abstract object anaphoric reference. Eckert & Strube (2000) outline heuristics for resolving pronominal anaphors in a corpus study of spoken English, using different types of information about typical predicates to determine if a pronoun was consistent with abstract object anaphoric reference or with individual anaphoric reference. But because the semantic type of the anaphoric expression and the semantic type of the antecedent may differ due to type-shifting, knowing the semantic type of the anaphoric expression does not always help in identifying the antecedent, as illustrated in example (3).[4] Also note that there are some limitations on type-coercion. For example, Eckert & Strube (2000) point out that for example event anaphors will not be able to coerce an antecedent from a state. In addition, facts can always derive antecedent from events, but events cannot always derive antecedents from facts. There may be other limitations as well that could aid in resolving abstract object anaphors and perhaps induced presuppositions of these types as well.

Webber (1991), Asher (1993) and Eckert & Strube (2000) have pointed out that the availability of antecedents for abstract objects influenced or constrained more by discourse structure than anaphoric reference to more concrete entities. This may be because anaphoric expressions which are generally used to refer to abstract objects, such as e.g. *that* or *it*, are some of the semantically least specified anaphoric forms available in English and cannot aid much in identifying the referent. It may also be because in many cases semantically abstract objects are believed to be in part delimited by the information contained in a single discourse segment. That is, the discourse segment itself that provides a referent for the anaphoric reference, making it more dependent on this segment.

It is not always the case that anaphoric expressions have clear, individuated antecedents in the discourse. Dahl & Hellman (1995) discuss how the use of some anaphoric expressions instigates a process of reification that leads to the creation of its own referent to serve as an antecedent. The anaphor itself is not merely serving an identification purpose so that descriptive information can be associated with it, but rather adds a new semantic individual in the discourse made from information given, or "collected" from the discourse context. This type of referent-creating process is common in anaphoric reference to non-identity antecedents such as abstract object anaphoric reference.

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[4] Note also that this sentence contains another fact which can be derived from the complement of realized, e.g. *Gudrun had much work yet to do*, yet this is not the preferred resolution.

Dahl & Hellman (1995)[5] identify three different referent creating operations, noting that their list is by no means exhaustive. *Summation*, or *Complex Creation* is the first operation they discuss. These terms describe anaphoric reference to split antecedents or even a list or a series of propositions. *Type-coercion*, or *type-shifting*, presented earlier, is the second operation they discuss. Finally, they identify the two operations of *Abstraction* and *Substitution*. *Abstraction* is when an anaphor can refer to the generic interpretation of a specific event or situation given in the antecedent. *Substitution* includes anaphoric relationships such as sloppy identity as well as cases where the same predicate is present in the antecedent and the anaphoric expression, but where the arguments are switched.

Before answering these question some of the corpus examples of bound presuppositions will be presented. This will illustrate their basic form and frequency as well as show how complicated the resolution task is.

4.2 ANTECEDENTS IN THE CORPUS

In order to evaluate the similarities and differences between anaphoric binding and presuppositional binding the relationships between the potential antecedent and the presupposed information in the corpus were examined. The method used was described in chapter 3 but is repeated here. First the presupposition induced by the triggering expression was determined. Then the transcript from the beginning of the recording until the triggering expression was examined for the same, or similar information as the presupposed material. The main criterion for identifying a potential antecedent was the similarity of contributed information. The results are presented in Table 3 for abstract triggers and in
Table 4 for definite descriptions.

In Table 3 the total number of induced presuppositions for each trigger type found is given along with the number of examples from each type identified as binding. Note that for definite NPs, the results from both annotators are given, the first annotator given on the left (the author) labeled 1st, and the second annotator given on the right in the shaded column labeled 2nd. Except for the demonstrative NPs the percentages for binding in each category were quite similar for both annotators.

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[5] Eckert & Strube (2000) have compared the process of referent-creation to that of accommodation, though this is different from the way in which accommodation is used in the anaphoric theory of presupposition. For presuppositional accommodation, new information is added to the discourse record, but in referent-coercion, information already given in the discourse, which is generally also currently salient and activated, is considered in a new way.

Triggering construction	TOTAL	Binding
factive verbs,–obj. comp.	109	28 (26%)
aspectual verbs	68	10 (15%)
it-clefts	31	19 (61%)
too	45	43 (98%)

Table 3 Cases of binding, abstract triggers

Triggering construction	TOTAL		Binding	
2 annotators	1st	2nd	1st	2nd
all definite NPs	**411**	**390**	**137(33%)**	**113(30%)**
definite NPs	248	235	78(31%)	67(28%)
demonstrative NPs	53	47	27(510%)	16(34%)
possessives	110	108	32(29%)	30(28%)

Table 4 Cases of binding - definite descriptions

None of the triggered presuppositions had binding as the most frequent interpretation. Presuppositions triggered by definite NPs had antecedents in around 30% of the cases for both annotators.[6] That the primary usage of definite NPs is not anaphoric reference to something already given in the text has been established in earlier corpus work of written Swedish by Fraurud (1990) and more recently with texts from the Wall Street Journal in an annotation task experiment done by Poesio & Vieira (1998). The figures here confirm this for unrestricted spoken dialogue. The frequency of binding for factives and aspectual verbs was very low. The triggers most likely to be resolved by binding are *it*-clefts and *too*. In fact, the presuppositions induced by *too* were almost exclusively resolved by binding with a discourse-given antecedent.

Induced presuppositions that are interpreted as bound are meant to be referring to information already introduced in the discourse. The most basic requirement placed on a potential antecedent is that the information it contributes is judged as compatible with the semantic content of the presupposed material. However, the more descriptive information associated with the triggered presupposition, the more difficult making this judgment becomes. For triggers that semantically presuppose an individual, we must try to find in our discourse representation an individual reference marker that has compatible semantic features. But for propositions, events, facts, and situations, e.g. abstract objects, identifying a compatible antecedent is a much harder task. In practice this means

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[6] Note that in this table the definite NPs that were considered bridging references are counted separately, and are treated in more detail in chapter 6. This means that the percentage of e.g. 33% binding for definite NPs for the first annotator does not mean 67% accommodation. For the figures for accommodation see Table 2 or Table 5.

comparing the semantic contribution of one linguistic expression with another. In many cases we are dealing with diffuse information contributed by several linguistic expressions and by several speakers and we need to reify this information into a single structured object when needed for anaphoric reference.

For many of the examples, because the linguistic form of the presuppositional expression and the linguistic form of the potential antecedent are often quite different, it is sometimes unclear if identifying a binding relationship is justified. Therefore, each example was further examined to see if there were other predicated or rhetorical relationships between the potential antecedent and the presupposed information which could be considered to corroborate the identification of the antecedent as such. Evidence from the response of the other discourse participants, or the behavior of the speaker that supported the recognition of a binding relationship was also considered.

Below I begin by presenting examples where the resolution was fairly simple and is supported quite well on the basis of the semantic similarity alone. The later sections of this chapter then go through different groups of examples where identification of the antecedent was further confirmed by the recognition of the other above mentioned factors.

For definite NPs, demonstrative NPs and possessives there were cases where the linguistic form of the noun in the presupposition triggering expression and the linguistic form of the noun in the potential antecedent were almost surface-identical linguistic expressions, making the identification of the antecedent fairly easy. This is illustrated in the following example.

(4)   definite description, triggered p[7]: A-levels (3-1b 700)

Speaker A   And . I . my A-levels are English French and *German*.
Speaker B   *Yeah.*
Speaker A   And I always enjoyed . {reading}, [@m] , I enjoyed very much reading for the A- levels .
Speaker B   Yeah.

For factives, aspectual verbs, *it*-clefts and *too* there were no examples found where the presuppositional expression was a surface-identical match with an earlier given linguistic expression. This means identifying antecedents was not simply matching in these cases. There were, however, several examples where the presupposed information and the potential antecedent were forms that were in a clearly identifiable lexical relationship as in the two *it*-clefts given below. In the first example, two speakers are discussing the attitudes of general medicine practitioners and specialists.

(5)   *it*-cleft, triggered p: "Someone/some are elitists" (2-9 625)
Speaker a: general science [@] general medicine now I thought was the . non-elitist -~|

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[7] Here it would perhaps be more appropriate to label this the presupposed information induced by the trigger, but to conserve space I am going to write the shorter "triggered p."

Speaker A: Oh no, <u>it's very elitist</u>.
Speaker a: I thought **it was** the specialists **who** <u>are elitists</u>

A basic requirement for resolving bound presuppositional expressions will be access to a lexicon that defines relationships between similar words of different parts-of-speech, to identify, or as needed, to calculate, the connection between "being elitist" and "being an elitist." *It*-clefts trigger a presupposition that there is a particular event or situation, but where one of the main arguments of the event is missing in some way, often because the identity of this argument is unclear. When binding, we need to match the presupposed material with the missing argument to the same information in the earlier context. The information that can serve as an antecedent for the presupposed material may have the argument instantiated. Consider another example.

(6)   it-clefts, triggered p: "Someone invited me (= Speaker B)" (2-1@ 1086)
Speaker B: …was the invitation to York for which I did not apply. <u>I was just invited</u>antecedent.
Speaker a: You you mean when you'd just been up *to to*…
Speaker B: *[Hm], m [Hm]*.
Speaker a: …see Freeman now.
Speaker B: [hm]#|
Speaker a: That was being considered for a job, was it .
Speaker B: Well, it's all rather vague, [@m] - because . you know Freeman's retiring.

(15 LINES LATER)

Speaker B: [@] They can't of course - make any offer of any kind -
Speaker a: [m].
Speaker B: But I certainly got the feeling from . the day I spent in York that they were very - - very much disposed . {towards <having me>}.
Speaker B: [m]. Did you meet . <Fuller>?
Speaker B: Yes. <u>It was he who **invited me**</u> .

B was invited differs from *someone invited B* only in that the former is passive and the latter active, so the agent of the inviting is not given in the first mention of the invitation because it isn't relevant. 35 lines later the agent/individual becomes relevant and he is introduced (in the previous statement) and then the connection is made between the invitation and the individual who was the agent. What the two sentences have in common is the fact that Speaker B was invited by an unspecified agent. In order to resolve the presupposed information, we examine the earlier discourse context to see if there is an event of Speaker B being invited by someone. There is one. The function of the presupposed information here then seems to be to help identify the same inviting event again in order to give additional information that is the focus and the point of the utterance, which in this case may have been unclear because Speaker B discusses Freeman but it was Fuller who

invited him. Note that we cannot replace the relative clause with an anaphoric expression, e.g. "It was he who did it." The following example illustrates a presupposition induced by a factive.

(7)   factive verb, triggered p: Poppy took her engine to pieces (1-12 341)
Speaker B   Well, once when Poppy had stripped down her engine in her car - and was standing there and . you were . helping her and when Miss Black went past she said -sort of **I did notice Poppy - sort of taking her engine to pieces *** and your husband saying . all right.
Speaker c   *[m]*
Speaker B   Now put it together again, and she said, could she really, put it together and I said well I don't know whether she could but she had to *because she was . left to do it .

Just as anaphoric expressions can refer to a different semantic type than its antecedent so can a presupposition bound to an abstract object. In this example Speaker B first describes an *event* or possibly a *situation*; the event of Poppy stripping down her motor. She then reports on what Miss Black said, taking Miss Black's perspective in her reporting, putting the description of the earlier event in the complement of the factive verb *notice*. So the presupposition has the semantic status of a reported *fact*, but it will need to take an *event* as an antecedent. This means that presuppositions seem to be able to take antecedents of different semantic types in the same way as abstract object anaphors, i.e. the type-coercion discussed earlier.

The next example shows an aspectual verb whose induced presupposition can be bound. Aspectual verbs presuppose *states*. The point of the utterances they appear in is to make clear that there was a change or a non-change in the state, e.g. either that a state continued, began, or ended. In this particular example, the discussion is about the constancy of the personality of an acquaintance. Speaker A's presupposition, that the acquaintance was made at a time earlier to the reference time of the utterance with the aspectual verb, is already given in Speaker b's comment.

(8)   aspectual verb, triggered p:"she was mad before" (2-14 977)
Speaker b   Yes, but <u>she was always rather mad</u>.
Speaker A   Oh she was,   yes - -
Speaker C   <Go on, tell>#
Speaker A   And she **<u>continues to</u>** be mad I mean she's one of these rather nice people who obviously go on being mad, till their dying day.

The following example of an induced presupposition also has an aspectual verb as a trigger. The information exchange here is particularly interesting because it is a combination of the questions and answers of the participants that together contribute to the antecedent information.

(9)   aspectual verb, triggered p: "(you) haven't prepared earlier to now"

(2-11b 346)

Speaker A How's things -
Speaker c   Things is OK - a bit hectic -
Speaker A Yes.
Speaker c I don't know we just don't seem to [@] get anywhere finish anything.
Speaker A [m] - -
Speaker c It seems to be a totally continuous and you know with this - great junketing coming up in September.
Speaker c +{I} know+, +we haven't+ done anything about it *<you see really>*.
Speaker A *Are you doing [lot] you're not* doing lots of arrangings and things - -?
Speaker c Well in principle yes, I don't feel that we've actually done very much.
Speaker A *Well it's too early*.
Speaker B *What's happening in September*.|
Speaker c +Well+.
Speaker A +They're getting+ married.
Speaker c We're being married.
Speaker B Good gracious - -.
Speaker d (. laughs).|
Speaker A But surely it's {too early}, to **start** <u>getting ready now</u>, or maybe it's isn't.

Finally, an example of the trigger *too* is shown below. As explained in chapter 2, *too* is generally treated as triggering the presupposition of an event or state of a type similar to one in its scope called the *theme*, with a focus element that is contrasted with another parallel argument to the argument in the utterance in which the *too* occurs. In the example below the speakers are choosing paintings to decorate their offices (as far as I can tell). The second speaker uses the *too* to highlight that she also would find the picture they are currently examining difficult to look at because her eyes would go out of focus, just as Speaker C has commented the theme is the painting unfocusing someone and the focus is Speaker A in the triggering expression and Speaker C in the antecedental expression. Note that both linguistic expressions share an argument, the *that* referred to by Speaker C is the same painting that is anaphorically referred to by the *it* in Speaker A's statement. Note also that the utterance where the presupposition triggered by *too* is made, is clearly a response to the comment made by Speaker C, where the antecedent was found, and certainly helps support an interpretation that this utterance is where the antecedent information derived from.

(10)   *too*, triggered p: (this picture) would unfocus someone else besides Speaker A
        (1-8 671)

Speaker C It might be astigmatism, but I, <u>I dislike lines which make my eyes go out of focus and I go out of focus very badly on that</u>.
Speaker A Yes, I know what you mean, yes, <u>it would unfocus me</u> **too**. No, I wouldn't be able to have that.
Speaker C It actually makes me feel rather nervous, you know.

As seen by the frequency data almost every example with *too* could be bound with something in the context, though the strength of the perceived relationship and the clarity of this relationship differs. This may have something to do with what *too*

actually does, it identifies parallel information. The following example shows a use of *too* that triggers a presupposition that is understandable from the earlier context but requires the use of world-knowledge.

(11)　　*too,* triggered p: there is lots about someone else's mother, (2-14 148)

Speaker -b　What are you looking for~|
Speaker C　<u>Mother's . autobiography,</u>　*<3 sylls>*
Speaker A　*Oh yes*, A　that's right, you were going to weren't **you yes**.
Speaker C **I had** your [ko] a copy lying around on my desk at the project for you
　　　　　　　for a long time but you haven't . been in - - what did I do with it now.
Speaker-b　Not the *part of your work which <3 sylls>*~|
Speaker A　*Well if it's still at the project -*, I'll collect it on Monday.
Speaker C　<Less bother>
Speaker A　Pass me my handbag *dear, and I'll get out my old pair of glasses - <1
　　　　　　　syll> If you're giving oh if you're giving it me that's lovely, yes.*
Speaker C　*yes here we are - - - you are welcome to have this - <I xeroxed you> a
　　　　　　　copy.*
Speaker A　Thanks very much - - yes.
Speaker C　Well I think you're entitled, as they say .
Speaker A　Yes {I think so} too, thank you - -
Speaker C　<u>And <there's> lots about your mother too</u> - -
Speaker b　Well there would be if they were sisters *and <this is> the early part of
　　　　　　　her life.*
Speaker C　*Yes - - and lots of it was the same life.
Speaker A　Quite - - **-** Thank you.

In the above example *too* triggers the presuppositions that there is *lots* about someone's mother in the autobiography. The focus in the triggering expression (referred to by the possessive noun phrase 'your mother') is bound with Speaker C's mother, the subject of the autobiography. The presupposed information cannot bind with information contributed by a particular linguistic expression as was the case in example (10), but instead the antecedental information is follows from what we know about autobiographies. In someone's autobiography we will find a great deal of information about that particular person.

　　The analysis of the excerpted *too* examples were also done by a second annotator because it seemed to differ so much from the other trigger types, and identifying the presupposed material and antecedent material was a much more complicated, but generally successful, task. It was almost always possible for both annotators to identify a theme or focus which the speaker might have meant, though in some cases this was vague or unclear.

　　In summary, it was not difficult to identify where similar or identical information was introduced in the discourse. The potential difficulty lies in then determining if the information contributed by the antecedent is meant to refer to the information contained in the induced presupposition, and to justify the decision to consider the one an antecedent of the other. The problem of determining if the triggered presupposition is really being bound to something, and what kind of

collaborative evidenced we can look for to find plausible antecedents, is the subject of the rest of the chapter.

4.3 IDENTIFYING ANTECEDENTS

In the earlier discussion on anaphora it was pointed out that depending on the type of semantic object an anaphoric expression refers to, the relationship between an anaphoric expression and its antecedent will differ, and the relationship these two have with the discourse structure will differ as well. But regardless of the semantic type, anaphoric expressions need an antecedent for their interpretation, and when there is more than one compatible antecedent, the different interpretations we get depending on the antecedent identified will have perceivably different effects on the interpretation of the entire discourse. This is where anaphors distinguish themselves from presuppositions.

Recognizing the antecedents of presuppositions is more difficult than for anaphoric expressions for two reasons,[8] both stemming from the fact that presuppositions are semantically more loaded than anaphors. First, looking for an antecedent often involves the difficult task of *comparing* two different linguistic expressions, often contributed by different speakers, and judging whether or not the information they contribute refers to the same object in the context. This is not always as straightforward as the examples given in section 4.2 make it seem – the more difficult cases will be discussed in the rest of this chapter. Second, presuppositions have the option of being interpreted via accommodation. In some cases the difference in interpretation between binding and accommodation was not readily apparent and this makes it necessary to justify the interpretation of the presupposed material as bound by looking for additional grounds.

Both of these problems are present to different degrees depending on the trigger type and the semantic type of the presupposition triggered. The presupposition of a concrete individual needs to be bound to its antecedent if there is one, but the case is less clear for the induced presuppositions of abstract objects. This difference is illustrated most clearly by discussing the consequences of *failing* to identify a given antecedent for presupposed material induced by the two main trigger types, concrete and abstract presuppositions. If the antecedent of a definite description is incorrectly identified or fails to be identified at all, a new discourse individual has to be accommodated, radically changing the discourse representation into one that has different truth-conditions. On the other hand, if we fail to identify the antecedent for the information presupposed by an abstract trigger, such as a factive, this abstract object *can* be accommodated, and the consequence of the accommodation to the truth-conditional meaning of the discourse representation will be difficult to pinpoint. For many abstract objects it is quite difficult to determine if a linguistic expression about it is referring to the actual object, to a part of it or a similar but different object if different linguistic expressions are used.

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[8] Some practical problems involved identifying antecedent of bound presupposition based on surface characteristics was presented in Spenader (2000)

Thus for many examples it is difficult to see what the truth-conditional difference will be to the interpretation of the discourse representation if we bind or if we accommodated because we don't have clear intuitions.

This is prevalent with abstract objects is because they are not individuated in the same way that concrete semantic individuals are but are "a matter of convention within our conceptual scheme" (Asher 1993, p. 258) and are therefore more dependent on the manner in which they are introduced and described in the discourse. This perhaps explains in part why they may be more dependent on discourse structure when serving as antecedents to anaphoric reference (e.g. Webber 1991, Asher 1993).

Please note that there certainly are cases of triggered abstract presuppositions where identifying the antecedent is essential for understanding the discourse. This is most clearly seen when the antecedent information is found in an embedded context. For example:

(12)   If John is the murderer then the inspector hasn't realized that <u>John is the killer</u>.

If the speaker fails to bind the presupposed information "John is the killer" to the antecedent of the conditional, then it will be accommodated in the main context which will lead to the whole discourse breaking the informativity constraint because the antecedent of the conditional will already be entailed in the context of interpretation. The resulting discourse would read "John is the killer. If John is the murder then the inspector hasn't realized that he is." This is then equivalent to "John is the killer and the inspector hasn't realized this," but a very unwieldy way to express this. Therefore the discourse is not well formed with this resolution.

For examples like these it is clear that resolving the presupposed material as bound and resolving the presupposed material as accommodated lead to different interpretations. These are also exactly the kind of examples we find in theoretical work on presupposition. But the reason why we can so clearly distinguish between the two interpretations is because of the nearly identical linguistic expressions and because the presupposition triggered would be bound in an embedded context, so we can clearly understand what the different resolutions would mean. The cases where we can distinguish clearly between an interpretation with accommodation and an interpretation as binding are cases where the information will end up in different levels of embedding if it is accommodated or presupposed as in (12) above.

However, these types of examples were not found in the corpus. Many of the cases in the corpus were triggered presuppositions that would either be accommodated in the main DRS or bound in the main DRS, where the linguistic expression that induce the presuppositions and the linguistic expression from which the potential antecedent is derived are sometimes very different. The combination of these two characteristics means the semantic difference between binding and accommodation is not clearly distinguishable. Additionally, the presupposed material's relationship with the rest of the discourse information would in most cases differ minimally regardless of the resolution strategy chosen.

This makes determining resolution difficult. For the abstract objects there were no examples where the abstract antecedent was surface-identical with the presupposition-triggering expression, though examples where they were quite similar were given in the last section. But for many examples it is difficult to have a clear intuition about how an interpretation as binding and an interpretation as accommodation will affect the truth-conditional meaning of the utterance. Because of this we have to look for other collaborating evidence that the induced presupposition needs to be, or is perceived as, bound. These clues can be found in the reaction of the discourse participants, or in the rhetorical or discourse effect that seems to be intended.

For some of the cases we also have to explain in part why a speaker would choose to use a bound presupposition. Given that we generally expect speakers to use shorter anaphoric expressions if the meaning will be the same, it follows from the Gricean maxim of quantity that speakers don't need to say more than is necessary. We need an explanation, therefore, for why speakers would choose to use presuppositional expression if an anaphoric expression was possible.

In the following sections I will first present evidence where presuppositions have functional traits similar to anaphoric counterparts, and then show additional examples which illustrate that bound presuppositions are functionally more versatile in their different roles, being more precise and clearer than their anaphoric counterparts. This also gives us an explanation of why speakers would choose to use bound presuppositions even if they could have used an anaphoric expression. This should be evidence that bound presuppositions and anaphor are of the same kind, but they are also different in that presuppositions have more utility, an ability that stems from their additional descriptive content.

4.3.1 Bound presuppositions make more precise references to abstract objects

Do induced presuppositions of abstract objects behave or function in a similar way to anaphoric expressions that refer to abstract objects? If the answer to this question is yes then we can say that we have found additional evidence to consider presuppositions and anaphors to be of the same kind. But in order to fully understand if this analogy is an accurate one, we need to look at some examples of abstract object anaphors in the corpus to see how they behave. I'll first present two examples from an additional excerption done on the LLC corpus of abstract object anaphors that appeared as the complement of factive verbs. Abstract anaphors also appear in other segments in different environments and I'll discuss these as well. After this data is presented, I'll give several examples of induced presuppositions that have similar, but additional functions.[9]

In the following example the abstract object anaphor refers to a portion of the information contributed by the previous utterances.

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[9] Some of this work was first presented in Spenader (2001c).

(13)   Abstract object anaphor: Same speaker, previous discourse segment, chain of
        references (1-2a 1014)

Speaker A: [@] It's, it's* [dhi dhi] faculty in the school *-* {that that
                 puts you forward}#|
Speaker B: *Oh no they don't {of course},   do they . No, no they
                 don't -,   <no>*.
Speaker A: You see.
Speaker B: *[m]*
Speaker A: So that it's the faculty of arts, or the faculty of
                 economics or both that'll be putting him forward (a)
Speaker B: Mmm. (b)
                 But they can put it forward for any title that they like apparently.(c)
                 I didn't realize THIS. (d)
                 1 to 2 sylls. so this
Speaker A: No, I didn't know THAT. (e)

Here, and in the following, each turn, or alternatively each sentence in a turn that makes up an informative utterance(s), and any acknowledgment phrases or comments that shows that the material has been understood by other discourse participants, i.e. that it has been grounded (see Traum 1996), will be treated as a discourse segment. More than one participant can ground the same utterance(s) so a discourse segment may be made up of utterances contributed by more than one speaker. The utterance marked as line (a) is grounded by the utterance by Speaker B in line (b), and together they make up a discourse segment. This definition of discourse segment is closely based on the Eckert & Strube (2000) notions of synchronizing units or SU's, in that it takes grounding to be a central clue to local discourse units.

        In the example above it seems clear from the speaker's use of "No", in "No, I didn't know that," that he is referring to Speaker B's last utterance, and not to the entire informational content of several of Speaker B's previous utterances. THIS in (d) refers to an abstract object derived from the linguistic expression in discourse segment (c). THAT in (e) refers to the same thing as THIS in (d), making it a chain of abstract reference. It is also possible that THAT in (e) refers to a greater segment than shown here, illustrating the problem of granularity in determining exactly how much of the previously introduced information should be considered to be the antecedent of the abstract object.

(14)   abstract object anaphor: Overlapping speech, source of abstract object could
        be synthesis of several utterances made by different speakers   (2-5a 118)
Speaker C: University of the Air (a)
Speaker D: *That would be S* (b)
Speaker C: *Are doing a series* on various sorts of communication
                 which struck me immediately as **disparates** (c)
Speaker B: Disparates, surely? (d)
Speaker D: ** <But but>** but it would be, um it would be non-
                 surreptitious wouldn't it ? (e)

Speaker C: *Presumably* (f)
Speaker B: *Yes -*, it would be +non-surreptitious +(g)
Speaker A: Yes, (h)
      but THAT wouldn't matter. (i)

In the above example, four different speakers take part, and identifying discourse segments was not totally straightforward. Here, different speakers ground the same utterance, e.g. it seems that (f), (g), and (h) all are grounding (e), making it one discourse segment. Utterance (b) is not grounded. Note that it overlaps with part of (c) and is not completed, being almost devoid of content, which is probably also why it is not recognized by the others. Here I have split Speaker A's utterance into two utterances, (h) and (i), because (h) seems to solely have a grounding function and belongs to the previous discourse segment, whereas (i) seems to be informative, though it is not clear if this is the correct segmentation. Speaker A's abstract anaphoric reference in (i) seems to refer to the immediately preceding grounded utterances (e) through (h), or could perhaps be considered to referring to only the grounded portion, (f) through (h), but clearly it refers to the fact that the recording from the University of the air will be non-surreptitious. This again shows the problem of granularity. It is not clear what analysis is correct, though in both cases the abstract object anaphor derives its antecedent from an immediately preceding utterance within the proceeding discourse segment. It is very unlikely that the anaphor could be referring to the discourse segment that makes up (a) through (d), because it would then be referring to the fact that they are disparates as well. Note that it THAT in (i) refers to the semantic contribution of (e) or (g), which is arguably the same situation. Therefore we can't really say that it refers to (e) or (g), it takes as its antecedent the semantic information contributed by these utterances in the discourse representation.

  The general pattern seems to be that the discourse segment immediately preceding the utterance with the abstract object anaphoric reference provides an antecedent for the abstract object anaphor, which in some cases can be interpreted as referring to a semantic object derived from a larger segment than just the previous utterance. In most cases there is a core element that quite clearly forms the basis of the antecedent, but how much additional information is also included is not definitively determinable.

  Let's now look at a presupposition triggered by an aspectual verb that can be bound to information derived from the previous linguistic context. The following example, the presupposition induced has the synthesis of several utterances, made by several different speakers, plus world knowledge as its potential antecedent. Note that Speaker A and B (=Debbie) are married and Speaker d (female) is going to get married.

(15) aspectual verb, triggered p: "people give you things before (Marriage)"
   (2-10 927)

Speaker d   Doesn't seem much different *except for* trying to answer these awful conundrums about what shall we give you - and trying to fit it **in (- laughs)** (a)
Speaker B   **that's . {that's} . nice** (b)
Speaker d   Yes but…
Speaker A   +{That's the bit} Debbie enjoyed enormously+ (c)
Speaker B   Oh that's much the <cos> that won't [haep] that won't -+ yes. that won't happen again. so I should enjoy it very much. (d)
Speaker d   *yes that's true* (e)
Speaker B   *Cos that stops* {very rapidly} after you get married actually#|
ALL   (- - - laugh)
Speaker B   People stop giving you things (g)

Here the presupposition triggered, that people will have been giving you things before marriage, is clear from the earlier context and seems to be the intended reference of *that* in the utterance in line (f). However, this proposition is presented in bits and pieces, in several statements with three speakers participating: In (a) Speaker A mentions the difficulties she has had in telling people what she would like as wedding gifts. This is the introduction of the topic, and Speaker B's statement in (b) begins with an abstract anaphoric reference *that* which seems to refer to either the entire statement made by Speaker A or to the situation of being able to say what you would like as a gift. Speaker C's statement in (c) also seems to refer to gift receiving with the reference to 'That's the bit.' Speaker B then also uses 'that' in (f) to refer to the same idea referred to by 'That's' in (c), gift receiving, but it may not be quite clear at that point what the reference exactly is. The following explicit reference to the idea using a presuppositional expression corresponds to what seems to be the idea that was referred to with all the previous instances of abstract reference, though this is the only point in the discourse where it is made explicit. Note however that the reference of the *that* seems to be the idea of gift-giving, whereas the presupposition induced is that people generally have been giving engaged couples gifts, the state of being the object of receiving gifts, in other words. The fact that Debbie in (c) enjoyed this enormously, and that other people were having problems trying to decide what to give in order to participate in this gift giving is clear from (a).

Thus, at the level of discourse representation, the information contributed by each of the different utterances will have to be combined into something that can function as an antecedent. The use of the triggering expression has a summarizing function that is well known in anaphors, and is particularly common with anaphoric references to abstract objects, as seen by many of the other expressions. But an anaphoric expression here in the same position would not have the same effect as the presupposition because the presupposition has descriptive content which helps specify in more detail the information that is meant to be considered as one idea. This allows the speaker to explicitly express as a whole an idea that was present only in bits and pieces in the earlier discourse, perhaps even contributed by one or more speakers. It may be that in a multi-speaker discourse setting, because information is being contributed from so many different

directions, it is necessary to more frequently use a full presuppositional expression rather than an anaphoric expression for clarity. The presupposition is able to summarize or join together this scattered information. That bound presuppositions can have these kind of functions is not surprising, because their anaphoric alternatives, abstract object anaphoric reference, can have them as well. But the bound presuppositions can do it better, in more situations, because they have a greater descriptive content which allows them to in a more precise or refined way identify exactly what previously given information is intended.

Another communicative function some of the examples of presuppositional binding seems to show is stating some kind of conclusion that is deducible or inferable from the discourse record. The presupposed proposition, because parts of it have already been introduced in the discourse may possibly be hearer-known if the hearer has been attentive and has made the correct conclusions. This is not always certain however and the presupposition increases redundancy.

The following example illustrates a case where the full presuppositional expression increases clarity. The abstract object referred to is only inferable and not fully expressed. Speaker B is telling a story to Speaker a. Speaker C also knows the story. Speaker B knows that the information communicated is new to Speaker a, but is unsure if the information presupposed will be hearer-new or not. This is because it is inferable from the earlier context (if you are put on probation you must have been prosecuted in court), but the whole focus of this point in the story is that this conclusion was not understood by Fan, a friend of the speakers. Speaker B's addition, where she again makes the premiss-conclusion connection more clear by repeating it. This further confirms that the speakers seem to be unsure if Speaker C will be able to make the same conclusion that Fan was not able to make.

(16)   factive, triggered p: "she must also have been up before the court" (1-13 681)
Speaker a *(- laughs)*~|
Speaker B *And he was* , put in gaol. I said to Fan, well I don't like to rub it in,   but - it must have been some {huge} affair, because - what {Fan didn't} realize, not being a lawyer, or a lawyer's wife - that apparently the wife was put on probation. So that Fan [?] Fan didn't **realize** that that she must also have been up {before the court}, you can't be put on probation, <not unless *you're guilty>*.
Speaker C   *Oh yes, she was* prosecuted too, +(. coughs) <not but but>,
Speaker B   +<She'd> burnt the books+, when she *knew that*…
Speaker a   *For helping* to fiddle the income tax~|
Speaker B (. coughs) *Well, she must have known about it.

Multi-speaker dialogue may need to use presuppositions this way because establishing information as mutually known is a more complex task when several discourse participants are involved than when only two participants are involved. All conclusions may or may not have been realized by *all* discourse participants. In fact, it would be strange if we would not need to explicitly conclude things on occasion, as a form of grounding. Let's look at a similar example of another bound propositional presupposition, the presupposition induced by the *it*-cleft below.

(17)   "Someone lifted it (=the concept of transformations) from them"
       (=mathematicians) (2-5a 615)

Speaker A: I mean every transformation word that I've heard is in at the moment in [dhi] course for mathematics.
Speaker B: That's right. Well, <u>that's where it all comes from</u> _{antecedent}.
Speaker A: <u>Yes.</u> And it's {so} fascinating to see the analogy and it's much better in the mathematics than it is in grammar, I think.
Speaker B: But <u>it's us that **lifted it from them**</u>, not vice versa.

Here, Speaker B has already pointed out that the concept of transformations originated in mathematics, but seems to feel that Speaker A has not really understood that. He therefore reiterates with a more forceful *it*-cleft construction that linguists took the concept from mathematicians. Understanding that the presupposition is already present requires understanding the similarity between *"it" all comes from (mathematics)* = *someone lifted "it" from mathematics*.

The *it-cleft* construction is particularly well suited for corrections in that it focuses one element and backgrounds the rest. Speaker A misunderstands or makes the wrong conclusion from Speaker B's statement, resolving *that* to *grammar* rather than *mathematics* as Speaker B intended. That Speaker A has chosen the wrong antecedent is clear from his next statement. If Speaker B had used a pronominal anaphor rather than a presuppositional expression, there would have been a chance of a further misunderstanding.

Bound presuppositions seem to be contributing additional discourse meaning by serving a discourse function that pronominal or empty anaphoric reference could not achieve because abstract object anaphors are dependent on their antecedents. Presuppositions can contribute descriptive content to their antecedents and thereby influence the perception of the concept referred to.

These types of examples are common with the abstract presuppositions in particular because of qualities inherent in abstract objects. Because abstract objects are not clearly individuated objects, the descriptive content of the presupposition induced can to some degree shape or form the object. These types of "manipulations," such as reification and summarization, are made more possible because abstract objects are less individuated and less delimited.

According to Eckert & Strube (2000), one of the most basic criteria for information to be available for anaphoric reference is that the information has been understood and processed by all discourse participants. One of the things that the above examples had in common was that in each case it was unclear that all discourse participants were aware of the information, induced by the presupposition trigger, or aware of it in the way it is presented by the triggering expression. As soon as the presupposed information is uttered, it is easy to pick out what part of the earlier utterances contribute the same information to use as an antecedent. But this information was not always an explicitly given object. This means that many times presupposition triggers have the same referent-creating ability identified in abstract anaphoric reference, but are more precise in their reification abilities.

Other corpus work has also mentioned additional features of abstract object anaphors that are relevant here. Fraurud (1992) in her corpus study of abstract object anaphors in written Swedish prose makes the following observation about the inability of replacing some of the abstract object pronouns with definite NPs. She writes (p. 36) "Some uses of pronouns are more or less obligatory pronominals"… " One (additional) reason for using such pronouns may be that it is a convenient way of avoiding specifying the referent" and the reason for this is because the abstract object, or complex situation to use Fraurud's (1992) term cannot be referred to with a clear nominal form. One of the major uses of abstract object anaphors in Eckert & Strube's (2000) study was a vague reference to what they consider to be some kind of topic of the discourse at that point in time. Some of these examples may also be cases where the pronominal anaphor refers to abstract objects that are difficult to specify with a nominal phrase.

In summary, it seems that bound presuppositions and abstract object anaphors can be seen as functionally complementary to each other: pronominal anaphor can be used for given information that is currently salient or in focus if the exact reference made is not important. In some cases, based on the observations by Fraurud (1992), you may want to avoid actually identifying some explicit referent, or identifying an explicit referent may not be very practical, and then the best expression may be an abstract object pronoun.

In contrast, bound presuppositions can summarize or collect given information in a unit or object that is more individuated and structured. Bound presuppositions can be more precise in specifying what information is to be taken as an antecedent because of their additional descriptive content compared with anaphoric alternatives. In a situation where there is a chance for misunderstanding, perhaps a common occurrence in multi-speaker discourse, we may prefer a presuppositional expression for its precision. But when the abstract object to be referred to is less important and we want to make less of a commitment to it, we may use a pronominal anaphor.

In the following an additional features of bound presuppositions are illustrated. Presuppositional expressions can add rhetorical effect to a message in context where an abstract object anaphoric reference could not fulfill this function.

4.3.2 Binding relationship adds rhetorical effect to the message

In the following examples the presupposition and its potential antecedent are not similar enough that an anaphoric relationship can be read off the linguistic expressions. The exact semantic contribution of the antecedent and the presupposition to the context is slightly different. But there are other clues in the dialogue that seem to suggest that the presupposition contributes to the discourse as part of a unit together with its antecedent, i.e. that it is in part dependent on some of the descriptive content of the antecedent for its interpretation. Additionally, perceiving the relationship adds rhetorical effect to the speaker's message in a way that an anaphoric alternative could not. By rhetorical effect I mean that treating the presupposed material as bound strengthens a feeling of

contrast, or alternatively strengthens a feeling of parallelism between the presupposed information and its potential antecedent. I also believe that speakers intend for this effect to be a part of their message. In many of these cases, if the hearer did not perceive a relationship between the presupposed information and the potential antecedent, then he has misunderstood the intended effect of the speaker's utterance. Consider the following example of an *it*-cleft presupposition.

(18)   *it*-cleft, triggered p: "Someone said I wanted to sell out" (1-13 855)

Speaker A: James, it was no good. <u>You didn't tell me to sell out</u> _{antecedent}, it was I who **said I wanted to sell out.**

The presupposed material is reported information in the scope of the verb of reported speech *said*, which creates an embedded context. This report is in turn itself an expression of the propositional attitude *want*, with the proposition being the speaker selling out. This creates another level of embedding. Intuitively, "You didn't tell me to sell out" is the antecedent, but the only information they share is the proposition which is the complement of the parenthetical verb *tell* in the potential antecedent, that is, that the speaker was to sell out. The speaker is asserting that it was she and not James who instigated her 'selling out' event with a contrast being made between the speaker being *told* and the speaker *saying she wanted to* herself. Both these events will generally lead to the same result if all goes well, that is selling out, so there is a semantic similarity in the information contributed.

Why should these two utterances be considered to be in an anaphoric relationship? First notice how the second utterance functions as a correction to the speakers first utterance, pointing out what she perceives James to have mistakenly believed. There is also a clear parallelism between the two utterances in the choice of expressions. Not seeing this relationship would miss the speaker's intention in saying the antecedent – if we don't perceive the relationship here we have no clear understanding of how the two utterances hang together, and we will have trouble interpreting one as a correction for the other. Note that it is difficult to pinpoint what truth-conditional difference would be the result of not recognizing this as an anaphoric relationship, i.e. if the presupposed material was accommodated, how would the truth-conditions differ from it being bound? But because of so many other factors, I think the utterances are clearly perceived of as being in a type of dependent relationship that could be considered anaphoric. Note also that in (18) the presupposition could be simplified by replacing some of the information by an ellipse so that it reads "It was I who said I wanted to $\emptyset$." This would have the effect of contributing the same semantic information, but the speaker's message would lose the contrasting effect if the expression 'sell out' is not repeated. So by using a full presuppositional expression the speaker is able to emphasize the contrastive relationship in a way that an anaphoric alternative could not.

Consider the following example where using a presuppositional expression triggered by a factive verb strengthens the perception of parallelism between the utterance with the triggering expression and the utterance with the antecedent information.

(19)   *it*-cleft, *triggered* p: She is unusual (1-3 1190)

Speaker c: - [m] - - but <she . at> the same time she seems unusual, doesn't she.
Speaker A: Yes. Yes. And everybody NOTICES <u>that she's unusual</u>[10]

Here, Speaker c (male) suggests 'she is unusual' and Speaker A (female) replies with a very similar proposition, that the person referred to as 'she' is unusual. The triggering expression is the factive verb *notices* and the presupposed information is that the person referred to this way is unusual.

Clearly these two propositions, "she seems unusual" and "she is unusual." are related, even if they are not identical in the semantic contribution that they make. Perceiving this relationship is key to understanding the function of Speaker A's utterance. From the definition of discourse segment given above, Speaker c and Speaker A's utterances can be considered to form on discourse segment. Speaker c expresses an assessment and Speaker A expresses her agreement by first grounding with "Yes. Yes" and then making an even more specific acknowledgment by presenting via presupposition a similar proposition. Speaker c's original, and somewhat weaker assertion, that 'she' only *seems* unusual, can be interpreted as a kind of hedging, i.e. explainable as an unwillingness to express a negative opinion. So Speaker A's presupposition serves the discourse function of letting Speaker c know that she agrees with his assessment. Replacing the factive complement with an abstract anaphoric expression, e.g. if the utterance had read "And everyone notices it" then we would still interpret Speaker A's contribution as expression agreement with Speaker c. But the perception of parallelism decreases, and as a consequence of this Speaker A's statement loses some of its strength. The need for a stronger sense of parallelism is perhaps especially appropriated just because Speaker c's utterance is hedged because it is an assessment of another person's character. Let's look at another example of a factive presuppositional expression that strengthens a perception of parallelism.

(20)   factive, triggered p: you weren't getting anything (2-1@ 645)

Speaker a   I can only say that [@m - - - @] you must take you must take Joe Power's advice on this [@m] - for the little that I know about the Ford Foundation and it is very little - [@m] would have been that A, you mightn't get anything~|

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[10] Note that the triggered presupposition, if bound with an antecedent derived from Speaker c's expressions 'she seems unusual', will have to retrieve that antecedent information from an inaccessible context according to the rules of semantic accessibility in DRT. That's because the *seems* will create a modal context. For further discussion of accessibility and presuppositional binding see Zeevat (to appear).

Speaker B   [m]#|
Speaker a   probably <u>wouldn't get anything</u> and B, it would be a long time before you **knew** that <u>you <weren't_getting> anything</u>~|

The presupposed material and its potential antecedent are not surface-identical but the information that *you weren't getting anything* in the scope of the modal verb *would* and *probably* will be able to easily serve as an antecedent to the induced presupposition *you weren't getting anything* which is also in the scope of the second *would.* The induced presupposition in the second modal context needs to be bound to material found in the first modal context,[11] i.e. this is an example of the phenomena of modal subordination discussed in Roberts (1989). Modal subordination is found with pronominal anaphor as well as with presuppositional expressions, and it is in interesting to find a naturally occurring example with a factive. Geurts (1999) gives a uniform analysis of examples of pronominal and presuppositional modal subordination in an extension of the binding theory. His analysis treats modals as presupposing their domains. This makes the second modal can be bound to the domain of the first modal, in effect extending its domain. Thus information in the first modal is accessible to the second and anaphoric expressions can bind with antecedents in the first modal context. See Geurts (1999) for further explanation.

What is central to notice here is that the speaker intends for us to perceive the binding relationship with the presuppositional expression in order to strengthen a feeling of parallelism, created by the speaker repeating different verbs, "mightn't/wouldn't/weren't" + "get/getting anything." The presupposition could be replaced with an abstract object pronoun, making it e.g. "B, it would be a long time before you knew *it,*" but this would null the rhetorical effect of parallelism created by using the presuppositional expression.

Consider now the following example with an aspectual verb.

(21)   aspectual verb, triggered p: speaker's sister was telling her off before
         (1-12 1108)

Speaker B   And, uh, so I rang up and my sister answered the phone and <u>she - really gave *me a* terrible harangue</u>.
Speaker D   *<sharp>* Yeah.
Speaker B   Over the phone - going on, and on, and on, about - how could I say such things {and so on}….
Speaker c   Trivial.

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[11] This is actually a simplification of the analysis of the example. Compatible antecedent information is already introduced in Speaker a's first statement of "you mightn't get anything," so it would be within the modal context created by *might* that the antecedent information would be found.

Speaker B   Really awful, I it was nothing, it was nothing, I said I didn't say anything
.
Speaker c   Oh God.
Speaker B   So anyway . by the time she'd **finished** <u>sort of telling me off</u> and me saying, now what's the good of quarrelling, it's so trivial and…

In the above example, an abstract object pronoun or even an ellipse could have been used, to read "by the time she'd finished that/ $\varnothing$" but the rhetorical effect would be lost, and the additional descriptive information that the presupposition contributes to the understanding of the speakers perception of what the "harangue" really was would be lost.

All of the presuppositional expressions of this type could be replaced with a pronominal expression. This wouldn't cause a loss of meaning, but it would cause a loss of rhetorical effect. These examples the presupposed information can be replaced with an abstract object anaphor is because the predicated information about the antecedent is so similar to the predicated information about the triggered presupposition. This makes the relationship unambiguously identifiable, even when an anaphoric expression is used. But a pronominal alternative cannot contribute rhetorical effects like presuppositions can.

The examples in the following section are different in that the presuppositional expression could not be replaced with a pronominal anaphor. However, it still seems to be bound. In the first example the reactions of the other participants are taken as clues to binding. In the second example understanding a relationship is necessary for perceiving the discourse as coherent.

4.3.3 Reactions by other participants point to the binding relationship being perceived

In the following example the presupposed material does not express exactly the same semantic content as the potential antecedent, similar to the examples in the previous section. Because of this, it is not clear what the truth-conditional difference will be between a binding resolution and a resolution via accommodation. But this example differs from the preceding ones in that the presupposition cannot be replaced with a pronoun and part of the reason for this is that the potential antecedent is quite far from the triggering expression. The distance probably also contributes to the difficulty in perceiving what difference resolution by binding and resolution by accommodation would make. Finally, there was no clear rhetorical effect that encourages us to recognize a binding relationship. However, there is evidence that the hearer *did* perceive a binding relationship:

(22)   factive, triggered p: "He is enthusiastic (He = Prof. Pitt)" (2-1@ 120)

Speaker A: Also Pitt has talked about it a good deal. Professor Pitt here, and <u>he has supported.</u> (a)
(SEVERAL LINES) Yes, <u>he has supported you</u> (b)
is it with the Cambridge Press.

<u>He has supported you quite strongly (</u>c) and we had

(UNTIL LINE 1015, i.e. 895 lines)

Speaker A: You could indeed but I should continue also to give Professor Pitt's since I know that
Speaker B: <u>Know</u> that **he is enthusiastic**
Speaker A: Yes, quite. <u>He supported you very strongly.</u> (d)

Having supported someone strongly is not a synonym to *being enthusiastic* but they both do express what are at least compatible positive attitudes. This makes their meaning similar enough consider the sentiment expressed by the former as a potential antecedent for the latter. What evidence do we have that Speaker A is binding the presupposed information with the previous statement? Actually, I think we have quite strong evidence of this because Speaker A in line (d) repeats the utterance from which the antecedent material is derived almost word for word!

Similar effects have been shown in cases of long-distance relationships between anaphors and their antecedents, discussed in Fox (1987) and Walker (1996), where often the same strings of words from the earlier context where an antecedent was last used are repeated by discourse participants when another anaphoric reference is made to the referent. Fox (1987) gave several examples of this in her book. For example the following (p.53-54)

(23)   Long-distance anaphor with lexical repetition, taken from Fox (1987, p. 53-54)

Speaker C: I heard <u>Little</u> was <u>making frames</u> and <u>sending them to California.</u>

[2 pages of intervening talk]

Speaker G: That's all – he don't have any kids, him and his wife never had any kids and…
Speaker C: (clears throat)
Speaker G: (Whatta) they got you know…
0.5
Speaker C: Well…
Speaker G: Well I guess –
0.7
Speaker C: T, nah, he helped
Speaker G: He's got he's got eight units that he rents out and
Speaker C: He helped uh, Merkie build his T bucket up, I saw Merkie's is un is a darn nice looking little bucket.
1.0
Speaker C: En then I, ex I heard det- you know **he** built a couple of them up and **he** used to <u>build frames for guys</u>. And then **he** uh see <u>sent a couple of them to California.</u>

Fox considers the case in point to be a return pop, for the interpretation of the anaphoric expression *he*. Return pops are the reintroduction of a discourse topic

and its elements. The use of the anaphoric expression, and the pronouns ability to be unambiguously resolved in such cases is taken to be evidence that the interpreters are able to access this earlier context after the intervening topic, thereby, using the terminology from Grosz & Sidner (1986), 'popping' a focus stack of the intervening topics to return to the earlier context. These types of examples have later been used to argue that discourse structure is hierarchical, a claim we'll look at more closely in 4.4.

In the above example, the topic is able Little making frames. Another topic is pursued, and then finally the discussion about Little and frames is returned to, and Little is the antecedent for the pronoun *he*. Fox (1987) identifies the repetition of several words and phrases from the first mention of Little as helping the interpreter to retrieve Little as the antecedent for the *he* in the later discourse. She writes: "The lexical repetition helps to accomplish a return pop to a specific point in the preceding talk, and this return pop allows the use of a pronoun to be unambiguous"(p. 53). She also gives examples where there does not have to be exact repetition but there can be similarity of meaning, on example from her data is "*and that made me feel good*" and *he made me feel better anyway* (Fox 1987, p. 52).

Relevant to the discussion of example (22) is that long distance anaphors often occur with lexical repetition of words and phrases from the last mention of the antecedent. Example (22) shows the same type of lexical repetition with an abstract presupposition and a potential antecedent that is quite a distance away from the presuppositional expression. Thus, speaker produce long-distance relationships between presuppositions and their antecedents in a way similar to the use of long-distance anaphors. The crucial difference between examples with anaphors and examples with presupposition however is that we cannot distinguish well in (22) between an interpretation where binding is the method of resolution and an interpretation where accommodation is the method of resolution because there is no clear intuitive semantic difference. There is also no clear rhetorical reason to perceive the relationship. Nevertheless, the data from the repetition, particularly in that it is almost word for word and is *not* made by the speaker triggering the presupposition, is evidence to believe that it is perceived as an anaphoric relationship by Speaker A.[12]

I think this example also supports the idea that even if the semantic effect of binding a presuppositional anaphor is difficult to distinguish from accommodating the presupposition, we should not be ambivalent about these two categories – we should try to bind. If the goal is to develop an analysis that leads to the representation of presupposed information in a way that accurately reflects the relationships that speakers intend to be recognized, and the relationships that hearers seems to react to or perceive, then we should prefer to resolve by binding rather than accommodation in these borderline cases.

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[12] There is an alternative explanation, though I think it is unlikely. It could be that Speaker S's standard response to any mention of Prof. Pitt and Speaker B is to utter something about "He has supported you quite strongly." I don't find this as plausible as the explanation given above.

4.3.4 The binding relationship needs to be perceived to make the discourse coherent

In the following example the information content of the presupposed material and the potential antecedent are different. The presupposed material cannot be replaced with an abstract object anaphor, and there is no evidence from the speaker or from the reaction of the other participants that some kind of binding relationship is perceived. Still, in order to understand the coherence of the discourse it is necessary to perceive the relationship. In the following example, Speaker A is telling a story about her experience barrier nursing for a very ill child. The child has some type of streptococcus bacteria that is highly contagious. The disease is the reference of the first *it* in the first utterance given below.

(24) factive verb, triggered p: You are going to knock out an expectant mother. (1-8 993)

Speaker A It was lethal to expectant mothers _{antecedent} with small children.

(38 more lines about barrier nursing and caring for very ill child)

Speaker A After all, I mean you can't go down and shop if <u>you know that **you're going to knock out an expectant mother**</u>-it was some <violent> streptococcus {that he'd got}

Finding the propositional antecedent in this example involves identifying the relationship between the group of expectant mothers and a single instance of an expectant mother, and recognizing that "x is lethal to y" refers to the same state of affairs as "x will knock out y." The function of the presupposition seems to be to emphasize the great degree to which the speaker was affected by the exposure to the illness. Here it would not be possible to replace the presupposition with an abstract object pronoun, in particular because of the distance. But on the other hand, given the topic, the only information that could appear after the *if*-clause has to be some sort of explanation about why shopping would not be possible, e.g. because the speaker could infect someone for whom catching the disease could be deadly, i.e. pregnant women. But using an abstract pronoun alone would not achieve this meaning, perhaps because of the distance and perhaps also because there are several other related ideas that could appear here as well. Using the presupposition is necessary to make clear exactly what is meant and if the generic expression wasn't meant as a generalization of the speakers own health status because of the nursing, then the discourse is not coherent.

4.4 PRESUPPOSITIONS AND GLOBAL DISCOURSE STRUCTURE

Several researchers have suggested that global discourse structure will affect the availability of antecedents for anaphoric expressions, and in turn that anaphoric expression usage will give us evidence of a hierarchical discourse structure. Is a hierarchical discourse structure relevant to the availability of antecedents for bound presuppositions as well?

Here I will first give some background information on global discourse structure and how it is meant to affect the availability of antecedents for anaphoric expressions. Two well-known proposals use tree structures to represent discourse structure, Polanyi's (1988) Linguistic Discourse Model and Webber's model (1991). Lascarides & Asher's (1993) model also uses tree structures to organize rhetorical relationships. The attentional model of Grosz & Sidner (1986) represents hierarchical structure as stacks of focus spaces.

One of the types of examples that have been used to support the need for a hierarchical discourse structure are so-called 'return pops.' However, Walker (1996) argues that the evidence from return pops can be explained by other factors without the need to refer to a hierarchical discourse structure. I'll present an example of a return pop with an anaphoric expression and then one from my own data with a bound presupposition. Then I'll discuss whether or not we need to hypothesize a hierarchical discourse structure to explain these examples. The answer seems to be no, and I'll discuss the issue in relation to the rest of the corpus data.

In a global discourse structure, information is organized into units, called discourse segments, which are related to each other by coherence or rhetorical relationships which may be coordinating or subordinating, creating a hierarchical structure. This structure then supports the use of underspecified forms efficiently because their resolution can be guided by it. The main distinction in discourse structure is between what is in focus, attentionally available or related to the current topic from what is not, as determined by identifying the relevant "focus space" (Grosz & Sidner, 1986), "context" (Fox 1987) or part of the hierarchical structure (usually the right frontier, in e.g. Polanyi 1988, Webber 1991, and Lascarides & Asher 1993).

The search for antecedents of anaphoric expressions will be most efficient if it begins by examining salient or activated referents, and these should be the referents found in a pre-defined discourse structural position. The relationship that holds between discourse structure and an anaphor may differ depending on the type of anaphor. Generally, abstract object anaphoric reference has been argued to be more dependent on discourse structure than anaphoric reference to concrete individuals in the discourse, perhaps in part because abstract object anaphors can sometimes refer to the information derived from one particular discourse segment. This is discussed in Webber (1991), who has argued that some abstract object anaphors can only access discourse segments on the right frontier, because those are the ones that are in focus or salient.

In one of the first computational models of discourse structure, presented in Grosz & Sidner (1986), contexts representing topics with discourse referents and other information are stored in so-called focus spaces, which are "pushed" onto a stack when introduced. When a subtopic is completed, it is "popped" from the stack in order to get to the previous focus space and return attention to the earlier (superordinate) discourse topic. The search for antecedents of anaphora in this model is restricted to the focus space on top of the stack. If there is no compatible

antecedent on the top of the stack, the use of the anaphoric expression may itself be triggering a "pop" of the stack. This work has been discussed extensively as a computational modal for discourse that can help in resolving anaphors.

Asher & Lascarides (1998b) proposal is the only one I know of that claims explicitly that hierarchical structure of discourse will also constrain the availability of antecedents for bound presuppositions. In their (1998b) model, as presented in section 2.5.2, presuppositions are always bound via a rhetorical relation to another discourse utterance – this is the attachment site. They argue that only attachment sites on the right frontier of the discourse structure will be available. In this way they also believe to constrain the binding ability of presuppositions in a way that improves upon van der Sandt (1992) by limiting the number of possible antecedents.

One of the main arguments for the need to consider discourse structure hierarchical is evidence from return pops. These are the cases mentioned above where it seems that speakers return to a focus space or context possibly linearly quite distant from the anaphor but seemingly without processing difficulties. The idea is that the antecedent is perhaps conceptually closer because the topic or context where it first appeared is on the right frontier or at the top of the stack after the pop. The following example illustrates a return pop with a personal pronoun in naturally produced dialogue (taken from Fox, 1987, p. 30).

(25)   Example of return pop with personal pronoun

Speaker A: Oh, my mother wants to know how's <u>your grandmother</u>.
Speaker B: Uh, <u>I don't know</u>. I guess she's al, she's alright . She went to the
uh hospital again today.
Speaker A: Mmm?
Speaker B: And I guess today was the day she's supposed to find out if she
goes in or not.
Speaker A: Oh. Oh. _____
Speaker B: Because they're gonna do the operation on the tear duct first,
before they do the cataracts.
Speaker A: Mm-hm. Right. Yeah.
Speaker B: So I don't know. I haven't you know, she wasn't home by the,
you know, when I left for school today.
Speaker A: Mm hm.
Speaker B: Tch. So uh, I don't know.
Speaker A. Mmm.
Speaker B: Well <u>my aunt</u> went with here anyway this time.
Speaker A: Mm, hm.
Speaker B: <u>My mother</u> didn't go.
Speaker A: Mmm.
Speaker B: But uh, <u>I don't know.</u> **She** probably has to go in soon though.

Here the last *she* refers to the grandmother, and the analysis given by Fox (1987) is that it does not even refer to the most recent mention of the grandmother, but the mention in the section marked above the horizontal line, where the topic is the

same as the last reference, i.e. the grandmother having to go into the hospital. A new topic has been pushed on top of the stack, placing the main topic lower in the stack. When reference is again made to this context, the reference markers in the subtopic are popped, and we then get access to the information in the previous topic. There is one example of a 'return pop' among the bound presuppositions. Let's take a look.

(26) factive verb, triggered p: Americans have a wonderful standard of living for some things (1-3 324)

Speaker a well - I don't know whether she's prosperous or not - *<but if she's>*~|
Speaker B *oh no#   not by American* standards +<of course> .# <1 to 2 sylls>+~|
Speaker a +but remember that+ as I said . <u>America - must have a cost of living about the same as here and the   standard is about twice as high</u>~| (326)
Speaker B Yes.
Speaker a So they do have far more of . the world's goods than we do - pro rata - - -~
Speaker B yes -   I mean Eileen writes back# and says the [p] the price of petrol is rocketing, it really is unbearable# and <it's worked> out at twenty-five pence a gallon.
Speaker ? (. giggles) [m]#|
Speaker B and when I tell her how much it costs# cos I always think that nobody else . in the family's writing <to Eileen> .# I don't think she really thinks we're paying what# seventy-five pence for a {gallon}   I think she thinks I'm exaggerating#|
Speaker C Just unbelievable, yes#|
Speaker a Yeah - - .~|

(49 lines later)

Speaker B Laurie, aren't you [?]ever intrigued,   by this so-called [ing] - improvement in the standard of living#
I mean I **know** that <u>Americans have <a>   wonderful standard of living for some <things></u> -# but frankly# [a] our standard of living# {l} reckon# has never been as high as it was# when [@] - when I was [jungg] .#

The induced presupposition refers to the earlier mention of the standard of living in America in order for the speaker to contrast it with her own view that the standard of living in England is actually now quite high. The first mention of the standard of living in America is made, and then a long discussion (53 lines) about the differences in prices between England and America, and whether Eileen, a relative living in America, really believes what they tell her. The return to the topic of standard of living could be considered a kind of return 'pop' to the earlier context where the idea was introduced. It is also clear from the way Speaker B begins her statement that she is beginning a new topic, and then it is made clear that she is actually reintroducing a topic that was not closed in the earlier discussion. The reason this should be considered binding is that the wording in the

two linguistic expressions is very similar and the meaning of the two expressions is also clearly the same. But we could also just simply consider this a return to an earlier topic that the speaker wishes to pursue. The semantic similarity is strong enough grounds to identify it as an antecedent, though there is no collaborating evidence in the reaction of the other discourse participants which show that they recognize that Speaker B is returning to an earlier topic, though it would seem quite strange if they did not.

It has been argued that the only way to account for return pops is to believe that speakers pop the focus space from the stack. This allows speakers to use pronouns to refer to linearly distant items unambiguously, because in general long-distance reference with pronouns like the one above should not be possible.

However, it is not entirely clear that this hierarchical structure in discourse exists and limits the availability of antecedents, or is at all necessary to explain anaphor resolution in cases of return pops. Walker (1996) has argued that discourse processes that 'operate under a limited resource constraint,' such as ellipsis, pronoun resolution and inferences about discourse relations, are instead affected by the LIMITED ATTENTION CONSTRAINT. This constraint says that processing can concentrate only on a limited number of items at a time; that is, linear recency is a stronger factor in limiting the use of and ability to resolve these discourse processes than hierarchical structure is, and that other information can also explain how return pops are understood.

In order to see if hierarchical structure is really needed to account for return pops and in order to find support for her model, Walker (1996) re-examined all the examples in the literature. Walker points out three ways in which the antecedent of an anaphoric pronoun for a return pop might be unambiguously signaled without having to rely on a hierarchical structure as an explanation. 1) there may be no other referent in the discourse with the same features, 2) the content of the first utterance in the discourse segment that begins a return pop is sufficient to signal what earlier context should be retrieved from main memory, 3) "the shared knowledge of the conversants (e.g. shared knowledge of the task structure) creates expectations…" (Walker 1996, p. 261) which allow the participants to unambiguously predict context signaled.

In 19 out of 21 cases of return pops given in the literature, Walker found one or more of the three clues that made the antecedent unambiguously identifiable. In the remaining two cases there was a competing referent with the same features as the correct antecedent in the context, but this individual was in both cases never salient in the discourse. In the example taken from Fox, example (25) given earlier, the clue to antecedent identification would be the information that the anaphoric subject was going to the hospital, and because only one discourse participant is talked of as going to the hospital earlier, this should be sufficient to identify the earlier context where the earlier mentioned grandmother appears in order to retrieve it as an antecedent.

Walker's (1996) results put into doubt the assumption that hierarchical discourse structure plays the key role in limiting the search space for antecedents of

anaphors, suggesting that other factors can also be involved. What about presuppositions in this regard? Example (26) with the bound presupposition (and possibly other examples of bound presuppositions will be similar) differs in one substantial ways. We don't necessarily have to return to the earlier context and bind with the antecedent to understand the discourse in (26) because we can always accommodate, and we certainly have enough information to do so. So unlike the pronominal return pops there is no need to account for the great distance between presuppositional information and its antecedent by assuming a hierarchical structure. This makes one of the main reasons for assuming return pops in the first place irrelevant for presuppositional expressions like the one in (26).

Evaluating Asher & Lascarides' claim that presuppositions take their antecedents from the right frontier is quite difficult to test. This and similar proposals for anaphors (e.g., Grosz & Sidner (1986), Polanyi (1988)) all use made-up spoken discourses to illustrate their approaches. Fox (1987) looks at naturally produced unrestricted dialogues, but she doesn't specify explicitly a structure and she doesn't make claims relating structure to anaphoric accessibility either. It is easy to construct a tree structure, or simulate a focus stack, for a made-up discourse, but it is much harder to determine if antecedents are found in the appropriate position in natural discourse due to its greater complexity. There does not seem to be any empirical work which tests the proposals and claims on large corpora, maybe due to the difficulty of the task. Eckert & Strube's (2000) work on resolving abstract object anaphors in spoken discourse seems to show however that a simplified local discourse structure is sufficient to correctly identify the antecedents of abstract anaphoric referents in over 60% of the cases.[13]

If we assume that pronouns, especially those that refer to abstract objects, take antecedents only from the right frontier, we have a problem explaining cases where a presuppositional expression cannot be replaced with a pronominal anaphor. If there is evidence that the presupposition is bound with the antecedent found, then we have to consider this to be evidence that bound presuppositions are not governed by the same constraints as pronouns on the location of antecedents. Examples already given include (24) and even more strikingly (22). That is, presuppositional information might be limited in where in the discourse structure it can get antecedent information, but these examples seem to show that this limiting effect cannot be the same for presuppositions as for pronouns, either it is different, or it does not affect presuppositions.

In conclusion, it is not at all clear that some type of hierarchical structure is necessary to account for antecedent accessibility for anaphoric pronouns and there is also no evidence in the corpus that hierarchical structure is necessary for limiting the availability of antecedents for presuppositions. The examples where it was not

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[13] Precision for Eckert & Strube's (2000) algorithm was 63.6% and recall was 70%. One of the explanations they give for these low percentages is that they limited the domain in which to search for antecedents to one synchronizing unit, a kind of adjacency pair similar to the discourse segments defined earlier. But they point out that this restriction is also what allowed them to do so well in classifying.

possible to replace a bound presupposition with an anaphoric alternative instead support the opposite conclusion, that *if* hierarchical structure affects the availability of antecedents for triggered presuppositions, then it does not do it in the same way as it restricts availability of antecedents for anaphoric expressions.

4.5 DISCUSSION AND CONCLUSIONS

I believe the corpus data supports the claim of the binding theory that presupposed information and anaphoric information behave in a similar way. On several different counts induced presuppositions seem to behave similarly to discourse anaphor. However, they are more versatile in many respects. Because presupposed information is descriptively richer and has semantic weight it can have functions in discourse situations that are not found with anaphoric alternatives. To sum up, in examples (15), (16) and (17) presuppositional expressions were able to precisely refer to already given information, even in cases where a pronominal anaphor was possible, but using it would not have had the same meaning. In some cases it can have a summarizing function. In other cases where an anaphoric alternative was possible the use of a presuppositional expression also contributed additional rhetorical effect that the anaphoric alternative would not have, e.g. (18), (19), (20) and (21). There are also cases where the recognition that the presupposed information and the potential antecedent refer to the same information is necessary for a coherent interpretation of the discourse, e.g. (24). Example (22) seems to suggest that even in cases of great distance, and where the presupposition could not be replaced with a semantically empty anaphoric pronoun, hearers may actually be perceiving the presupposed information as anaphoric. Finally, example (26) shows that presuppositional expressions can function in contexts in a way similar to what has been generally described as discourse pops, retrieving an antecedent from an earlier abandoned topic after an intervening discussion.

Given the difficulties in identifying antecedents discussed above, it might seem simpler to use some version of the satisfaction theory, only intuitively considering the discourse record to see if the information presupposed is already satisfied by information given earlier in the discourse. If it were satisfied, simply considering the triggered presupposition to be felicitously used and leaving it at that would simplify the analysis immensely. But this strategy would also have completely obscured the other functions that the presupposed information had in the discourse. Seeing that the already given information and the presupposed information together add rhetorical effect or seeing that they are creating a new abstract object, or understanding how they make a conclusion more concrete and explicit by the use of the presuppositional expression, as in examples (15), (16) and (17), is part of what speakers perceive about the information exchanged, and is certainly something we want to be aware of in resolving presuppositions. Therefore, I maintain that we need a binding analogy to account for these examples, because we need to identify the linguistic expression from which the antecedent is derived to see how it fits in with the rest of the discourse.

For many of the examples, the semantic information contributed by the linguistic expressions alone was only a weak indication that presuppositional binding was taking place. If the predicative role of the presupposed material and how the binding relationship contributes to the coherence of the discourse are understood, then the only way to arrive at a coherent interpretation is by binding between the presuppositional expressions and the earlier information. This result seems to support Asher & Lascarides' (1998b) emphasis on the role of pragmatic information in resolving presuppositions, at least for binding examples. Until we have a clearer idea of how to determine when linguistic expressions are referring to the same information, we can use our understanding of how binding would contribute to understanding the rhetorical relationship between utterances in the discourse as collaborating evidence that we are dealing with bound presuppositional information.

The ability of the presuppositional expressions to have these extra discourse functions seems to be largely dependent on the type of semantic object that the trigger induces.. The function of anaphors in context differs according to the type of semantic individual they refer to as does the function of presuppositions. Anaphoric expressions that refer to concrete semantic individuals have an identifying function, whether they identify an already given individual, or in the cases of set-relationship anaphors, an individual from a given set. The same goes for presuppositions of concrete semantic individuals. Triggers that presuppose concrete semantic individuals, e.g. a subset of the category identified by Zeevat as the *referential anaphoric triggers* and represented in the corpus by definite NPs, seem to serve either an identifying function alone or in combination with the addition of more descriptive information. Zeevat (to appear) argues that the use of these triggers only helps to supply referents for predications and to link the descriptive meaning that they are associated with to the right semantic individual in the discourse representation, i.e. "it is by no means clear that the role these referring expressions play in defining the thought expressed by the sentence in which they occur depends much on the content of their presuppositions." (p. 9, Zeevat, to appear). Concrete individuals are generally in an identity relationship with their antecedents. Their correct resolution can contribute to understanding the discourse structure but this is not their main function in discourse. Whereas triggers that induce presuppositions of abstract objects can display extra functions more easily because the antecedent that they will be binding with is also an abstract object. Because of the lack of individuation of abstract objects, the descriptive content contained in the triggered presupposition can shape or delimit this object more than pronominal anaphoric reference could, or more than concrete anaphoric references can delimit their antecedents. Also, because of the additional descriptive content we can create rhetorical effects by repetitions and other means that are less available with concrete anaphoric reference. For these reasons, I think the type of semantic object that the trigger induces will support these additional functions, and in the case of abstract presuppositions, it supports these extra effects.

Throughout the preceding discussion I have side-stepped the issue of partial resolution, i.e. cases where only part of the induced presupposition is given in the previous discourse, and a part of the information actually will have to be accommodated. For the examples where the presupposed material and its antecedent are less clearly related, in certain cases partial resolution may have been a more appropriate or correct characterization in what was going on. However, for the abstract object presuppositions shown we still face the same problems of identifying binding as before, but they become more complex because we somehow have to compare the presupposed material present in the discourse representation with the material that can function as an antecedent and then separate this latter information from the rest of the presupposed material to find out what will have to be accommodated. Trying to say something more specific about how this would work and what has to be done in my opinion would not have made understanding the examples any easier, in fact more likely the opposite. I leave this difficult question for future work, and discuss partial resolution primarily in relation to definite NPs, in chapter 6.

5 Accommodation and Presupposition

Current presupposition theories assume that presupposed information not already part of the context can be accommodated, that is, the context can be revised so that it contains the presupposed information in order to make the use of the utterance with the presupposition felicitous. When using the binding theory, all information that cannot be bound with discourse-given information will be analyzed as accommodated and treated as discourse-new at the level of representation.

Accommodation is still not well understood. It is a process about which there are a great number of theoretical proposals, but there is very little empirical evaluation. This is due in part to the fact that it is not clear what type of evidence would confirm the different proposals. In this chapter I will try to add to the discussion some new empirical observations based on the corpus data.

In 5.1, I will show what naturally occurring examples of accommodation look like and in particular, how trapping and trapping-like phenomena lead to non-global accommodation.

In 5.2, I will discuss the information status of accommodated information from the perspective of the discourse participants. There is a common misconception that presupposed information is generally shared knowledge. I will show that the presupposed information triggered by factives in the corpus data studied here were generally used to communicate information the speaker thought was hearer-new.

In section 5.3 I will discuss what licenses accommodation, that is, what allows information that needs to be accommodated to be generated and to be understood when used. There are two main explanations in the literature. Van der Sandt (1992) has suggested that descriptive content licenses accommodation. A competing proposal is offered by Zeevat (1999, to appear) and Blutner (2000)

based on the bi-directional optimality theory version of the binding theory. They propose that a lack of alternative expressions that will not need to be accommodated licenses accommodation. Both proposals make some incorrect or unclear predictions when applied to a range of empirical data. In addition, they are difficult to evaluate when applied to real examples because many key concepts used in the proposals are not well defined. Each explanation also addresses different factors that seem to play a role in ease of accommodation and tendency to accommodate. I will also show that accommodated information projected to the main DRS in the corpus examples is often linked to it via bound pronominal or presuppositional expressions. This linking may also contribute to the felicity of accommodation in these examples.

Finally, in 5.4, I question the proposed preference for higher levels of accommodation over lower levels. There are two main proposals in the literature, the informativeness principle (IP) (discussed in Blutner 2000, Zeevat to appear), which states that hearers prefer the logically strongest reading, and the buoyancy principle (BP) (Geurts, 1999), which says that presuppositions prefer to be globally accommodated because they are background information, and background information prefers to be as high as possible in the DRS. In a recent article, Geurts (2001) has pointed out that neither proposal is very convincing.

Corpus study is an appropriate method for investigating preferences[1] and here we find some surprising results counter to earlier theoretical proposals. The corpus data does not support a general preference for global accommodation for all trigger types because factives in particular were locally accommodated as often as globally. I will suggest that there are different preferences for trigger types to occur under embedding, and when they do, the triggered presuppositions exhibit different tendencies to be globally accommodated. Projection preferences for presupposed information then have to do with the triggered presupposition's semantic type, the type of embedding under which it is induced and the function it can have in the discourse. While this idea is still very speculative, I hope some of my observations may encourage more research into this question.

5.1   CORPUS EXAMPLES OF ACCOMMODATION

In both the binding theory and the satisfaction theory, accommodating a presupposition is a secondary step in the analysis. We first try to bind, or alternatively we check the context to see if the presupposition is already satisfied. Only when these strategies have failed do we resolve the presupposition by accommodation. For this reason the only examples discussed are cases where binding was already ruled out as a possible analysis.

In the binding theory, accommodation can take place globally, intermediately or locally. Note that all three levels of accommodation are available only when the

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[1] Because if we find that a preference is a tendency to prefer expressing information in one manner over another, and frequencies are the quantitative result of tendencies.

presupposition is triggered under an embedding that creates at least two contexts. To be able to correctly discuss preferences for higher levels of accommodation over lower ones, only cases where there was some type of embedding should be included in the count. For this reason I will make a distinction between global accommodation (GLOBAL) for cases where the presupposition is triggered in at least one level of embedding, and main accommodation (MAIN), where there is no embedded context and the only level possible for accommodation is in the main DRS, i.e. where the home DRS of the trigger *is* the main DRS of the discourse. This means that accommodation at each level was tested to determine if the resolution would result in a well-formed DRS, e.g. with no unbound variables, as well as a DRS acceptable from a discourse perspective, i.e. both consistent and informative. Currently, cases of INTERMEDIATE accommodation are counted with LOCAL because it was often unclear what the differences in readings will be between intermediate and local accommodation.

Table **5** presents the number of examples of each type found in the London-Lund corpus.

Main DRS (MAIN) and global accommodation (GLOBAL) were the most frequent analysis for presuppositions triggered by all trigger types except for *too*.

The low number of examples of GLOBAL and LOCAL accommodation may be the result of a lower frequency of embedded contexts in dialogue. For abstract triggers, there were only 28 cases where the triggering expression occurred under at least one identifiable level of embedding. For definite NPs categorized as new there were no presuppositional expressions accommodated under embedding. A possible explanation for this could be that presenting information or ideas using these types of contexts may be less frequent than concrete references to the past or to the here and now in informal conversation.

The tendency to accommodate differed greatly by trigger type. Aspectual verbs, followed by factives, were the most likely to accommodate. On the other hand, only two presuppositions triggered by *too* could be interpreted as possible cases of accommodation. One of these cases was an utterance with *too* found at the beginning of a recording where the speakers were already engaged in their conversation when they entered the room with the recorder. This might mean that this particular presupposition was not intended to be accommodated and had an antecedent in the part of the conversation that was not recorded.

Triggering construction	Total	Accommoda-tion	Main	Global	Local	Binding
fact verbs	109	81(74%)	59(54%)	10(9%)	12 (11%)	28(26%)
aspectual-verbs	68	58(85%)	43 (63)%	13(19%)	2(3%)	10(15%)
it-clefts	31	12(38.7%)	10 (32)%	2(6.4%)	-	19(61%)
too	45	2(4.4%)	1 (2.2%)	1 (2.2%)	-	43(95%)

Table 5 Accommodation of abstract triggers by trigger type

Trigger Type	Total²		Acc		Main		Global		Local	
Annotator	1st	2nd	1st	2nd	1st	2nd	1st	2	1st	2nd
definite NPs	248	235	56 (22%)	82 (35%)	39 (16%)	60 (25%)	14 (6%)	23 (10%)	0	0
demonst NPs	53	47	9 (17%)	10 (21%)	7 (13%)	8 (17%)	1 (2%)	2 (4%)	0	0
possessives	110	108	50 (45%)	63 (58%)	33 (30%)	40 (37%)	15 (14%)	23 (21%)	0	0
TOTAL	411	390	115 (28%)	155 (40%)	79 (19%)	108 (28%)	30 (7%)	48 (12%)	0	0

Table 6. Accommodation of definite NPs by trigger type. The double columns for definite NPs represent the tagging results of the first and second annotator, in that order.

5.1.1 Accommodation in the Main DRS

Main accommodation was the most frequent resolution for presuppositions induced by all trigger types, except for *too*. In the first example below the presupposed material is triggered by the factive verb *realize*. The speaker is describing his experiences when he returned to teaching and how teaching methods had changed. In the second example, the triggering expression is the aspectual particle verb *carry on,* which presupposes that the activity in question was occurring before the reference time of the utterance. The topic is how the general disorder in your household will increase when you have children.

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[2] Note that the figures for accommodation only include examples that were considered new by both annotators. See Table 13 for figures for binding as well as for NPs that were considered related to the discourse, e.g. bridging NPs.

(1)   factive, triggered p: Everybody else in the college was using (visual aids) all the time. (MAINACC) (2-11b 1306), four participants.

Speaker A: but if you're doing *them* by all the International House things and - sort of - drills and all this all this business or did you just sort of do it (a)
Speaker d: oh well I could remember some of them . the drill things~| (b)
Speaker A: yes. (c)
Speaker d: And a few more of them came back and I gradually **realized** <u>that everybody else in this college was using them all the time</u>. You know, visual aids, prompts, this sort of lark. (d)
Speaker A: Horrors (e)
Speaker d: Situations (f)

(2)   aspectual verb, triggered p: He (cousin of Speaker B) was writing his thesis earlier (MAINACC) (2-10 991)

Speaker B: I have a cousin a bit like you actually. he used to throw his children bananas to eat . when they were hungry <he seems *to have> yes (a)
Speaker c: *[gjum] (- - - laughs)* (b)
Speaker B: Just casually toss <them> a banana, to a three month old child - tossed across the room,   **carry on** <u>writing his thesis</u> (laughs). It was an absolute pigsty. (c)

For both examples, binding was ruled out as a potential interpretation. There are no utterances that communicate the same or similar information in the context. In example (1), Speaker A acknowledges Speaker d's utterance and therefore also the presupposition. The presupposition may only be partially resolvable until line (d) where Speaker d clarifies what reference was intended for the pronoun *them* in his last utterance of that line. In the discourse from which example (1) is taken there is nothing said about other college employees using visual aids or other types of International House type drills.

In example (2) there is no information that the subject of Speaker B's utterance had been working on a thesis prior to the time of the utterance. This is also marked rather explicitly in Speaker B's utterance in line (a), e.g. "I have a cousin", suggesting that Speaker c probably isn't aware even of the existence of the individual. The conversation from which example (2) was taken was between four participants, including Speaker B's spouse (no utterances shown above) and it is conceivable that this individual may have already known about the cousin and his habits, but because Speaker B seems to be addressing his/her story to Speaker c, it seems to be information that the speaker believes is hearer-new. Note that neither of these presuppositions could be considered unexpected or predictable information.

5.1.2 Global Accommodation

The examples categorized as GLOBAL accommodation in the table were presuppositions triggered in an embedded context but were accommodated in the main DRS, formerly considered presuppositions that were projected. This group is

therefore distinct from MAIN ACCOMMODATION in that there was a real potential for other levels of accommodation.

Example (3) below is taken from an interview where Speaker B is discussing with Speaker A his analysis of D. H. Lawrence's work, and illustrates a simple example of global accommodation.

(3)   aspectual verb, triggered p: Addressee had not begun to rearrange his assessment of Lawrence's novels prior to the reference time of the utterance (GLOBAL) (3-1c1226)

Speaker a   **yes** have you read virtually all of Lawrence now .~|
Speaker A   [@m] I've read his major novels . *<I've read [@m]>*~|
Speaker a   well *which would you say was his* majorest -~|
Speaker A+A   (laughs -) . [@m] - - I would say Sons and Lovers -#|
until line 1260 (30 lines)
Speaker B: Well, <u>if</u> you apply that criterion, <u>then</u> surely you <u>must</u> **start** <u>to rearrange your estimates of Lawrence's novels</u>, surely.
Speaker A: Yes. I don't just see in them Lawrence as a man .I regard them also .as they are as . standing on their own . as novels .as stories of people - -

The *if-then* structure and the *must* introduce three contexts. Therefore there are four contexts available for accommodation: the main context, a context created by the antecedent of the conditional, a context created inside the consequent of the conditional and a context created by *must*. Because the presupposed information is triggered in the context created by *must*, all four contexts are available for accommodation, i.e. there is a potential for global accommodation in the main DRS of the presupposition, intermediate accommodation which would resolve the information in the antecedent or the consequent of the conditional, or local accommodation in the home DRS of the presupposition created by *must*. We test higher levels first.

The result of accommodation must be a well-formed DRS, and must be informative and consistent in the discourse. Global accommodation doesn't leave any variables unbound and results in a well-formed DRS. It also results in an informative discourse after the interpretation of the entire utterance. Speaker A's reaction to Speaker B, e.g. the *Yes*, seems to indicate acceptance of the presupposition. If Speaker A disagreed with the presupposition he might have said something like "Well, I have long had a different estimate of Lawrence's novels." Either he found the presupposition fine or that he didn't agree but didn't find it important enough to object.

Note that the statement could be interpreted both as a generic question, considering *you* to be a generic pronoun, or as a more specific question to the addressee about how applying *the criteria* affected his assessment (note the adverb 'surely'). Based on the greater context (not given here), I believe the latter is a more accurate description of what is going on.

5.1.3 Intermediate and Local Accommodation

For the majority of the examples that were accommodated locally or intermediately, global accommodation was ruled out either because it would be epistemically indefensible or because a discourse referent within the embedded context is either explicitly or implicitly referred to in the presuppositional expression, i.e. cases of trapping.

It was mentioned in section 2.4 that the satisfaction theory has difficulties representing intermediate accommodation. If corpus linguistic evidence shows that we need a concept of intermediate accommodation to correctly interpret naturally produced examples, we would have an additional argument for preferring the binding theory. In order for intermediate accommodation to be a potential interpretation the utterance containing the trigger will need to have at least three contexts to accommodate in.

Unfortunately, in many complex cases it is difficult to determine if and where embedded contexts begin and end. This made it difficult not only to determine if intermediate accommodation was possible but also to determine what the meaning of each reading would be at each potential level of accommodation with the different embedded contexts. Therefore I was unable to evaluate this claim in relation to the corpus data. Additionally, it does not seem very meaningful beyond the level of individual examples to know frequencies for intermediate accommodation contrasted with local accommodation. The important question about the behavior of presuppositions under embedding has to do with global versus intermediate or local accommodation, but it is not important for these discussions how deep in the embedding accommodation actually was.

The following example is representative of about half of the locally accommodated factives. Only global and local accommodation are options because it is clear that there is only one logical operator creating a level of embedding, the negation.

(4)   factive, triggered p: I am going to be a vast amount of help to you (LOCAL)

(2-2a 16)

Speaker A: But I don't really **know** that I'm going to be a vast amount of help to you.

The induced presupposition here is "I am going to be a vast amount of help to you." This is embedded under negation. Global accommodation would result in the speaker presupposing that he is going to be a vast amount of help but then denying knowing about this. This analysis is epistemically indefensible; the speaker cannot presuppose a fact that he then denies knowing about. Therefore we must locally accommodate in the negated context. There were 5 cases of this specific structure among the factives, all examples where the subject of the matrix sentence is the speaker, and the matrix sentence is a present tense negated factive verb. This type of example is also well known from the theoretical literature (see Gazdar (1979), Kiparsky & Kiparsky (1970)). In order to correctly analyze them we need to add a

requirement to accommodation which says that the result of accommodating the presupposition must be an epistemically defensible discourse.

Note that changing these examples so that the subject of the factive is no longer the speaker, as done in (5), or changing the tense of the verb so that it is no longer present tense, makes global accommodation preferred. Embedding an example like (4) under a modal operator, will also make global accommodation preferred, as illustrated in (6).

(5)   John doesn't really **know** that he is going to be a vast amount of help to you.

(6)   I might not **know** that I am going to be a vast amount of help to you.

The preferred interpretation of (5) globally accommodates the presupposition, and it will mean something like "John isn't aware that he will be a vast amount of help to you." This is because the speaker and the subject are no longer the same individual, and there is no longer a conflict between the information presupposed by the speaker and the beliefs attributed to the subject of the factive.

Trapping, and a phenomena similar to trapping, were the main causes of presupposed information being prevented from projecting out of embedded contexts. These are cases where the presupposed proposition triggered in an embedded context contains as an argument a reference marker that was also just introduced within that embedded context, making it impossible for the presupposed proposition to be accommodated higher than the context where the reference marker was introduced because the argument would then become unbound.

(7)   aspectual verb, triggered p: A pattern is not working at time t-1 (LOCAL)

        (1-2@ 649)

Speaker A: When we've got a bit more [inf] information, and if we've seen <u>a pattern</u>$_{\text{trapped referent}}$ <that> that **begins** <u>to work</u> [@m] With [@m] with an Austrian university

In (7), Speaker A and another (not shown) are discussing setting up a program or research cooperation between their university and universities abroad. Whether the program will become reality or not is still unclear and they are at the planning stage at the time of the discussion. Up until the sentence *and if we've seen a pattern* they are discussing which Italian universities would make possible partners and that the pattern would have to first work with these universities. After this, something else will be implemented *with and Austrian University*. Here it is necessary to read a great deal of the previous context to understand that the pattern referred to is a discussion of how the exchange will work in practice between their university and the Italian universities.

This becomes a case of trapping because the presupposed state that could be described as 'a pattern is not working earlier' contains a reference *a pattern*, whose reference marker is introduced in the context created by the *if*-clause. Global accommodation would make the discourse undefined because the reference marker

for *a pattern* wouldn't be accessible from a DRS higher than this clause. There could be a potential for intermediate accommodation if you consider the *if* as creating a new embedded context within the whole discussion which is signaled at the beginning as a hypothetical discussion. However, it is very difficult to determine exactly what the difference in interpretation between a reading with intermediate accommodation and a reading with local accommodation, just as it is difficult to tell where the embedded contexts begin and end. The   following   example   also illustrates trapping.

(8)   factive, triggered p: Somebody is a celebrated striker (LOCAL)(2-14 792)

Speaker C: Well I only hear from Barry#   but . <of> all I hear# the difficulties of sacking people# in this country today .#|
Speaker b: I don't think you'd have a hope in hell of sacking him *Pen*~|
Speaker C: *they've* got to rape the manager's daughter at least twice#|
Speaker b: It might be - that if you **knew** <u>that somebody was a celebrated striker</u> - you might try hard not to employ him.
Speaker A: I think it may be something like this# but having got him# and he was perhaps sacked for something else - but I do not know# or made redundant or something#*- anyway# this is what* he says#|
Speaker C *[mhm] - -# <3 sylls>*~|

Here the hypothetical situation is marked very clearly with surface clues such as *it might be* and *if* as well as what seems to be an impersonal or generic *you*. The presupposition is embedded in at least one context within the main discourse context. However it is not clear that all the signals such as *if* and *it might* be, which we would consider natural language equivalents of operators are actually functioning as such and creating more than one embedded context. If we take both expressions to be operators which create embedded contexts, our DRS could be written in the following way, using the simplified notation for factive presuppositions used in Beaver (1997).[3]

(9)   a. [: ◊ [: [x : gen_you(x), [: celebrated_striker(y)]),
      α[z : celebrated_striker(z)]] ⇒ […]].

      b. [: ◊ [: [x : gen_you(x), [y : celebrated_striker(y),
      knows(x,[: celebrated_striker(y)])] ⇒ […]].

Because the presuppositional expression itself introduces a reference marker (*somebody)* the induced presupposition becomes trapped. This reference marker will not be accessible outside the modal context. Examine the example in (10) below.

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[3] In the notation used above gen_you(x) stands for generic you, to be interpreted similarly to somebody, and the complement of the factive verb is represented as a DRS. Factive presuppositions should probably be treated by using propositional discourse markers. To do this we need to extend standard DRT. A detailed proposal for this is found in Asher (1993) and a relatively conservative extension is presented in Geurts (1999).

(10)   factive, triggered p: Your scientist is going for question one (1-1 942) (LOCAL)

Speaker B: And let's have your literature question, let's have it in the same position every time so that your scientist will **know** that he's going for question one, your literature person will go for question two and . they don't have to read the two *passages* and decide *.*#|

Speaker A: *<quite>*# *<yes>*#|

Speaker B is discussing his ideas for how an examination could be improved to make it more relevant for students from the natural sciences (referred to as scientists, or as here, *your scientist* contrasted here with students from the liberal arts, *your literature person*) and the discussion begins several lines previous to his statement. Future tense, as well as phrases such as *let's have* are all signals of the modal subordinating context.

Global accommodation would lead to an interpretation where the natural science student (*your scientist*) knows he/she is going for question one even before the new format for examinations has been mentioned, making it a rather illogical choice. The entire discussion distinguishing questions for literature students from questions for natural science students. We understand from the earlier context (not presented here) that natural science students prefer to answer questions dealing with non-fiction texts, and standardizing the order of questions will make it easier for these students to quickly find this question. The assertional meaning of the sentence is that the scientist will be 'aware' of which question he is going for, and not that he will be going for an already existing question. Local accommodation could also be argued to be preferred because *question one* only exists within this hypothetical discussion, there is no question one in the test as it is now, at least not with properties that the new version of the test will give *question one*. This also makes it a kind of trapping. It may also be that the discussion of how the exam will be set up is sufficient for the discourse participants to infer the existence of two questions, but in that case *question one* still refers to the question in the new format will be represented by a reference marker introduced within the hypothetical discussion.

Other cases of presupposition triggered under embedding could be understood as cases of a kind of implicit trapping. Example (11) below is an excerpt from a discussion concerning the difference between *signs* and *symptoms* in which the general usage of the terms is discussed. A hypothetical X-ray and what you could see in it is used as an example.

(11)   factive, triggered p: Things are blocked up 'in X-ray'(2-9 1132)

Speaker B: Signs are the only things you can observe, like if you took an X-ray and **saw** that things were blocked up or something.

There is only one level of explicit embedding created by the *if,* so only global and local accommodation are available. Possible interpretations for global and local accommodation are the following:

Global: Signs are the only things you can observe, like things are blocked up and if you look at an X-ray you see this.
Local: Signs are the only things you can observe. If you take an X-ray then things are blocked up and you see this.

There is no X-ray before the clause beginning with *if*. If the X-ray is what permits us to observe that things are blocked up, then global accommodation does not seem to be an option. It seems to violate something similar to trapping though not something that would make a variable unbound explicitly, but perhaps implicitly. The reason seems to be that the continuation of the sentence is most likely "if you took and X-ray and saw that things were blocked up *in the X-ray*." If this had been the actual utterance then we would be dealing with trapping (see 2.3.2), but when the argument is unexpressed seems to result in a kind of implicit trapping. We are discussing information we can have only by virtue of the reference to an X-ray that does not exist at the level of the main context. Taking an X-ray is a prerequisite for seeing that things are blocked up.

The above should have given some idea of the types of examples found in the corpus, as well as shown some of the difficulties involved in determining the levels of embedding and the resulting level of accommodation. With these difficulties in mind we can now use these results, as well as other characteristics of the corpus examples, when discussing three major questions in relation to accommodation, what kind of information do speakers use accommodation to communicate, what is it exactly that licenses accommodation and is there evidence for the proposed preference for higher levels of accommodation?

5.2 ACCOMMODATED INFORMATION FROM THE PERSPECTIVE OF THE DISCOURSE PARTICIPANTS

For the majority of examples of accommodated factive presuppositions, the speaker intentionally wished to communicate information he believed was new to the hearer. This confirms earlier corpus work on *it*-clefts (Prince, 1978, Delin 1995) which pointed out that being presupposed has little to do with the information status of the presupposed information to the interpreter or what the speaker believes the interpreter knows.

The numbers in

Table 5 actually say nothing about the information status of the accommodated information. The figures for accommodation refer to how often the presupposed information will need to be added to the discourse record because it has not already been introduced in the discourse. Accommodation roughly shows the adjustments that need to be made to the representation to make the presupposed information felicitous, adjustments that should be similar for participants as well as annotators. In order to say something about what information status accommodated information has, what functions speakers use accommodation for, and how hearers understood the information, we have to

examine what the information was to the speaker and what purpose or role it served in the discourse. [4]

Presupposed information that the hearer has to accommodate could be *shared knowledge,* or *hearer-old,* or it could be *hearer-new.* If it is *shared knowledge* it is part of the common ground between the participants, but has not yet been expressed or made salient in the current discourse. Then it seems to perform a reminding function, making known information that is needed in order to provide background for non-presupposed information, perhaps making the message more coherent. This potential function of presupposition is discussed in Delin (1995) and is often an implicit assumption in much discussion of presupposition.

Another reason why shared information must perhaps be activated in a discourse may have to do with reasoning. Walker (1996) has suggested that logical conclusions cannot be made unless all premises are activated and available. If the discourse participants share an important element of background information which is needed as a premiss to support a conclusion, this information may need to be introduced into the discourse first before the conclusion could be made. This could possibly be a role played by shared presuppositions in discourse, given that presuppositions are generally treated as background knowledge, i.e. information that is taken for granted, this seems to be an appropriate form by which to introduce such information.

Information that is hearer-known but discourse-new has a different status than information already given. The former is not activated at the time when it is used, whereas the latter might be. Most theories of discourse make a distinction between information that is activated or salient and information that is perhaps being retrieved from e.g. main memory.

Presupposed information that must be accommodated could also be information assumed by the speaker to be *hearer-new.* The claim that some trigger types are clearly being used to intentionally introduce hearer-new discourse information as a major usage is still somewhat controversial, despite the earlier corpus work that has shown that it is a common use for the presuppositions associated with some triggers, e.g. see Prince's (1978) work on information bearing *it*-clefts, and Delin's (1995) work on *it*-clefts, as well as the many studies of definite NPs, in particular Fraurud (1990) and Poesio & Vieira (1998). This earlier work for the most part comes from written corpora. We know very little however about how frequent this type of usage is for spoken discourse, or for factives.

Another generally agreed upon feature of presupposition is that, whether discourse-given, hearer-old or hearer-new, the presupposed information generally

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[4] Conclusions we can make from the figures for accommodation are therefore very different from those we can make from the examples of binding, where we can assume that the annotator and the discourse participants were both aware of the information because it was discourse-given, and something can easily be said about the function of bound presuppositions based on the transcript alone. The speaker's message is not intended for the annotator and the hearer's interpretation can differ from the annotator, so we need to try to determine what the participants meant and understood by looking at other utterances.

seems to be backgrounded to another main message, and even at a logical level the characteristics associated with presupposed information, e.g. projection from non-entailing contexts, etc., point to it being backgrounded. For example, Asher & Lascarides (1998b), take this into account in their analysis of presuppositions by generally treating them as rhetorically related to the discourse by *Background* or *Defeasible-Consequence*. By backgrounded I mean that the presupposed information is not the main point of the utterance, but rather supports the main point. If known information is made activated by being presupposed, it should be serving a background function to some other new information. If the presupposed information is hearer-new, it should also be serving a background function to some other new information.

By examining the context in which examples of accommodated presuppositions were used, we can look for clues as to whether or not the presupposed information seemed to be new information that the speaker intended to introduce, or known information that the speaker intended the hearer merely to recognize, retrieve, and or treat as currently salient, etc.

There are two types of evidence that have been discussed as clues to the information status of presupposed information. The first is the presence of prosodic prominence, discussed in Delin (1995). Delin considers pitch accent within the clefted constituent in *it*-clefts as signaling that at least part of the information presupposed must be hearer-new, and she uses this as her main evidence. The second type of evidence is length, pointed out by Prince (1978) in her study of information-bearing *it*-clefts. Length signals informativeness, and a very long sequence is taken as evidence that the information is new.

I will mainly rely on another type of evidence, though I will refer to the other two just mentioned. I will concentrate instead on the way the speaker has set up his message, the message used, the role of the message with the presupposed information in the discourse and the hearer's reaction. If the presupposed information is the main point of the utterance, being what I would call *foregrounded,* then I interpret it as being hearer-new as long as there is not other evidence to the contrary.

The hearer's reaction is actually a kind of secondary evidence that only suggests whether the presupposed information was totally new or known. His reaction may however confirm or deny the speaker's assumption. If it seems that the speaker is introducing information that he seems to be treating as hearer-new, and the hearer responds with something like "But I already knew that," the presupposition was still being used to introduce what the speaker believed to be hearer-new information. For this reason the use of terms like hearer-new, and hearer-old can sometimes be inadvertently misleading because we cannot give a unit of information a neutral "tag." Instead we have to discuss hearer-new information from the perspective of the speaker, and hearer-new information from the perspective of the hearer. It is the former perspective that tells us something about the functions speakers believe they can use presuppositions for. The latter

perspective tells us how complex the resolution task was for a real discourse participant when interpreting a presuppositional expression.

5.2.1 Hearer-new or hearer-known from the perspective of the speaker?

Factives in the corpus were a trigger type that tended to induce presuppositions that have to be accommodated. The factive examples were reexamined, paying particular attention to the context in which the presupposed information was used and how hearers reacted. Each example was categorized according to whether or not it seemed as if the speaker believed the presupposed information was known to the hearer, maybe known to the hearer, maybe new to the hearer, or certainly new to the hearer, looking for the kind of evidence outlined above. The results are summarized in Table 7.

category	**known**	**maybe known**	**maybe new**	**new**
number	15 (18%)	12 (15%)	7 (9%)	47 (58%)

Table 7 information status from the perspective of the speaker in the corpus of the 81 examples of accommodation

The interesting result is that in 47 examples, making up 58% of the entire sample, the speaker seems to believe that the presupposed information is new to the hearer, while only in 9 examples is it fairly clear that the speaker believes the information is shared. Thus, the most frequent function of factive presuppositions in the corpus is to communicate hearer-new information.

What did the evidence look like that suggested that speakers intended to use presupposed information to communicate hearer-new information? One common clue was that the presupposition was foregrounded by being an essential part of a story the speaker was telling.

(12)   factive, triggered p: the tremendous number of claims against the railway companies were people whose fingers had been caught in doors (1-9 215 C)

Speaker C: *when I* worked on the railways these many years ago .I was . working in the claims department . at Pretona Station Warmington as office boy for a short time - and . one <u>NOTICED</u> that the . tremendous number of claims against the railway - companies were people whose . fingers had been [sk] caught in doors as the porters had slammed them -.
Speaker A: Really. Oh my *goodness.*

In this example the speaker is telling a story and while some of the information in the narration may be hearer-known, e.g. that Speaker C once worked for the railroad, the presupposition is the main point of the story and is clearly believed to be hearer-new. We also see from Speaker A's reaction that the information *was* hearer-new. Length was mentioned above as clue to informativeness. Here the complement of the factive that forms the basis of the presupposition is very long, and this would also seem to be evidence that it is unlikely that all the presupposed information could be known. Note also that because the presupposition is the main

point of the story, it is used in a way that is directly counter to our characterization of presuppositions as backgrounded information. The same clues are found in the following example. The presupposition is made in the context of the speaker telling a story and the information presupposed is the focus of the story.

(13)   factive, triggered p: there were also about twenty-five cows (2-11a 89)

Speaker A and sun trying to come through#|
Speaker b   oh~|
Speaker A and horses mucking about# <at the> bottom of the [?] ha ha#|
Speaker b [m]~|
Speaker A [ho ho]#   [hi hi]# I don't know what it's called#|
Speaker b   (laughs)~|
Speaker A Ho ho . (. giggles) thing# <well> you know
Speaker b Yes~|
Speaker A   They all came forward#|
Speaker b +Ah+~|
Speaker A   +And [dh@] .+ there were two two two mares {in the field} which was . rather extraordinary# cos then we **discovered** that there were also about - twenty-five cows# *(- laughs)~|
Speaker b *(- . laughs) [a r]*~|
Speaker A Who sort* of loafed about -#|
Speaker b [M]~|

In the next example, one of the main clues that the speaker believes the information to be hearer-new is that the speaker seems to be trying to convince the other discourse participants, offering the presupposed information as an additional reason. Again, the presupposed information is foregrounded. However in contrast to the two earlier examples. Speaker C is not noticeably surprised and seems to accept the presupposition as well as the rest of the argument.

(14)   factive, triggered p: doing many things which they could do quite legally would mean the death of ? fiddling (unclear) (1-13 1089)

Speaker C   *[m] . [?m]* - - -#|
Speaker B   But Laurie [?] . [d@?@] . do you find# because yours is an international company -#that [dh@z] a lot of getting round the British tax laws#|
Speaker a No~|
Speaker B   No#|
Speaker a   Because . Quadrille . is . both a big company and therefore . has to watch its Ps and Qs - and because it is a company which has always been . ultra honest - and also because . the eye of everybody is on . international companies now - it . not not only obeys the letter of the law but the spirit of the law - . [@] so that they are very legal~|
Speaker C [M] .#|
Speaker a   And don't do many things which . they could do quite legally . because they **know** that this would be the death - <1 to 3 sylls> fiddling *<4 to 6 sylls> idea*~|
Speaker C   <[M]> in the long run# it *would be bad for trade* .yes#|

The following example is more complicated because there are actually two factive presuppositions originating in the complement.

(15)   factive, triggered p: 1) I understood, and 2) Speaker A was pitching his language with deliberate homely (2-2a 633)

Speaker A   but it's a very difficult time at the moment .#|
Speaker a   is your ability to verbalize so very accurately and and clearly to a layman about your particular mystery .*. [@m] .* an advantage in getting the job . **in becoming a stockbroker**~|
Speaker A   (laughs - *-*)~ **you mean you** {understand what I'm} saying#| (a)
Speaker a   Yes, yes~| (b)
Speaker A   [@m] .~|
Speaker a   and I imagine you **knew** that I I understood and that you were you were so to say pitching your language with deliberate homely [@m]~|
Speaker A   Well no I don't think so#   no# ©

The first presupposition, that Speaker a has understood, has already been confirmed in the previous statement and will need to somehow be bound to the information contributed when Speaker a answers "yes, yes" to Speaker A's question in (a). The second presupposition is that Speaker A was "pitching his language with deliberate homely." The reason why we should consider this part of the factive complement is the use of the complement marker *that*. The other alternative is to treat it as a complement to *imagine*, but this seems unlikely because in such a case *imagine* would have to be in past tense to fit naturally with the potential complement which is also in simple past. Speaker a's second presupposition refers to Speaker A's own state of mind but seems to be questioning if it is a correct impression, which Speaker A then denies. Therefore it is hard to consider it a known and accepted fact because Speaker a seems unsure about the status of the 2nd presupposition. Therefore the 2nd presupposition is considered hearer-new.

How do these examples differ from cases where the speaker seems to believe the information must have been known to the hearer. In the next example, the information offered by Speaker A about Yoolat and the fact that he has already arrived makes it quite clear that Speaker A knows that it was earlier decided that Yoolat was coming so Speaker B cannot believe his presupposition is new. Only the asserted information regarding his own knowledge about the arrival can be new here.

(16)   factive, triggered p: he was coming (1-1 563)

Speaker A   have you met our man Yoolet yet -# *<the one who's a student for the . >* diploma#|
Speaker B   *[@] no# <no>*# no#|
Speaker A   [mhm]#|
Speaker B   I **knew** that he was coming# I've heard Stan Carter mention him# and *. <they've obviously>*~|
Speaker A   *<yeah> .#

There were several examples where it was hard to consider the presupposition to be a fact. It seems to be an opinion that the speaker wishes the hearer to agree with or acknowledge, which in some cases they do and in some they don't. It is hard to determine if signs of an expectation of agreement are signs that the speaker expected this to be part of the common ground, or only that they expected the hearer would agree to accept the presupposition. Here is one example:

(17)   factive, triggered p: this is very serious, this = the earlier list of events, considered (1-9 506)

Speaker C   yes#|
Speaker a   but [sa] . who else has been responsible for the Carriage and Pair the Duke of Preston the Apple Tree . <u>do you **know** that this is *very serious</u> - we've lost . we've lost several* pubs around here within . sort of living memory within the last five or six years - and it means that the existing pubs they've made no new pubs *.* and the existing pubs . which were . comfortably crowded before my God they're packed - you try to get into the Scarborough for lunch now and it's just uncomfortable isn't it~|
Speaker C   *<ministry> of town and country planning -#I mean [dhi dhi] BCC*#|
Speaker A   *no*#|
Speaker B   [m]#|
Speaker ??   [m] .#|

In the next example, the presupposition will need to be locally accommodated because the subject of the simple tense factive is the Speaker, and it would be epistemically indefensible to both presuppose the information in the complement and then deny that one was aware of it. It also seems to clearly be the speaker's opinion.

(18)   factive, triggered p: those continued supply of funds was justified considered new, (Local) (2-8a 473)

Speaker B   but how would . I mean having said that# at what point would you have changed it# and how would you have changed it#|
Speaker A   well I mean -# [@ dh@ dh@s] they were keen on maintaining the status quo#
 because they kept getting funds from England .#|
Speaker B   well~|
Speaker A   I don't **see** <u>that those continued supply of funds was justified</u> -#|
Speaker B   but then would you have them all thrown out of work# I mean it's the Catholics *. the Catholic minority*#|

5.2.2 Discussion

What do these results tell us about presuppositions and their function, factive presuppositions in particular? These results confirm what has been shown with *it*-clefts and definites: that presuppositions can be used as a means to intentionally communicate information that is hearer-new. For factives this function is far from unusual, being the main usage of examples found in the corpus data. Why then, do

speakers choose presupposition as a method to communicate new information? Here are several hypotheses.

First, communicating new information via presupposition could be the result of poor planning. The general characterization of accommodation is that it is a repair strategy. This characterization takes the perspective of the hearer[5] and the complexity of his interpretation task. Accommodation, because it requires adjusting the incoming DRS, is considered to be more complex than interpreting non-presupposed or bound information. Generally, presuppositions have been characterized as backgrounded information. If the hearer has to accommodate new, backgrounded information, we could attribute this to poor planning or sloppy communication on the part of the speaker. Then it is easy to consider it to be a mistake that needs to be repaired by the hearer.

This would be a nice explanation, if it weren't that most of the examples found here are cases where it is clear that the speaker believed that the information was hearer-new, and intentionally using presupposition as a means to communicate this information. These examples can hardly be ascribed to sloppiness or poor planning on the part of the speaker.

Communicating new information via presupposition could be an attempt to be more efficient in communication. Even if the speaker is aware that it is hearer-new, he may find it more efficient to introduce the information via presupposition because many triggers allows speakers to communicate two things at once, the background to your main point as presupposed and then your main point with the rest of the information as asserted.

However it is also difficult to characterize most of the examples here as the result of the speaker trying to be more efficient in communication. In most of the examples, one of the characteristics that makes it so apparent that the speaker intended to communicate what he believed to be hearer-new information was that the presupposed information was the focus of the utterance, i.e. the point of its being said at all, foregrounded. If the whole point was to communicate this information, why choose presupposition to do this, given our general understanding of its usage?

Communicating new information via presupposition is a way to mark new information as non-negotiable. This is information the speaker wishes the hearer to take for granted, which is different than backgrounded information. Presupposition can be used by speakers, at least for factive presuppositions and those triggered by *it*-clefts, as a means to communicate focused, new information if they so desire, information that they don't want to spend time discussing. This explanation is similar to Delin (1995). Delin argues that a clear separation must be made between presupposed information and *shared information,* and this is quite clear from the data. But she also argues that what presupposition does is tell discourse participants what

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[5] Note that accommodation is less appropriately described as a repair strategy from the perspective of the speaker, thought it is possible to think of it as an attempt by the speaker to adjust the input context to what he himself wants.

discourse model they should be assuming. This could be a reason for why presupposition can present hearer-new information.

The appropriateness of communicating hearer-new information by accommodation seems to depend heavily on the trigger involved and the context. Perhaps speakers don't really care that they are communicating hearer-new information via presupposition. From the speaker's perspective, the key is successful communication of the message. The hearer may have to do some "repairs" to correctly process this but if the presupposed information is semantically rich enough that accommodation can proceed without the danger of misinterpretation on the part of the hearer, then it will be exploited by speakers.

Trigger types seem to differ in the ease with which their induced presuppositions can be accommodated as well as their tendency be resolved by accommodation. What underlies these differences, and does it have anything to do with their appropriateness for communicating hearer-new information? This is the focus of the next section, which looks more closely at two proposals for explaining what licenses accommodation and adds some observations from the corpus data.

5.3 WHAT CHARACTERISTICS SUPPORT OR HINDER EASE OR TENDENCY TO ACCOMMODATE?

In the corpus data we can see that different trigger types displayed very different tendencies to bind or accommodate. This was predicted already in van der Sandt (1992) where he writes that "All (these) triggers are anaphoric in the same sense though they may differ in their capacity to accommodate" (p. 342). Since this paper Zeevat (to appear) has pointed out that differences in the ease with which triggers accommodate are not treated systematically, if at all, in the satisfaction theory, or the binding theory and its variations. In this section I'll discuss what characteristics license accommodation, and what characteristics play a role in tendency to be accommodated. There are two proposed explanations: van der Sandt (1992) relates the ability to accommodate to the amount of descriptive content a presupposition has and Zeevat (1999) and Blutner (2000) argue that a lack of alternative expressions that do not need accommodation licenses accommodation.

There are three groups of expressions that behave differently and whose differences should be accounted for in any proposal that claims to explain what licenses accommodation. The first group is the class of traditional anaphors, represented by pronouns. Any explanation about the licensing of accommodation in the binding theory, or its variations, should explain this class doesn't accommodate. The Binding Theory treats anaphora as a subset of presupposition so they should have some explanation for why pronouns behave differently in this regard.[6]

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[6] I suppose an explanation as to why pronominal anaphora don't accommodate is unnecessary for versions of the satisfaction theory because these theories don't treat anaphora and presupposition in the same way.

The second group is made up of traditional triggers that induce presuppositions which do not accommodate easily. This group of triggers is includes the group of *non-referential anaphoric triggers* identified by Zeevat (to appear) which includes *too, even, again,* German *wieder* (again)*,* and several Dutch particles, e.g. *inderdaad, wel, toch, immers* as well as the conjunction + particle *omdat immers*.[7] Particles like *too, also,* and *even* have been identified by many researchers as inducing presuppositions that are difficult to accommodate (e.g. Stalnaker 1974, Kripke, ms). The only member from this group that was studied in the corpus was *too*, whose presuppositions were almost exclusively bound. For convenience I will call this group the non-accommodating group of presupposition triggers. The non-accommodating group could also be thought of in a more positive way as things that prefer to bind, i.e. they prefer to be anaphoric. Tendency to bind could then be described as related to the need to access or retrieve descriptive content for interpretation.

The third group is made up of traditional triggers that seem to induce presuppositions that have little or no trouble accommodating. Obvious members of this group are the ones induced by factives and big definite NPs, i.e. NPs modified by adjectives, relative clauses or in some cases prepositional phrases. Evidence that this third group accommodates easily comes from the well known examples in the theoretical literature on presuppositions, some of which are presented in (19) with the presupposition trigger in bold. From these examples we can see that factives like *regret* and *point out*, the focus particle *almost*, possessives and big definite NPs can be used felicitously by a speaker to add discourse-new information to a context (taken from Karttunen, 1974, p. 191, example 26).

(19)   a.   We **regret** that children cannot accompany their parents to commencement exercises.
         b.   There are **almost** no misprints in this book.
         c.   I would like to introduce you to **my wife**.
         d.   John lives in **the third brick house down the street from the post office**.
         e.   It has been **pointed out** that there are counter examples to my theory.

The high frequency of accommodation in the corpus data presented here for factives, as well as for big definite NPs presented in the corpus work of Poesio & Vieira (1998), also confirm that the triggers in this group induce presuppositions that tend to need to be accommodated.

Two types of triggers, aspectual verbs and *it*-clefts, were studied in the corpus but weren't mentioned as members of any of the three groups, e.g. small definite NPs, i.e. NPs with only an article and head noun, aspectual verbs, *it*-clefts. These triggers can all trigger presuppositions that can accommodate easily, but were not overwhelmingly used this way in the corpus. In this way these triggers are

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[7] *Zeevat (to appear) says *inderdaad* is similar in meaning to indeed, *wel* is similar to emphatic *do*, *toch* could be translated as *after all*, *immers* is similar to *as you know*, and *omdat immers* is approximately equivalent to *because as you know*….

more moderate in that they accommodate felicitously but they are also used with a binding interpretation a good deal of the time. There is a distinction between being able to accommodate felicitously, and the tendency to be used with discourse-new information that will need to be accommodated by the hearer. For now, I will concentrate the discussion on the more extreme cases, triggers or anaphoric expressions that either show both qualities, such as the accommodating triggers, or lack both qualities, such as pronouns and non-accommodating triggers. If we can find a plausible account for the behavior of these triggers then we should be able to later account for the mixed behavior of the remaining triggers more easily. Then we should also be able to make a clearer distinction between ease of accommodation and tendency to be used with a resolution that requires accommodation.

Below I discuss the two major proposals in the literature, the descriptive content explanation of van der Sandt (1992) followed by and the lack of alternatives explanation of Blutner (2000) and Zeevat (1999, to appear) in relation to each of these groups, considering both the theoretical observations and the tendencies in the corpus data. Neither of these explanations can account for all the data in a satisfying way . Missing from both explanations is a discussion of the role of context, and the relationship the presupposition has to the context and I'll relate this ideda briefly in relation to the corpus data.

5.3.1 Descriptive content licenses accommodation

Van der Sandt (1992) claims that descriptive content makes accommodation possible. He discusses how presuppositions differ from pronominal anaphors in that "unlike pronouns they contain descriptive content which enable them to accommodate an antecedent in case the discourse does not provide one" (p. 344). Look at the following example.[8]

(20)   a.   [x :]
       b.   [x : content(x)]

(20)a represents the generic form of a pronoun in a DRS. It needs to be identified with another reference marker already in the discourse record in order to get an interpretation. This given reference marker will already have some sort of descriptive content associated with it, e.g. there will be something like [y : content(y)]] already in the DRS. A presupposition, on the other hand, already has a form like (20)b. Because it has its own descriptive content, it can create its own antecedent with which to bind if the discourse record doesn't provide one.

This is admittedly a simplification of the actual situation. Pronouns often do contribute some descriptive content, though it is admittedly not very much. For example, the pronoun *she* contributes the descriptive content that its referent is female and the pronoun *these* contributes the descriptive content that its referent is plural. The pronoun *she* therefore contributes the same descriptive content as the

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[8] This is a simplification of example 44' given in van der Sandt (1992, p. 359).

definite NP *the woman*. Another simplification is the claim that pronouns never accommodate. There are situations where a pronoun can be used felicitously without a discourse-given antecedent. Consider the following examples ((21) taken from Geurts 1999, ex 67).

(21) The doctor kept warning **him** but **he** would never listen, and now Harry's dead.

(22) Grandma refused to accept **it,** so I put the money in her purse.

For both examples the pronouns must be accommodated at the time that the pronoun is reached, an example of cataphora or forward reference. We obtain enough descriptive information to fully understand the reference later, and this makes the entire utterance felicitous. Thus it seems that the interpretation of some pronouns can involve accommodation in their resolution at some point, though this is a less frequent use of pronouns.

Presuppositions and pronouns differ in that a presuppositional expression generally signals the semantic type of its referent by its trigger. The semantic type of the presuppositions of factives and aspectual verbs are pre-determined. In this way *this* or *that* are semantically poorer because you cannot tell from *this* whether you are dealing with an abstract object or with a concrete one. But from *she* or *they* you can determine semantic type even though they are pronouns and from *this situation* or *the woman,* you can determine semantic type, even though they contain relatively little descriptive information.

Still, pronouns in general have less descriptive content than most presuppositions triggers, and this seems to give us an explanation of why pronouns do not accommodate well.

If we now consider the non-accommodating triggers, taking *too* as our representative, Zeevat (to appear) has argued that van der Sandt's explanation fails in that it doesn't offer a plausible account for why *too* doesn't accommodate. Following van der Sandt & Geurts (2001), *too* ϕ(a) is treated as presupposing another predicate of the same type as that in the utterance with *too,* (e.g. the *theme,* or ϕ in the DRS representation), but with a different contrasted element (e.g. the *focus* element or x), that may not be identical to the element in the utterance with *too* (e.g. a). The form of the presupposition in its alpha-structure is then $\alpha[: \phi(x), \alpha[x : x \neq a]]$, where *[x : x ≠ a]* is a pronominal element. The presuppositional expression would seem to have a great deal of descriptive information, yet the presupposition triggered by *too* is generally difficult to accommodate and the trigger isn't used this way in the corpus either. This is not accounted for in van der Sandt's explanation.

Finally, van der Sandt can explain why presuppositions induced by triggers in the accommodating group can be used felicitously without an antecedent. Factives induce presuppositions derived from the lexical information in their complements and this is generally a great deal of descriptive content.

Descriptive content also seems to explain the felicitous accommodation of big definite NPs, because by "big" we actually mean having more descriptive content than small definite NPs. This also explains why accommodation of small definite NPs is generally less felicitous. This means that van der Sandt's (1992) explanation does account for the differences in tendencies for different types of NPs to accommodate or bind. Descriptive content also functions as an explanation for variations in tendency to accommodate even within one and the same trigger type.

But does this explanation hold for presupposed material induced by other triggers that seem to be similar in the amount of descriptive content they have, but still do not accommodate frequently? *It-cleft* presuppositions have arguably as much descriptive content as a factive presupposition. But in the corpus data *it-clefts* only accommodate one-third of the time, preferring to bind. It seems quite difficult to account for these differences in terms of descriptive content and it's not clear that we need to. Perhaps we need an explanation based on function that can account for the high number of bound *it*-clefts.

So the explanation that the ability to accommodate has something to do with the descriptive content of the presupposition seems to be able to account for some of the data. It explains why pronouns in general do not accommodate, they generally have less descriptive content, and it explains why the presuppositions of factives and big NPs can accommodate so well. But it does not explain why *too* doesn't accommodate. And we have not guidelines to determine when the descriptive content is sufficient to license accommodation in a particular context. This is the main difficulty with van der Sandt's explanation: we somehow have to say how much descriptive content is *enough* to make accommodation felicitous.

5.3.2 Lack of expression alternatives licenses accommodation

Zeevat (1999, to appear) makes the following claim based on the consequences of Blutner's (2000) constraint AVOID ACCOMMODATION: Non-presupposing alternatives inhibit accommodation. Blutner (2000, p. 212) formulates this claim attributed to Zeevat, in the following statement:

A trigger for presuppositions does not accommodate if any occurrence of it has a simple expression alternative that does not trigger.

This idea is based on the consequences of one of Blutner's (2000) constraint AVOID ACCOMMODATION in his Bidirectional Optimality Theory version of the binding theory, presented in section 2.5.3. AVOID ACCOMMODATION was meant to capture van der Sandt's (1992) preference for binding over accommodation. This explanation of the licensing of accommodation looks at it bidirectionally, and therefore differs from van der Sandt's (1992) who discusses accommodation from the perspective of the hearer.

In generation, AVOID ACCOMMODATION will penalize candidate forms that have to accommodate a reference marker. This results in candidates that bind always winning over candidates forms that need to be accommodated. But

AVOIDACCOMMODATION does more, it makes using assertional means to introduce information preferred over presuppositional means as well. In this way it differs radically from van der Sandt's explanation in that it compares assertion with presupposition.

How this works is best illustrated with an example. Consider the following three sentences as the beginning of a conversation. Suppose a speaker wishes to introduce a new female individual in the discourse. There are then at least three expression alternatives available, *a woman, the woman,* and *she.* Each expression alternative could update an empty input context to truth-conditionally equivalent representations, i.e. they will all introduce a reference marker for a female individual in the discourse representation.

(23) a. A woman came into my office today and offered me gum.
      b. ??The woman came into my office today and offered me gum.
      c. ??She came into my office today and offered me gum.

Why are (23)b and (23)c infelicitous as the first sentence in a discourse? The reason given by Zeevat is that they both involve accommodation. The only expression alternative that does not involve accommodation is *a woman.* The constraint AVOIDACCOMMODATION will penalize *she* and *the woman*, as illustrated in Tableau 2, because both require accommodation of a reference marker, therefore the expression that should be generated will be *a woman.*

Tableau 2 **intention:** refer to a female individual, **context:** female individual new in the discourse

generation:	AVOID ACCOMMODATION	BESTRONG
she	*!	
a woman		
the woman	*!	

Van der Sandt's explanation would be that it is the lack of descriptive content in the pronoun and the definite NP that will make these forms difficult to accommodate. Zeevat rejects this explanation. He argues that if lack of sufficient descriptive content is the reason why pronouns do not accommodate, then this suggests that they don't contribute enough information to introduce a new reference marker in the DRS in a coherent manner. But because *a woman* above contributes the same descriptive content as *her* or *the woman,* the "amount" of descriptive content alone cannot explain the infelicity of introducing a new female reference marker with accommodation, something felt when reading the examples in (23)b and (23)c. If lack of descriptive content is what makes the use of a certain expression incomprehensible, then how can it be that the same amount of information is sufficient for coherently communicating with assertion? There must be something more going on that is preventing accommodation than just a sufficient amount of descriptive content. Zeevat argues that the limitation seen in

presuppositions has to do with the other alternative expressions available for presenting the same information, which would not require adjusting the input context through accommodation. The existence of these alternatives block certain usages. Interpreters will consider the introduction of information anomalous because they are aware of other generational alternatives that were available to the speaker, e.g. they consider what the speaker could have generated in interpreting what they did generate, a bidirectional perspective.

This explanation can in general explain why pronouns and small definite NPs do not accommodate. Note however, that this argument will differ slightly when applied to other pronouns and indefinite NPs, because all indefinites do not have pronominal expression alternatives that contribute the same amount of descriptive information. For example, *a car* and *it* are not expression alternatives in the same way, and neither are *children* and *they*. Neither pronoun would ever be able to update a context in the same way as the indefinite NP. It seems that expression alternatives differ depending on the intended referent.

Zeevat (2000) discusses "non-accommodating alternatives," that is bound presuppositions, and "non-triggering alternatives," that is assertional expressions. There will be a preference for binding over accommodation, and assertion over presupposition. If there is no equivalent non-presupposing alternative, then the trigger will support a usage where the presupposed information is accommodated because there is no alternative way to express the same information. Thus, accommodation is licensed by the lack of candidate alternatives that do not require accommodation.

In order to consistently apply Zeevat's account to other examples we need to be able to identify what the expression alternatives are for each presupposition trigger, and this is where the proposal gets into problems. We could consider alternatives to be those generations that, given an input context, will update the discourse in such a way that the output context will be the same for each generation, but where different processes by which the update is made compete, or we could take a broader view and just consider the alternatives that can lead to similar updates without taking the input context into account. The difference in definition of candidate alternatives does not affect the example in Tableau 2, where the alternatives considered were *a woman, the woman,* and *she.* Each expression will result in a new reference marker for a female individual being added to the discourse representation, and will also lead to the same interpretation. However, the definition of expression alternatives does crucially affect the predictions of the explanation for the other triggers.

Consider the non-accommodating triggers and what happens when we try to apply Zeevat's and Blutner's explanation to account for their behavior. We must first identify the expression alternatives to utterances without these triggers. If we take *too* and *also* as representatives of this group , as far as I can tell, there do not seem to *be* any expression alternatives for utterances with these triggers. At least there do not seem to be alternatives that can be said to have the same input context. Consider the following examples:

(24)   Sofia <u>also</u> baked a cake.
(25)   John comes to the party <u>too</u>.
(26)   a.   Beth decorated the room and Sofia baked a cake.
        b.   Beth decorated the room and Sofia <u>also</u> baked a cake
(27)   a.   If the boss comes to the party then John comes.
        b.   If the boss comes to the party then John comes too.
(28)   Beth baked a cake. Beth decorated the room.
(29)   John comes to the party and the boss comes.

Given an empty context, both (24) and (25) would need to be accommodated. The same utterance without the trigger might be able to be considered an expression alternative. However, this won't work with the above examples if we define an expression alternative as updating the same input context and leading to the same output context. Interpreting (24) without *also* means that you have lost the information that someone else did something comparable to what Sofia did.

The only alternative is to introduce the presupposed information by assertion, as in (26) and (27), so that the information that the trigger was going to contribute is already part of the context. The problem with this solution is then that if we add the presupposed information before the utterance without the trigger, then we have changed the input context. There is no longer an expression alternative that will *need* to be accommodated, because the use of the trigger in this new context will be resolved by binding. And binding will always be a winning alternative to accommodation.

The problem here is that we cannot construct assertional alternatives for the presuppositions triggered by *too* and *also* unless we communicate the information that would otherwise be accommodated *first*. As soon as we do that, we have created an antecedent for the triggered presupposition. This changes the input context which in turn changes the set of relevant candidate alternatives for generation. Thus, if we define expression alternatives with respect to the input contexts, there are no expression alternatives to accommodation for these triggers. This predicts that accommodation is freely available for *too* and *also*. But this is the opposite of what is claimed in the literature and of what we find in the corpus. Note that the examples with *too* are therefore very different from the previous examples with pronouns because in those examples there was both an assertional and an accommodating alternative that could update the same input context in a similar way.

On the other hand, if we loosen our definition of alternatives and say that the input context doesn't have to be the same at the exact time of the expression then we can use this explanation to account for *too*'s behavior. *Too* doesn't accommodate well because speakers prefer to first introduce by assertion and then bind the presupposed material to it. Because this alternative is always available, we never get accommodation with *too* in naturally produced data and we as hearers find examples where *too* has to be accommodated anomalous because we know the speaker could have used a form which wouldn't have required accommodation.

Thus, depending on whether the input context is relevant to the selection of candidate alternatives or not, we get different predictions. If it is considered relevant, then we cannot explain why *too* doesn't accommodate because there are no alternatives. If it is not considered relevant, then we can.

The account gets into further trouble with the accommodating triggers as well because of difficulties in determining what candidate alternatives are relevant. If we look at potential alternatives to accommodated factives, there are the following possibilities:

(30)   Factives with different types of complements.
        a. Computational linguists are in demand
        b. Students apply for our program because they **know** that <u>computational linguists are in demand</u>.
        c. Students apply for our program because they **know** THIS.
        d. Students apply for our program because they have noticed THIS TREND/THIS FACT.
        e. These days many companies and government agencies are looking to hire computational linguistics. Students apply for our program because they **know** that <u>computational linguists are in demand</u>.

Sequence (30)ab illustrates a bound presupposition. The presupposition induced by the factive in (30)b can be bound with the information supplied in (30)a. Sequence (30)ac illustrates abstract object anaphoric reference with a pronominal anaphor as does (30)ad, but with a full NP is used. Finally, example (30)e illustrates a case where the presupposition can be bound to the information expressed in the first sentence. It is possible to communicate the same information by using (30)b alone, accommodating the presupposition are. The anaphoric references in (30)c and (30)d are more similar to an accommodated factive than an unqualified statement of the same information by one of the speakers, which could be interpreted as a *fact*, but also as speaker *belief*. The other alternative is a more direct method, an explicit statement such as "It is a fact that *P*." This would also differ from factives in that there is no asserted information associated with the utterance.

If abstract object anaphoric reference from the complement of a factive is considered to be an alternative to presupposition then we see that it is freely available. An alternative to accommodation would seem to be a bound presupposition. Both of these are predicted by AVOIDACCOMMODATION to be preferred to using an expression that will have to be accommodated by the hearer. Blutner and Zeevat's proposal applied to these examples would seem to predict that sequences (30)ac, (30)ad, and (30)e alone, should be highly preferred to (30)b, which should be quite infelicitous. Unfortunately, (30)b is felicitous. The corpus data doesn't confirm their predictions either.

In order to look more closely at this question, Factives with abstract object anaphor in their complements were excerpted from the LLC in order to compare them with the previously excerpted factives that triggered presuppositions. Factives without a complement, or with an NP-object, non-abstract object complement,

were discarded. For each example of an abstract object anaphor, the relation between the potential antecedent, if there was one, and discourse structure was examined, noting speaker shifts between antecedent and anaphor, distance, in utterances, and any other potentially relevant aspects. The results are presented in the table below.[9]

	Bound	Accommodated	Abstract Object Anaphors
Object complement	28	81	20
Subject complement	0	0	14
Totals	28	81	34

Table 8 Abstract Object Anaphors, Bound Presuppositions and Accommodated presuppositions

The 28 bound presuppositions and the 34 abstract object anaphors together make a total of 62 cases of assertional or bound alternatives, versus 81 cases of accommodation. This means that factive verbs in the corpus occur with full propositional presuppositions that need to be accommodated more than half the time (56%), and as we saw in the section 5.2, a great number of these are examples where the presupposed information is believed by the speaker to be new to the hearer.

If we define expression alternatives relative to input contexts, then bound factive presuppositions and abstract anaphoric reference are not alternatives to accommodated factive presuppositions. Therefore there doesn't seem to be an expression alternative to factive presuppositions and the proposal correctly predicts that factives should accommodate easily. But if we loosen the input context requirement and make bound presuppositions and abstract object anaphors alternatives, then the explanation incorrectly predicts that factives should not accommodate well and we need another explanation for why over half of the corpus examples were factives that had to be accommodated.

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[9] The forms of abstract object anaphora used may also be of interest, but note that no special patterns were observed among the characteristics. There were 8 cases of *it*, 2 cases of *this*, 18 cases of *that* and 3 cases of zero anaphora and 2 cases of *definite noun phrases*. For almost all examples a linguistic expression that could be a source for an abstract object could be found in the previous discourse segment, or in the same discourse segment, though there were a few exceptions. In 19 cases the same speaker who uttered the abstract object anaphor also had said the linguistic expression from which its antecedent can be derived; in 12 remaining cases the speakers were different, and in 3 cases it is impossible to pinpoint exactly what utterance(s) provided the antecedent are (cf. Eckert & Strube who also found a great number of vague or difficult to identify abstract anaphoric occurrences), though it is clear that it is part of the previous context (e.g. previous or same discourse segments), it is often (as illustrated in example (3)) a question of determining how much of the previous context is intended as the antecedent

It should be clear that the main problem with Zeevat and Blutner's explanation lies in the definition of expression alternatives, in particular the role of the input context in their identification. If we require the same input context, we can predict correctly that factives will accommodate, but we will also predict incorrectly that *too* should be able to accommodate as well. On the other hand, if we loosen our requirement on the input context, we can correctly predict that the presuppositions triggered *too* will not accommodate, but we now incorrectly predict that presuppositions triggered by factives should not accommodated either. Even if we know more about alternatives, I don't see how we can ever get this explanation to account for the behavior of factives and *too* simultaneously.

We saw in the examples in (23) and the OT analysis that the proposal can explain why definite NPs do not accommodate well, and this explanation predicts the same result regardless of the effect of the input context on alternatives. If input contexts affect alternatives, then definite NPs will either be bound or won't compete with the indefinite. If we use a looser definition, then the indefinite will always win because the definite will be penalized by AVOIDACCOMMODATION. Here the account makes the correct predictions. Unfortunately, big definite NPs accommodate well, and no matter how we define alternatives in relation to the input we can't explain this.

Zeevat recognized this and in order to deal with big definite NPs he develops a detailed proposal for what constraints are at work in the generation of NP forms. These depend on the characteristics of the referent of the NP in the context in which it is used (see Zeevat, to appear) and are in the form of parse constraints. Parse constraints in OT are constraints that say what features present in the input must be marked in generated forms. One of the parse constraints he proposes is PARSEUNIQUE. In generation, PARSEUNIQUE will demand that unique NPs are marked for their uniqueness, and this is satisfied by using a definite article. Therefore only non-unique definites have indefinites as assertional alternatives. This then explains why big definite NPs are able to accommodate easily, because the additional information that makes them "big", also makes them unique in their context, and an indefinite would not be a winning candidate because it wouldn't fulfill the parse requirement. Zeevat even explicitly states that only unique definites can accommodate.[10]

This explanation is problematic for two reasons. The first reason is that a majority of definite NPs refer to referents that are unique in their context, but only big NPs tend to be used to introduce discourse-new information. With the addition of this constraint, however, most definite NPs should be able to accommodate, even small definite NPs. Potentially, we could say that the bigger the NP is, the more unique it must be because we have more specific information, but this would seem to be just a reworking of van der Sandt's descriptive content explanation in the form of an OT parse constraint. The second reason why this explanation is

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[10] The ordering for the constraints considered relevant for choices between definite descriptions and indefinites are PARSEOLD >> PARSEUNIQUE and then AVOIDACCOMMODATION .

problematic is because it involves introducing a new OT constraint in order to make the explanation work for one type of NP. This seems a little unsystematic. Either expression alternatives inhibit accommodation or other factors must play a role in *all* triggered presuppositions.

Zeevat discusses another counter-example to the lack of alternatives as an explanation, one pointed out by Geurts and having to do with the expression *manage*.[11] Examine the following examples.

(31)   Jennifer managed to finish her dissertation.
(32)   Jennifer finished her dissertation.

Example (31) is said to presuppose that Jennifer had some difficulty in finishing her dissertation. It has a simple, non-presupposing alternative, the same utterance but without the *manage* as in (32). Both could be used in similar input contexts. But the utterance with the triggered presupposition can easily be accommodated, even though there is an expression alternative. Zeevat (to appear) concludes that this example suggests that truth-conditional equivalence is too weak a criterion for determining expression alternatives. Instead we need to find alternatives that display a "psychological identity." Unfortunately, Zeevat does not discuss how psychologically identical expressions could be identified.

Psychologically equivalence may be needed to identify alternatives to account for why *manage* can accommodate but it doesn't help much with the other triggers. Changing meaning equivalence, which was already problematic because it is not clear how this should be defined with respect to the input context, doesn't get easier because we change to a definition of psychological equivalence. In contrast, we would have to conclude that *too* and the other triggers in the non-accommodating group certainly *do not* have a psychologically equivalent expression. This is most clearly seen by taking cases where *too* or *also* are bound and removing them, where something is immediately lost. This "something" seems to be the speaker's attitude to the information, or how the speaker feels the information rhetorically relates or coherently fits in with the rest of the discourse, even if theses alternatives would seem to be truth-conditionally equivalent. I am not sure how to evaluate the psychological equivalence of alternatives such as indefinites, pronouns and definites, but because it would be a stricter definition than the one we were using, it would seem to cause more problems then it solves.

Zeevat recognizes that there are problems with the predictions made by AVOIDACCOMMODATION. For this reason, he discusses a weaker alternative constraint called **Obligatory Triggers Do Not Accommodate**. Because this constraint refers exclusively to obligatory triggers, it excludes many of the problematic counter examples to the stronger theorem. Some triggers seem to be

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[11] It is not at all clear that *manage* is a presupposition trigger. When the PTB is applied it does project, but it is very difficult to make up natural examples where it will bind.

obligatory in certain contexts,[12] in particular the triggers *too, also* and *another,* and Zeevat also mentions *a different,* some definite NPs, intonational marking and pronouns (p.14). One of the generational constraints for dealing with this proposed by Zeevat is PARSEOTHER. This constraint says that if there is another item of the same type but different in the discourse context as the item being introduced, this needs to be marked on the generated form. Consider the following examples:

(33)   a.   Hanneke likes cookies. Noor likes cookies **too**.

       b.   Hanneke likes cookies and Noor likes cookies

(34)   a. Each child must have a costume for each play so we need a/one costume for Cinderella and another for Snow White.
       b.?? Each child must have a costume for each play so we need a costume for Cinderella and ?a costume for Snow White

For both of these examples the b-version is less natural than the a-version. In (33)b, you get the feeling that there should be a third person giving snack preferences and (34)b is awkward. These triggers are also those that do not accommodate.

Why should obligatoriness in certain contexts be related to inability to accommodate? Zeevat (to appear) writes that he and Blutner have not been able to come up with a good explanation for why this weaker constraint makes such correct predictions. I have one. First, in what contexts are obligatory triggers obligatory? If we look at the contexts that are usually discussed, such as with *another* or *too*, they are all cases where the presupposition has an obvious antecedent, as pointed out in Zeevat (to appear). If PARSEOTHER is what is active in the generation of utterances with triggers such as *too* and *another* then we only generate these triggers in contexts where they are needed or required by virtue of another item in the discourse context. We have no reason to generate the triggers unless there is another item that is similar, but not exactly the same. The presence of this obvious antecedent is what makes the trigger obligatory in the context.

The result is then that these triggers are obligatory in contexts where they have antecedents. If triggered presuppositions have antecedents, they **bind.** If they bind, they won't get a chance to accommodate. Hence, the reason obligatory triggers do not accommodate is because they are only generated in contexts where they have antecedents.

Now note that some researchers believe *too* can accommodate in the right situation, e.g. even Zeevat (to appear) gives an example of a situation where another speaker says "Do you want coffee *too*" and accommodation would seem to be possible because the presupposition can be resolved to the speaker as the other

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[12] Actually here Bart and I disagree. Bart does not believe that *too* or *another* are *ever* obligatory and he says that the Dutch equivalents do not need either of these markers. I disagree for the English examples, there is something there that makes the version without the marker unnatural and awkward, and it only works when using a very special intonation pattern.

individual. But this perhaps should be analyzed as binding to something in the discourse situation. It is unclear how non-linguistic antecedents and binding to them should be handled in the discourse analysis, but it is clear that this example cannot be considered a case of pure accommodation. The question is, if and when *too* can accommodate without any antecedent at all.

Most of the examples in the literature where it is attempted to show that *too* and the other similar triggers are actually able to accommodate are examples that are "out of the blue" or given without a context. The reason for this is that the need to bind is so strong, that if *too* is added to a sentence in a context, it leads to the immediate identification of several rhetorical relationships that were not perceived earlier. This can be illustrated with the following example, where Speaker A is describing the war experiences of an acquaintance to Speaker B, and I have added a number of *too*'s which were not in the original text.

(35)   (1-10 198)
Speaker A   He was invalided out of New Guinea with three kinds of jaundice (*too*) two kinds of malaria (*too*), extensive jungle sores (*too*). Filthy climate, dengue fever (*too*) and a couple of other things to be going along with and he was in hospital for six months (*too*) <sort of> hovering about the *place* till he made his mind up to come back, you know.
Speaker b   Frightful.
Speaker A   He weighed six and a half stone when he came out of New Guinea. He's about the same height as me (*too*), which is not good and you know you you can duplicate this (*too*) among . a {lot of middle-aged} Australians (*too*)
Speaker b   Yes - - it makes for a great great generation gap (too) in this country (too) at any rate.
Speaker A   Well, the generation gap is the same anywhere I think between anyone who took part in World War Two and people who've grown up living on the fat of the land without any prospect of being conscripted (too)

The example above intends only to show that, given a context, *too will find* an antecedent, meaning that its presupposition is underspecified enough to easily find something to bind with in a rich context.

The *too's* in example (35) can obviously be removed. However, in Zeevat (to appear), Zeevat mentions that he has examined a Dutch novel together with a student and attempted to remove the Dutch equivalent of *too*, and that in most cases the version without the *too* was an infelicitous alternative.[13] Example (35) is the opposite of what Zeevat (to appear) did in his study where he removed *too's*. Where does the difference come from? The best explanation I have for this is that

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[13] We can guess that the examples all were cases of *too* with antecedents, though Zeevat doesn't explicitly mention if the *too's* were bound or accommodated. If they were cases of accommodated *too*'s then the infelicity experience by the versions without the *too* would have to be considered evidence that the version without the particle cannot be considered as real non-presupposing alternatives.

there is a qualitative difference between the contexts in which the *too's* are produced naturally and the *too's* in (35). The naturally occurring *too's* will be used in cases where they are obligatory and then it will be hard to remove them because they are needed by the context.

It is also possible to argue that what example (35) illustrates is not so much binding but accommodation of a parallel relationship at a rhetorical level, taking semantic information of the right types and then joining them in a relationship. A parallel relationship between two constituents is construed when *too* is placed in the vicinity. We are able to perceive a parallel relationship in texts where there were none simply by inserting *too* and letting accommodation do the rest. This explanation requires that we revise our view of what *too* presupposes. It would also mean that in practice we could never distinguish well between accommodation and binding for *too* because it always finds elements that can serve as its antecedent.[14] This would make it difficult to evaluate claims about *too* related to its ability to accommodate.

Clearly we need to know more about what should be considered an assertional and a bound alternative to accommodating in order to be able to correctly apply these notions to the data to make predictions about ability to accommodate or lack. This is the main problem with Blutner and Zeevat's explanation. Cases where the proposal makes correct predictions are often consequences of the way constraints and generated forms interact so that counterexamples are not produced. This is seen in the explanation that works for factives, the alternative explanation that works for *too,* and the changes necessary for accounting for big definite NPs. But the constraints themselves need to be motivated by something more than the fact that they will lead to the right predictions. Also, because what can and cannot be accommodated becomes a consequence of the generational constraints, we never actually get to an explanation of what qualities license accommodation, because the answer seems to be external to the characteristics of the triggered presupposition itself, it has to do with characteristics of other similar available items.

In summary, the availability of expression alternatives may explain why pronouns don't accommodate, and explain the feeling of anomaly in sentences where this is attempted. It can either explain why *too* doesn't accommodate or it can explain why factives can accommodate, but not both. It cannot explain why big definite NPs can accommodate and small ones cannot without adding additional constraints that in effect seem to define away these counterexamples. It also prerequisites a method for determining what the expression alternatives of an expression are. However, it is unclear to what degree the input context plays a role in determining what alternatives are relevant. It is also unclear whether the alternatives must be truth-conditionally equivalent or if a stricter, but as of yet not clearly defined alternative of psychological equivalence is necessary. It is also

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[14] One potential method could be to check *too* preserves the naturalness of the utterance then it most likely was a case of accommodation, but if removing the *too* makes the utterance awkward, then we consider it to have been bound.

unclear if AVOIDACCOMMODATION is the correct constraint or if we need some kind of weaker alternative.

5.3.3 Corpus Data and Discussion

I believe neither van der Sandt's nor Blutner and Zeevat's explanations are quite satisfactory in accounting for what licenses accommodation, though I think the former is more successful than the latter, without further specification about how expression alternatives should be determined.

Van der Sandt's account and Blutner and Zeevat's account actually explain very different things. Blutner & Zeevat have given us a system which will allow infelicitous forms to be non-preferred in production, and by doing this they avoid generating forms that involve accommodation if there is another alternative. They explain the infelicity of such forms to the hearer as a consequence of the hearer's awareness of what generational alternatives the speaker had available. But this explanation says little about why the different forms are the kind of alternatives they are, and if we just say it has to do with the number of reference markers that will have to be accommodated, we haven't explained very much.

Van der Sandt's explanation concentrates on the question of why forms are the kind of forms they are by discussing the inherent characteristics of the presuppositions induced by each trigger. Together the proposals perhaps make up the beginnings of an explanation, giving us some ideas about what is going on in accommodation, but neither can presently account for all the data in a way that seems satisfactory.

Both accounts have little to say about the role that the context plays in the speaker and hearer's communication. Van der Sandt (1992) only discusses inherent characteristics of presuppositions induced by certain triggers, and Blutner and Zeevat make no reference to the context in the choice of alternative expressions. They do discuss input contexts, but they do not discuss the effect of particular contexts and the information they may contain. But context and the relation between the presupposed information and the context both plays a key role in felicitous accommodation.

Below I'll discuss the corpus data of *too*, and argue that *too* does not have as much descriptive content as has been attributed to it. Lack of descriptive content could then function as an explanation for why *too* doesn't accommodate easily. However I'll argue that the ability to make a coherent interpretation in the context is what allows accommodation and this is seen in the one case of *too* in the corpus that seems to be a clear case of true accommodation. In addition, presupposed information is easier to interpret if it is partially linked to the context, by, for example, containing anaphoric arguments. This linking, first discussed in Heim(1982) in reference to definites, is found in many of the corpus examples and may play an important role in licensing accommodation. Linking is also more likely the more descriptive content a presupposition has because there will be more opportunities to link.

5.3.3.1 Presupposition of *Too*

The presuppositions triggered by *too* may not contain the amount of descriptive information that is currently assumed.[15] Annotating the presuppositions induced by *too* was a more complicated task than for other presuppositions in part because the exact presupposition is not given in the utterance where the trigger *too* occurs but will be related to the presupposed information in a predictable way. To increase reliability, the annotation of the *too* examples was done by the author on two separate occasions, as well as by a second native speaker on one occasion. Each annotation task had two parts, first, the utterance containing *too* was presented with a short context and a hypothesis was made about what the presupposition was. Second, an expanded context was given and the hypothesis about the presupposition was made again and the utterances where antecedent information could be found.

Identifying the presupposition from the utterance with *too* alone, i.e. identifying what elements were being contrasted, was very problematic. This is because *too* can focus any one of several constituents: the subject, the predicate or part of the predicate, or another constituent making it often difficult to determine what information was the *focus* and what was the *theme*. This variability was first discussed by Jacobson (1964) and Fjelkestam-Nilsson (1983) has pointed out in her corpus study of written uses of *too* that all three types of focusing occur. *Too*'s position in the sentence was not a strong clue for identifying the focused constituent either. Jacobson (1964) classified *too* as potentially occurring in four positions relative to the focused constituent: immediately before, immediately following, or before or after the focused element. Fjelkestam-Nilsson (1983) found that all combinations were possible and occurred at least once in the data, though some combinations were more frequent than others so the position can help in some cases. This variability accounts for the difficulties in both this study and in Fjelkstam-Nilsson (1983) identifying the contrasted element in the utterance where *too* occurs is very difficult when examination is limited to the local environment. An illustration of this variance is given in (36) (example modified from Fjelkestam-Nilsson, 1983, p.28). Examples (36)a (36)b, and (36)c, select two different constituents to be compared and (36)d varies both the focus and the theme.

(36) a. Tom called Mary. John called Mary too.
      b. John wrote to Mary. John called Mary too.
      c. John called Susanne. John called Mary too.
      d. John called Susanne. John wrote Mary too.

On the other hand, determining the focus element is not difficult when the example is simple and other factors contribute or support one interpretation. See in (37)a-c .

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[15] Some of these results and the discussion given here were presented in Spenader (2001a).

(37) a. It was done at midnight too.
   b. MARY overslept too.
   c. Mary, too, overslept.

In (37)a there is only one possible interpretation for the contrasted element because the theme is anaphoric, and we are only left to determine what the other element of the focus was. For (37)b, prosodic prominence on Mary supports an interpretation that someone other than Mary overslept. (37)c places *too* in a position in which the only interpretation is that the *theme* must be oversleeping and Mary is the contrasted element.

The second annotator's notes also clearly show that in many cases she had either no idea what was being focused and what was the theme or began with a completely incorrect first hypothesis when examining the usage without the benefit of the greater discourse context. Consider the following example of *too* with very little contextual information:

(38) (2-1a 1291)
Speaker B To eighteen Devonshire Close.
Speaker a   That's a nice address too.

The first hypothesis given by the second annotator was that the address was being contrasted with other nice things about the residence. But examination of a greater context (given in (39)) shows that this is incorrect and the two constituents compared are the two addresses. Note that the *theme* here is "a nice address" and the two constituents being compared are the actual addresses: at Stratford Corner & eighteen Devonshire Close.

(39) Example of *too* with expanded context (2-1a 1269)
Speaker B   And we have a place now. Temporarily for a few days. … (three lines) At Stratford
            Corner which is near Marshall and Snelgrove. Yes really, yes yes, you know, you know, it is in Oxford Street.
Speaker a   <u>A very nice address.</u>
Speaker B   It's all right temporarily. It's got a Mayfair number! But we are moving on Saturday. All this bloody stuff.
Speaker-a   To whither . or . where as the vulgar say .
Speaker B   To eighteen Devonshire Close.
Speaker a   That's a nice address **too.**

After examining the transcript, prosodic information only aided in determining the contrasted elements in the local context in a few cases. Also, the majority of examples were much more complex than those traditionally given to show the disambiguating effects of prosody. Identification of the contrasted element in the utterance in which *too* occurred for the majority of cases was only possible after the antecedent had already been found.

In all but two cases at least one potential parallel constituent was found. One case mentioned earlier where the use of *too* was at the beginning of a recording, with little context. This made it difficult to even determine what the *theme* and *focus* were so it is difficult to consider this to be an example of a presupposition that was intended to be accommodated. The relationship between the antecedent and the sentence with *too* seems to be characterized by a very strong mutual dependency, where we cannot determine what it is that *too* is meant to be presupposing until *after* we have found its antecedent.

The problem with *too* seems to be that the descriptive content it is associated with in the utterance where it is triggered can be very different from the descriptive content that its presupposition will be associated with. The thematic information must be comparable and the focused elements have to be of the same type, but beyond these requirements, the descriptive information of the utterance itself cannot aid much in determining the content of the presupposition. Because of this *too* doesn't actually serve well as a counter-example to van der Sandt's explanation of what licenses accommodation and we could then consider van der Sandt's explanation to be correct in that by reanalyzing the presupposition of *too* we have been able to account for what seemed to be a counter-example.[16]

However, descriptive content alone is not sufficient to license accommodation in all cases so there are still problems with van der Sandt's explanation. Consider the following two examples from Beaver (to appear, p. 41, examples (29) and (30)).

(40)   The 15 year old squirrel ate a biscuit.
(41)   Mary is a one-legged Albanian pole vaulter too.

Beaver points out that neither of these examples, despite a great deal of descriptive content, and despite being very unique, function well at the beginning of a discourse. Their presuppositions are not easily accommodated. He concludes that we should rethink the characterization of presupposition and anaphora as being one phenomena, rather than two.[17]

I come to the opposite conclusion. The above examples support the characterization of presuppositions and anaphors as being of the same kind, because similar to pronouns, presuppositions can have difficulty accommodating, and this is regardless of the amount of descriptive content. I believe these cases do not accommodate well is because there is no link at all with a preceding discourse;

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[16] Note that the reanalysis of *too* does not change the predictions for the behavior of presuppositions triggered by *too* for Zeevat and Blutner's account because we still have to determine what the expression alternatives are for an utterance with *too*.

[17] Beaver writes "…it seems that being a one-legged Albanian pole-vaulter must be sufficiently rare that the presupposition of the third sentence is highly informative. So why not simply accommodate a one-legged Albanian pole-vaulter? At present, in order to account for the failure of accommodation in some cases, a fundamental difference between anaphora and presupposition must somehow be stipulated in van der Sandt's model. And this does not sit well with the intuition that presuppositions and anaphora are not two phenomena, but one." (p. 42)

there cannot be a link because there is no context. Presuppositions can be used in discourses without a linguistic antecedent just because the context allows them to make a link with the preceding discourse. The context and the link between it and the presupposed information makes accommodation felicitous.

If the descriptive content contributed by an utterance where *too* appears is specific enough or constrained enough in the context where it is used so that any ambiguity in interpretation is ruled out, then the presupposition triggered by *too* should be able to accommodate as well. This is also what we find in the one example of a plausible case from the corpus data of a presupposition triggered by *too* that needs to be accommodated:

(42)   An example of *too* triggering a presupposition that has to be globally accommodated (2-14 411)

Speaker A   He doesn't see why you should make - bother to make [pr] why you should - - be feel forced to make provision for the disabled . particularly the wheelchairs who are the voluble ones and I agree with him there - in both . underground and - [@m] buses so long as one form of [tra] public transport *is* available that should be reasonable -

Speaker C   *[M]*

Speaker A   [@m] and he said the Swedes have gone absolutely overboard on making everything possible for the disabled which also emerged in passing from this paper *. and he says.*

Speaker C   *They're probably richer.*

Speaker A   Yes, but he says now they've spent all this money they're finding they can't afford to keep it up

Speaker C   Oh . [m], yeah.

Speaker A   (laughs -)

Speaker C   Couldn't you have all loos . designed so that [dei] disabled people can use them **too**? *<I'm thinking about paraplegics>*

Speaker A   *I think you could, yes.*

In the above example the presupposition triggered is that someone other than disabled people can use *all loos*. This presupposition can be accommodated and the resulting meaning is clear, non-disabled people are able to use *all loos* now. There are two reasons why accommodation here is felicitous. First, the theme is that all loos can be used, something that is trivially true. Second, individuals actually only belong to one of two categories, they are disabled or they are not disabled. Because the focus element in the utterance with *too* is disabled people the most likely focus element for the presupposition is non-disabled people. These two factors make accommodation felicitous.

Expressions with greater descriptive content accommodate easier because they are more able to be linked in some way with the context, but, as the above examples shows, only if there is a context. Presuppositional expressions can have arguments that may be already given in the discourse so that part of the presupposed information is immediately able to be integrated in the discourse record when the presupposition is triggered. Heim (1982) argues that this type of

interlinking is something that is necessary for definite NP accommodation. In her analysis of indefinite and definite NPs in file change semantics (FCS) she only allows definite NPs to contribute new file cards when they are able to be linked in some way through their descriptive content with another file card.

Interlinking is probably playing a role in the accommodation of *all* triggers, and may in part be what makes accommodated information felicitous and understandable. We can see evidence of this in many of the examples of accommodated presuppositions in the corpus, for example the *this college* referred to in example (1) in this chapter, as well as for many others. The reader is encouraged to reexamine the example of accommodation from this chapter. Most of them contain a number of anaphoric an presuppositional expressions embedded within them,[18] e.g. *Lawrence's novels* in example (3), *this* in (14)*, you language person* in (15), *he* in (16), *this* in (17)*, and *those continued supply of funds* in (18).

The amount of linking that will be possible will differ by trigger type. Triggers differ greatly in how much structure the presuppositions they induce have, e.g. definite NPs have less structure than factives. Noun phrases are less likely to be complex and contain variables, especially bound variables, or to show the type of interlinking that abstract presuppositions can show. Big definite NPs are often big because they have additional arguments, sometimes entire restrictive relative clauses. The more structure a triggered presupposition has the more chance there will be that it is linked to the give discourse.

In conclusion, neither van der Sandt and Zeevat's nor Blutner's account take the context into consideration in the discussion of what licenses accommodation, and this means they are unable to explain some cases. The potential to accommodate is to a certain degree related to inherent features of the triggering expression, as in van der Sandt's explanation, or to features of the potential alternatives to the triggering expression as in Blutner & Zeevat's explanation. But the degree to which the presupposed information is linked to the context and the degree to which alternative interpretations are excluded because of world knowledge or other pragmatic factors will also play a role how practical and how felicitous accommodation is.

It still remains to be explained how much linking is enough, so this explanation suffers from the same problem as van der Sandt's. I don't have an answer to this, and I wonder if it is possible to even give one. In the end, accommodation is licensed when the resulting discourse is understandable, and this will vary not with a particular presupposition trigger or a particular presupposition, but with the context in which a particular presupposition is used. Because of this, the ability to accommodate easily or felicitously is not an absolute feature of certain triggers but only a tendency in trigger usage that can be overridden by contextual information and world knowledge. This means that it will be difficult to make more than general predictions about when the factors that influence the licensing of accommodation will actually permit it.

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[18] I am grateful to Rob van der Sandt for pointing out this pattern in my data.

5.4 IS THERE A PREFERENCE FOR HIGHER LEVELS OF ACCOMMODATION?

Both Heim and van der Sandt have suggested that higher levels of accommodation will be preferred over lower levels and evaluating the likelihood of this proposed preference in relation to the corpus results is the third main question for this chapter. These preferences should have resulted in GLOBAL being more frequent than LOCAL or INTERMEDIATE, and INTERMEDIATE more frequent than LOCAL.

First I will present several explanations given in the literature for why there should be a preference for higher levels of accommodation over lower. Then I'll discuss these in relation to the corpus data. Factive presuppositions were locally accommodated as often as globally, so the data does not show a tendency for higher levels of accommodation over lower levels for all trigger types. I'll present an alternative proposal, that there is no general preference for higher levels of accommodation, and that triggers differ in the likelihood with which they will be used under embedding, and the behavior of the induced presupposition will also differ depending on the type of embedding.

There are two well discussed accounts for the proposed preference, contrasted at length in Geurts (2001). The first proposal is that backgrounded information tends to float up to the main context. Because presuppositions are arguably a kind of backgrounded information they also tend to float up. This proposal was made by Geurts (1999, 2001), and he terms it the Bouyancy Principle, or BP. Geurts comments that it still remains to be explained why background information should float up, so the BP isn't really an explanation. The second proposal argues that the proposed preference is related to the desire of speakers to make the strongest reading possible. Presupposed information projected to the main context is argued to result in a stronger reading than non-globally accommodated versions, so hearers will tend to globally accommodate. This account is advocated by those working on Optimality Theory treatments of presupposition (e.g. Blutner 2000, Zeevat to appear) and is captured by the workings of Blutner's (2000) proposed constraint **BESTRONG**. Semantic strength is usually defined in the following way: consider two possible readings for an utterance, reading A and reading B. If reading A entails reading B but reading B does not entail reading A, then reading A is stronger because it would add more information to the context than reading B, hence Geurts (2001) terms this the Informativeness Principle, or IP.

A simple example of how the IP works is given below. The interpretation of the DRS when the presupposition triggered is globally accommodated, (43)b, entails the interpretation of the DRS when the same presupposition is locally accommodated, (43)c, but not vice-versa.

(43)   a. If the King of France is bald, then he lives in exile.

b. [x : KofF(x) [bald(x)] → [lives_in_exile(x)]]

c. [[x : KofF(x), bald(x)] → [lives_in_exile(x)]]

Here, for all models (or worlds if you prefer) where it is true that there is a King of France, and if he is bald then he lives in exile, it is also true that if there is a King of France who is bald then this individual lives in exile. The hearer is believed to prefer the strongest reading because he assumes that the speaker is following the Gricean Maxim of Quantity and saying as much as he knows. If the speaker had meant the weaker reading, he would have chosen a different means of expression.

There are two main problems with using the IP to account for the proposed preference for global accommodation. First, in some cases neither the local nor the global reading is stronger than the other. Second, the reading that results from global accommodation isn't always the strongest reading. Geurts (2001) and Beaver (to appear) have pointed out that the IP will make different predictions depending on the type embedding. For example, Beaver (to appear, p. 36-37) writes "In the cases of accommodation triggered by a presupposition in the consequent of a conditional, or the scope argument of a universal quantification…" IP will "…result in the preferences Global > Local > Intermediate. Note that the exact preference resulting from a preference for logical strength will vary according to the monotonicity properties of the embedding environment, so that, for instance, the quantifier *not every* yields a preference Global > Intermediate > Local." Thus, it is hard to use the IP as an explanation for a general preference for higher levels of accommodation.

Geurts (2001) concludes that in studying cases of presupposition projection under several different types of embedding, it is not possible to find support to differentiate between the BP or the IP. In many cases the IP will make the same predictions as the BP, or there will be no preference predicted. However, advocates of the IP have argued that it is a better explanation because it may be a more general constraint on interpretation that applies to other structures, not just to presuppositions. These other structures include reciprocals, discussed in Dalrymple et al. (1991) and plural predication (Winter, 2001). If this could be shown, it would make a stronger case for the IP. However, Geurts shows that while the IP may be able to explain some other non-presuppositional phenomena, it clearly makes wrong predictions when applied to other phenomena. In the end, we have no clear way to determine if something like the IP or the BP is functioning and there seems to be no clear advantage to either proposal.

Geurts (1999) gives two other potential explanations for the proposed preference for global accommodation.[19] The first suggestion is that speakers will prefer global accommodation because they will try to make the most relevant interpretation they can and he gives the following example (Geurts 1999, p. 58).

(44)   a. Fred didn't bring his wife.

   b. [x, y : Fred x, y is x's wife, ¬ [: x brought y]]

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[19] He also presents the IP.

       c. [x : Fred x, ¬ [y: y is x's wife, x brought y]][20]

In this example reading (44)b is considered to be preferred over reading (44)c. There are several problems with this explanation. First, we are faced with the obvious problem of spelling out how the most relevant interpretation is to be determined, because surely this is dependent on the message being communicated and the context. But the example here is totally decontextualized, as most semantic examples are, without any potentially disambiguating prosodic information. When spoken, if prosodic prominence is put on the correct words you can unambiguously get either reading, but again, the appropriateness is dependent on the context. If we say context disambiguates, then there is no longer a 'preference', i.e. heuristic that interpreters would need to rely on.

       The second problem is explaining why the most relevant interpretation should always coincide with the interpretation that projects out. I believe a better explanation can be made for the preferences in this example when alternative expressions for the reading given in (44) are taken into account. In an empty context, a speaker wanting to generate the meaning of (44) will prefer to say one of the following:

(45)   a. Fred didn't bring a wife.

       b. Fred isn't married so he came alone.

The first implies that you are still not sure whether or not Fred is married, and the second is more appropriate if you know he is. The example is clearer with "girlfriend" (try it!) probably because temporary relationships fluctuate, and we do not always know who is single and who is not. Marriage, on the other hand, is a more prolonged state (or, at least for most people). This explanation for interpretation (44)b over (44)c is a bidirectional OT type explanation. (44)a is not the most optimal way to express (44)c if that was the speaker's intended meaning. (44)a can mean (44)c, but the more optimal interpretation is (44)b. We can say that (44)a and (44)b are optimal pairs, and (45)a or (45)b with (44)c are optimal pairs. Note that even with phonetic prominence on *wife* in (44)a*,* which will give you reading (44)c, the statement would still always be followed by something like "Fred isn't married," or "That was his girlfriend," because using that (44)a to express that (44)c could lead to misunderstanding and will often demand additional clarification. So even with disambiguating intonation (44)a and (44)c are not an optimal pair without additional information. I don't think the solution has to do with relevance, but more with what alternatives are available.

       The third suggestion given in Geurts (1999) is that readings where the presupposition projects out are more informative and less complex, e.g. 'intuitively simpler' (p. 58), and that in some way (44)b is simpler than (44)c. Geurts doesn't discuss this further, but I think one reason why the globally accommodated version

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[20] In his book Geurts writes c. [x, y: Fred x, [y: y is x's wife, x brought y]] but this must be a typo.

might be considered simpler is that it doesn't ask the interpreter to keep track of non-existing things. Locally accommodating Fred's wife, as in (44)c means having to keep track of Fred's non-existent wife. Keeping track of non-existent things might be more complex than keeping track of existing things.

Finally, another explanation could be that the higher presupposed information is accommodated, the easier it is to access for later reference. For example, if presupposed information is accommodated in some sort of embedded context rather than in the main DRS, it will be inaccessible for reference outside of that context. Information in the main context is accessible from every position which might make it more useful.

All these proposals may account for the proposed preference for higher levels of accommodation, but as shown in Geurts (2001) many of them have problems, and right now they all seem fairly weak.

The corpus data shows two things. There are very different tendencies for presupposition to be triggered under embedding and to be accommodated locally or globally, when triggered under embedding. The big exception to the proposed preference for higher levels of accommodation over lower is the factives in the corpus. The number of examples of each type is admittedly small, but I think it is still possible to discuss what they may imply.

I believe these results, and the inability to find a definitive (plausible) explanation for a preference for higher levels of accommodation suggest a very different idea, namely that there is *no* general preference for global accommodation for all trigger types. My suggestion is that triggers will differ in tendency to occur under different types of embedding. These tendencies are related to the type of information that the entire triggering expression is associated with, both asserted and presupposed information. Tendency to project out when triggered under embedding is then also related to the function the induced presupposition can have, and this function is related to the semantic type of the triggered presupposition.

Before the discussion continues we should be clear on what it means to say that there is a preference for global accommodation, because it is easy to begin to think of it as merely a position in a DRS and to forget what it means in interpretation to speakers and hearers.

Saying there is a preference for global accommodation amounts to trying to predict what type of backgrounded information people will need in their communication, arguing they will generally prefer backgrounded information that is itself not hypothetical in a hypothetical discussion, that is *not* conditional when the discussion is based on a number of conditions. I am not convinced that these are always intuitive predictions.

The corpus work suggest that tendency to occur under embedding as well as tendency to be globally or locally accommodated when embedded differs by trigger type - therefore my suggestion is that we consider the possibility that **PREFERENCES ARE EMBEDDING AND TRIGGER DEPENDENT.** Preferences for accommodation at higher levels are dependent on semantic properties of the

presupposition triggered and on the type of embedding where the triggering expression occurs.

Before I elaborate more on these ideas I should like to point out that several researchers have made vague or implicit suggestions that projection may differ according to the type of embedding. For example, the idea that triggered presuppositions may have different tendencies to project globally depending on the type of embedding is implicit in Geurts (2001) who tests both the IP and BP with presuppositions under different types of embeddings in order to see if there is a difference. He didn't find one, but I would argue that one of the reasons may be because all his examples except one are of definite NPs, i.e. he is testing only one trigger type.

That the IP makes different predictions depending on the type of embedding has been used as an argument against it, but this objection is only relevant if we assume that accommodation preferences will be to the highest level. If the assumption that higher levels are preferred over lower levels is not confirmed, we can no longer use the different predictions of the IP as an argument for dismissing it as an explanation for tendencies in level of accommodation. Instead we have good reason to look more closely at actual interpretations in the corpus data to see whether they confirm or disconfirm these different predictions of the IP. In conclusion, believing that there are different tendencies does not necessarily mean a rejection of the IP or the BP, but instead that our explanation will have to account for more heterogenous data.

If there are differences in projection by trigger type, why haven't we seen these differences before? This is an important question. I think the answer is that we have been looking at the wrong type of data, in fact data that could perhaps never tell us whether or not there is a preference for global accommodation. The biggest difference between my investigation and the earlier ones I have been discussing lies in the data that has been examined. In fact, we could reject the corpus results here and ascribe them to sparse data and to chance – and granted, the frequency data is slight. Because surely, as has already been shown in chapter 2, we can take any sentence with any of the presupposition triggers and embed this sentence under any of the logical operators and we will most likely get an interpretation where the presupposition projects out, i.e. global accommodation. But I would say this is just the method that gives us the *wrong* type of example. We may unwittingly choose examples with characteristics that make them particularly suited for being part of the main context when embedded. We then embed them to see if this changes our interpretation, but the operators that create these embeddings are applied to examples where the presupposition was already considered part of the main context. Because the interpreter has already been exposed to the positive, often declarative version of an unembedded presupposition. It is not hard to understand that when the sentence is written as a new version which embeds the presupposed information under some operator that the tendency will be to continue to treat the presupposed information as something that was already known, and trying to get a non-presupposing reading then involves

additional effort and will generally be considered by the interpreter to be a less natural reading.

When we are presented with examples where the presupposed information is already embedded under some type of logical operator, it is more often than not without a context. But how can we use decontextualized examples to illustrate and make conclusions about preferences for presupposition projection when everyone agrees that resolving a presupposition to the right level of accommodation *is a context-dependent process*. There may be a preference to use presuppositions with higher levels of accommodation, but I am not sure if we could ever prove or disprove it using this particular method.

Other work has also pointed out that decontextualized examples will often give misleading information about preferences. For example, Delin (1995) has shown that the use of decontextualized examples in the literature on *it*-cleft presuppositions has led to *it*-cleft presuppositions incorrectly being confused with shared-knowledge. She points out that this is because the intonation associated with a decontextualized, unmarked *it*-cleft in written form phonetically focuses the clefted constituent and the cleft complement is not focused at all. This intonation strongly suggests that the presupposed information is shared information. But naturally produced clefts regularly appear with different intonation patterns and these lead to different interpretations of the presupposition. Adding explicit information about prosodic prominence is a way to simulate context, and can thereby force a reading with local or intermediate accommodation. This is illustrated in the examples below. The a-sentences are presented without marked intonation, and the b-sentences have been marked to encourage a particular prosodic realization. The a-sentences strongly suggest a reading with global accommodation, whereas the b-sentences strongly suggest a reading with local accommodation.

(46)   a. John might know that Mike has been stealing funds.

         b. John MIGHT KNOW that Mike HAS been stealing funds.

         b-sentence suggests: we are not sure if Mike has been stealing funds.

(47)   a. John might not know that a decision was made.

         b. John MIGHT NOT KNOW that a decision WAS made.

         b-sentence suggests: we are unsure if a decision was made

Analogous to the *it*-clefts studied by Delin (1995), default intonation conspires to encourage the impression that the presupposed information is shared information, – "normal" or "default" intonation of decontextualized examples lead us to believe that this is the default usage. I would argue further that especially for factives, the

default intonation also generally suggests that the presupposed information is background information to the assertional information, which is concerned with who knows what, with what degree of certainly. Geurts (2001) may be on the right track in arguing that the notion of presupposed information as background information is somehow related to preferences for accommodation, because in decontextualized examples intonation suggests that presupposition is shared information and shared information will prefer to be globally accommodated. This tendency to be shared information is not uniform for all trigger types, or even for all presuppositions induced by triggers within the same group. For example, the above examples do not work as well when the factive is *notice* or *realize,* something that should perhaps be addressed in more detail, but I hope that the examples above suffice to show that default intonations for decontextualized examples may give misleading intuitions about what type of readings are available, or are most natural.

On the other hand, from section 5.2 we saw that many of the accommodated factives were used to communicate hearer-new information, though the majority of these examples were not embedded. In the following example, the presupposition will not be globally accommodated because it would lead to an inconsistent global context.

(48)   John is a baptist and a bachelor. He is convinced that <u>his wife</u> has to be a baptist too. That's why he only dates girls from church socials.

In conclusion, the type of data we examine is crucial when trying to make conclusions about preferences. Using only data that has been removed of its contextual links is going to give us an incomplete picture of the situation. Examples in theoretical work on presupposition do show that global accommodation is preferred, but because these are decontextualized examples this sample is somewhat skewed.

In the corpus there are differences in tendencies for different triggers to be induced under embedding, regardless of the level of accommodation, though admittedly the number of examples is quite small. The main types of embeddings are negation, conditionals, hypothetical or modal contexts.

First we can ask if all logical operators create embeddings that affect anaphoric accessibility in the same way. I don't believe negation produces the same type of embedded context that other operators do and there is a higher tendency for global accommodation under negation than under other operators. Things embedded under negation do not exist. Generally, we don't discuss at length non-existent things when we don't accept their existence. We do however discuss at length hypothetical states of affairs, objects, etc. Therefore I believe information introduced under modal embeddings, and *if-then* clauses will have a greater ability to play an independent role in these embeddings than information introduced in the scope of a negation operator, and this will affect tendencies to project out.

The trigger types show differences in how often they occurred under embeddings. *It*-clefts are somewhat special among the triggers studied here in that they are associated with a particular syntactic form, rather than having a presupposition that is localized on a lexical item, and this may make it more awkward to embed, a potential cause for the low number of embedded examples found.

Definite NPs seem to almost always be globally accommodated. One explanation could be that we don't tend to introduce concrete individuals into a discourse by using a presupposition trigger unless they are meant to be assumed to be known, or they are shared information with the hearer, etc. In a hypothetical or conditional discussion where the presupposition is not bound, definite NPs are likely to project out. Also this could be an effect of the relationship between hypothetical discussions and semantic individuals introduced within them.

Most hypothetical discussions are short-lived, local, generally limited in life to the current discourse context plus the participants, i.e. we don't often continue hypothetical discussions from conversation to conversation. Because of this, individuals that are hypothetical can seldom fall under the category of hearer-known but non-salient, they are generally introduced for the first time within that particular context, and similar to definite NP usage in non-embedded contexts they will tend to be introduced by indefinite nouns or indefinite noun phrases. Thereafter, subsequent references with a definite NP will get bound. This group will never make it to the main context. When definite NPs *are* used to introduce hypothetical items these are generally partially resolvable to other information in the hypothetical context, and should therefore more appropriately be considered bridging. But if a definite description is used in an embedded context and can't be bound or resolved through bridging, it will be accommodated in the main context.

Factives are different. In a hypothetical context, for example, an *if-then* clause, if a factive is used in the conditional clause, there is a good chance that it will not project out. The point of the hypothetical context is to discuss information about how the world could be. The point of using a factive is to discuss who did or didn't notice, know, regret, realize etc., the fact presented as the complement at a particular time. Factives are able to be used to introduce hearer-new information that is also the point of the utterance, or what is focused or foregrounded. There may be some sort of relationship about being able to be the main point of an utterance which encourages the ability to function independently in an embedded context, but I am not quite sure yet how to describe this. But I think this feature will encourage/support the speaker using the presuppositions induced by these triggers to be locally accommodated.

In factive presupposition, we can also separate the attitude towards the fact from knowledge about the actual fact. This separation of the asserted and the presupposed meaning, where each can make a significant new contribution to the discourse (as shown in section 5.2) is something that is missing from aspectual verbs.

In the case of aspectual verbs I think it is more correct to consider their presuppositions to be preconditions in a way quite different from the factives and presupposed material triggered by other expressions. The hearer doesn't have to agree with or believe a presupposed fact in order to understand that the subject *noticed, regretted* or *knew* it. But the hearer has to accept the truth of an aspectual presupposition to make any sense of the rest of the information associated with it, i.e. I have to accept that John used to smoke to make any sense of the information that he quit.

Others have pointed out that the presuppositions of aspectual verbs are somewhat different, and Zeevat (1992) argues that they could be classified like lexical triggers like *bachelor*, and that their presuppositions seem to be easier to describe in terms of satisfaction than the binding theory.[21] They seem to be more of a sortal restriction on using the word with the assertional meaning. Another way in which they differ is that it is nearly impossible to locally accommodate them in the scope of negation unless you are dealing with true denial. The reason for this is because denying the presupposition makes the asserted material uninformative as well. This is arguably quite different than other cases of local accommodation. They can however be locally accommodated under other types of embeddings. For example, when they are induced by a trigger in a long hypothetical discussion, illustrated in the example below. This is another way in which negated contexts differ from other embedded contexts.

(49)   it is not working now with an Austrian University (LOCAL) (1-2@ 649)

Speaker B   when we've got a bit more [inf] information, [@] and if we've . seen a pattern <that> that **begins** to work…[@m] with [@m] with an Austrian university .#|

B and A are discussing setting up some kind of program between their university and universities abroad. Up until line 650 they are discussing which Italian universities could be partners and line 651 continues an unspecified sentence that "first with Italian universities and then when we've seen a pattern that begins to work" with and Austrian University. Here it is necessary to read a great deal of the previous context to understand that the pattern referred to is being developed in Italian universities and "with an Austrian university" is not a clause in any way attached to the preceding sentence.

Why do the induced presuppositions of aspectual verbs behave this way? It could have something to do with the role that presupposed information associated with aspectual verbs has. These presuppositions are usually not new information that the speaker wants to present as a fact and have accepted, but relatively unimportant though necessary background information/pre-conditions for the main point, whether the asserted information is negated, conditional or hypothetical. This is also why aspectual verb presuppositions are generally rather boring and seldom controversial, e.g. someone used to do something, someone

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[21] Note however that Zeevat (1992) also places factives in this same category.

didn't used to do something, someone is still doing something. They are not used to introduce new topical information. The following example illustrates that these presuppositions are background information, not focus.

(50)   aspectual verb, triggered p: He (cousin of Speaker B) was writing his thesis earlier (MAINACC) (2-10 991)

Speaker B: I have a cousin a bit like you actually. he used to throw his children bananas to eat . when they were hungry <he seems *to have> yes (a)

Speaker c: *[gjum] (- - - laughs)* (b)

Speaker B: Just casually toss <them> a banana, to a three month old child - tossed across the room,   **carry on** writing his thesis (laughs). It was an absolute pigsty. (c)

There is an interesting contrast between example as (49) and (50). In example (49), the presupposed information is central, it is what is being communicated, the topic of the conversation. In example (50) the presupposition and even the asserted information is peripheral to the main story, tossing bananas. Even if we had known that the cousin was for example a graduate student, we would still need to globally accommodate the background information for this specific story. I think this is showing us something about the difference in function between the two triggers. Accommodated aspectual verbs are general information that is backgrounded to the main topic, but accommodated factives are generally foreground information. Consider also the impossibility of aspectual verbs being used to communicate opinions.

It is difficult to see how we could ever phonetically focus the presupposition of aspectual verbs because the actual presupposition is calculated from the triggering expression and none of it is a surface structure that is copied or moved like with factives. Prosodic prominence in the form of what is often termed pitch accent is generally considered in English to be a way to signal that information is focused, and when added to decontextualized examples generally suggests that the information associated with it is new, important, or foregrounded. The effect of phonetic focus on the surface form of the trigger can only carry over to the induced presupposition if the presupposition is derived from some part of the surface form. But because there is no part of the surface form of aspectual presuppositions is repeated in the induced presupposition, phonetic focus has no effect. The same is true of lexical presuppositions.

For *it*-clefts I think their function plays more of a role in their tendency to occur under embedding and to be resolved via global accommodation. The form of *it*-clefts supports a correction function. This function also influences the way presuppositions induced by *it*-clefts contribute to the discourse. Presuppositions induced by *it*-clefts were bound a third of the time, a much higher frequency than the other abstract presuppositional triggers. When the presupposed material was bound, the antecedent was usually in the proceeding utterance. This high frequency of binding seems to be related to this correction function. In the bound cases,

often this correction referred to one argument of what was said earlier in the previous utterance.

When *it*-cleft presuppositions were given an accommodated interpretation it was often because there is an implication that there is a potential for the other discourse participants not to believe or to be unaware of the argument that is asserted. The whole structure is formed so as to highlight the contrasted or misunderstood argument, and the presupposed part is background information. *It*-clefts did not appear very often under embedding, only twice in the corpus, and both cases the presupposition was globally accommodated. I think the reason for this lies in their function, they are used to focus one argument of factual information, things that the other discourse participants should be aware of. These types of meanings are not as likely to occur in hypothetical embeddings or in modal contexts.

Trigger Type	Tendency to appear in an embedded context	Tendency to be globally accommodated when non-negation embedded
definite NPs	high	high
Factives	medium	low
aspectual-verbs	no special tendency	high
it-clefts	low	high

Table 9   Tendencies to appear under embedding and to be globally accommodated for different triggers

There are several possible explanations for differences in tendencies to appear in an embedded context and differences in tendencies to be globally accommodated when embedded. There may be a difference depending on the type of semantic object different triggers presupposed. And this in turn most likely relates to tendencies to be backgrounded or foregrounded.

Actually I would say we need to separate the presupposition triggered from the asserted information with which the trigger is associated. If the presupposed information can be the focus of the speaker's communication when using the trigger, then it can also contribute information substantial enough to function on its own in a hypothetical context. If the presupposed information is generally backgrounded in relation to the asserted information, and is a requirement for this asserted information as in the case of aspectual verbs, then it will tend to project out. The presuppositions associated with aspectual verbs generally can only serve as backgrounds, where factives can be both backgrounded or foregrounded. *It*-clefts already have an explicitly foregrounded element, the clefted constituent, so even if their presupposition can be partially or entirely new information, the rhetorically relationship between the presupposed information and the rest of the text will always be backgrounded, at least for most of the examples. Definite NPs on the other hand can be both foregrounded or backgrounded, making a distinction here difficult to draw. However, when we want to introduce a new discourse referent in an embedded context we won't choose a presuppositional expression.

In summary, the assumption that higher levels of accommodation will be preferred over lower levels cannot be well motivated by using decontextualized examples, nor have any of the theoretical explanations for this proposed preference been entirely convincing. The corpus results supply, albeit weak, support for an alternative proposal that tendencies to accommodate at different levels has to do with the tendency for a trigger to occur under certain types of embedding, the function of the presupposition trigger, and in some cases its relation to the asserted information associated with the trigger and the ability of the presupposed information to be the focus of the message communicated. An explanation along these lines could perhaps relate tendency to be accommodated globally with tendency to communicate hearer-new information. These ideas can certainly be developed more, but I hope I have convinced the reader to entertain at least the possibility of an alternative to the proposed general preference for higher levels of accommodation.

5.5 SUMMARY

This chapter discussed the conditions for accommodation; when it can occur, how it occurs and why it is used. These questions have been discussed in the literature in reference to made up examples. Here I tried to related them to the corpus data and use it as a basis to discuss three theoretical questions in presupposition theory.

The first question discussed dealt with how often presuppositions were used to present hearer-new information, and looked more closely at the use of factive verbs in the corpus. It seems that factive verbs are used the majority of the time to present information that the speaker believes is new to the hearer.

The second question discussed was what licenses accommodation for presuppositions, and what prevents it in traditional anaphors. The two main explanations in the literature, van der Sandt's (1992) account based on descriptive content, and Blutner's and Zeevat's proposal that it has something to do with the availability of non-presupposing alternatives, were both shown to be unable to account for all of the data in a convincing way. There were also great differences in what explanation worked for which trigger which suggests that the licensing of accommodation is a much more heterogeneous phenomena than it is perhaps portrayed. Context also plays a large role in the felicitousness of accommodation, and we can see that accommodated presuppositions were often linked to the discourse record in the corpus examples.

The third question discussed was the proposed preference for presupposed information to be accommodated at the highest level possible. I point out that the proposed preference is not entirely supported by the corpus data, and that current explanations still do not adequately account for why this preference should hold. Instead, I argue that there is no general preference for global accommodation that applies to all triggers and under all types of embedding, and that while presupposition triggers all have the same potentials they are not are functionally used with all their potentials and that this is in part due to their semantic types, the

asserted information associated with the trigger, and whether or not the presupposed information induced by the trigger can be the focus of the speaker's message.

6 Between Binding and Accommodation

The past two chapters presented and analyzed the easily categorized cases of presupposition resolution. But this gives an overly simplistic picture of the great variety of relationships between presuppositions and the discourse context. Specifically, much of the information that is presupposed is actually partially given or is strongly related to information already in the discourse. These examples require an analysis that identifies how they are partially related to the discourse context, while still recognizing the new information contributed by their presence, i.e. an analysis that could be characterized as being between binding and accommodation.

Clear cases in point are found among definite NPs, where examples of bridging or indirect anaphors defy the neat interpretations of binding or accommodation.

In this chapter I will first present some of the different definitions and proposals that have been made for resolving bridging inferences. This will provide the background necessary to understand the discussion of the corpus examples. Current approaches to bridging have generally worked under the assumption that for a given bridging anaphor, it is possible to determine a unique anchor and a unique explanation for how the anchor could or should be identified, i.e. the type of link intended to be generated and perceived to exist between the bridging NP and its anchor.

However, earlier corpus annotation work on written text and the annotation of the spoken data presented here reveals that many bridging examples in coherent discourse have multiple anchors; that interpreters have differing intuitions as to which anchor is most appropriate; and finally, that the link between a bridging anaphor and its antecedent can often be recognized and understood by using

information from several sources. So instead of the textbook case of *one* definite NP having *one* anchor, we more frequently see *multiple anchors*, as well as *multiple links* between anchors and even combinations thereof. None of the current theoretical approaches to bridging seem to take the presence of multiple anchors seriously, let alone integrate them into their proposals for resolving bridging inferences. If current definitions are consistently applied to naturally produced discourse with a rich context, the number of relationships that will be recognized as bridging is far greater than the relationships generally perceived as bridging by annotators, in effect overgenerating bridging relationships.

I believe that the presence of multiple anchors indicates that bridging is actually more accurately seen as a relationship between a discourse-new individual and the discourse context, and not a unique inference based on the presence of another unique individual in the context. Treating bridging anaphora as related to the context also necessitates a third resolution category within the binding theory of presupposition, distinguishing between binding, *bridging* and accommodation.

I also argue that only a subgroup of the relationships identified as bridging can be fruitfully treated by the same method. This subgroup can be delimited by identifying some core characteristics of bridging anaphora. The result is a more homogeneous set of relationships that is also motivated to a greater extent on semantic grounds.

6.1   WHAT IS BRIDGING?

The term 'bridging' refers to the recognition of a relationship between discourse-new information that is strongly related to discourse-given information, and where this recognition is essential to understanding the role of the discourse-new information in the message. The following two classical examples are what most linguists probably associate with the term 'bridging.'

(1)   Mary took <u>the picnic supplies</u> out of the trunk. <u>The beer</u> was warm.[1]

(2)   I walked into <u>the room</u>. <u>The chandeliers</u> sparkled brightly.[2]

I will use the term 'bridging NP' for a noun phrase that is interpreted by means of a bridging inference or assumption,[3] the term 'anchor' for the information contributed by an earlier discourse-given linguistic expression which seems to be licensing the use of the definite description of the bridging NP, the term 'link' for what this relationships is based on, and reserve the term 'antecedent' for co-referential relationships. In example (1) above *the beer* is the bridging NP, *the picnic supplies* is the anchor, and the link refers to the relationship between *beer* and *picnic supplies*.

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[1] From Haviland & Clark (1974)
[2] From Clark (1975).
[3] Clark speaks of them as implicatures, but I will refrain from using this term.

These uses of definite NPs have been termed 'inferables' by Prince (1981), 'associative anaphoric uses' by Hawkins (1978), and 'indirect anaphors' by Erku & Gundel (1987). There is actually a great deal of confusion about what types of examples should be considered to involve bridging inferences, and many would probably be surprised by Clark's (1975) original application of the term, where it is used to cover a wide range of relationships including what we now classify as rhetorical relationships. These are summarized in Table 10, given on the next page where I have also repeated one of Clark's original examples to illustrate each category.

There are several interesting points here. Included among the examples are pronominal anaphors and co-referential NPs with the same head noun. These types of examples are usually not considered key examples of bridging in other work, and this may be because the inference needed to resolve co-referential relationships of this kind are fairly straightforward. Bridging is more frequently applied to more difficult examples, such as *Her house was large. The size surprised me.* According to Clark, in order to understand the reference for size we need to infer that it must be the size invoked by *large.* Note that the example given in the table for pronominalization would be subsumed under abstract object anaphoric reference in recent approaches.

Epithets is a group of co-referential bridging relationships where the bridging NP adds descriptive information about the individual referent. *Set-membership* subsumes several well-known examples of different types of plural anaphora.

In the two categories under indirect reference the examples that are generally associated with the term 'bridging' in other later work are found. These include the category *necessary parts* as in *room-ceiling*, necessary because a room almost always has a ceiling, *probably parts* as in *room-window,* because rooms generally have windows, and *inducible parts,* illustrated in the table with *went shopping-the climb*, where the climb is meant to be understood as intending to refer to part of the shopping event. The classical example given in (2) above also illustrates *inducible parts*, e.g. *room-chandeliers.*

The relationships termed *indirect characterizations* have to do with different roles in events. These roles can be necessary or optional. For example, in the event referred to by *John was murdered, the murderer* is a *necessary role*, but in the event referred to by *John died, the murderer* is an *optional role*. Finally, the last category contains what we today would consider to be rhetorical relations, relationships of *reasons, causes* and *consequence*. For example the following is considered a *reason*, and is also taken from Clark.

Category	Example given by Clark
Direct reference	
Identity	I met a man yesterday. <u>He</u> told me a story.
	Her house was large. <u>The size</u> surprised me.
Pronominalization	Her house was large. <u>That</u> surprised me.
Epitets	I ran two miles the other day. <u>The whole stupid business</u> bored me.
Set membership	I met two people yesterday. <u>The woman</u> told me a story.
Indirect reference by association	
Necessary parts	I looked into the room. <u>The ceiling</u> was very high.
Probable parts	I walked into the room. <u>The windows</u> looked out to the bay.
Inducible parts	I went shopping yesterday. <u>The climb</u> did me good.
Indirect reference by characterization	
Necessary roles	John was murdered yesterday. <u>The murderer</u> got away.
Optional roles	John died yesterday. <u>The murderer</u> got away.
Reasons, causes, consequences, and concurrences	
Reasons	John had a suit on. It was Jane he hoped to impress.
Causes	John had a suit on. It was Jan who told him to wear it.
Consequences	John fell. What he did was break his arm.
Concurrences	John is a Republican. Mary is slightly daft too.

Table 10 Varieties of Bridging Inferences, abridged from Clark (1975, p. 414-19)

(3)   John fell. What he wanted to do was scare Mary.

The explanation given by Clark for (3) is "John fell for the reason that he wanted to do something; that something is the Antecedent to what he wanted to do." (p. 418) Note that the *John wanted to do something* is also a presupposition induced by the *wh*-cleft. For all the examples, the element which needs to be understood by a bridging inference is marked either as anaphoric or as presuppositional. The examples given under *Reasons, causes, consequences, and concurrences* are also presupposition triggers (e.g. *it*-cleft, *wh*-cleft and *too*), where the triggered presupposition has an anchor derived from the information in the first sentence.

Clark summarized three characteristics he believed to be shared by the group of bridging inferences he identified. Bridging inferences (from Clark 1975, p. 411-412):

> *1) originate in the Given-New contract between speakers and listeners.*
> *2) 'draw on ones knowledge of natural objects and events that goes beyond one's knowledge of language itself' (p. 412)*
> *3) 'are not indeterminate in length but have a well-defined stopping rule' (p. 412)*

The first characteristic refers to the 'Given-New contract' between speakers and listeners, discussed in Haviland & Clark(1974). This is the agreement that speakers will partition language into identifiably new and identifiably given information to make interpretation easier. The second characteristic points out that bridging

inferences involve world knowledge and cannot be resolved solely by linguistic or lexical means. *The stopping rule* refers to the requirement that hearers make a short, plausible bridge. Clark (1975, p. 419) gives the following example of how the stopping rule works with a *concurrence*:

(4)   Alex went to a party last night. He's going to get drunk <u>again</u> tonight.

Here a bridge has to be built between the presupposition triggered by *again* and the previous context, i.e. the induced presupposition that Alex got drunk at sometime previous to now. But there is no mention of an earlier drinking event with which this presupposition could bind. Instead, interpreters are argued to assume that the earlier drinking event was at the party last night. However, another explanation could be that after parties, where Alex generally resolves not to drink at all, he goes to casinos where he gambles and loses, gets upset, and ends up drinking. This bridge is less plausible and certainly longer than just identifying the earlier drinking event as something that happened at the party. Thus, the stopping rule is what compels the interpreter to stop making inferences when a plausible bridge has been found. Clark also believes that "The listener assumes ... that the speaker intended him to be able to compute a unique bridge from his previous knowledge to the intended antecedent…", (Clark, 1975, p. 420) and that "in natural discourse bridges are always determinate."

     Given this very free initial definition it is not surprising that later researchers have focused on different subgroups of the examples introduced in Clark's (1975) paper. But a consequence of this is that discussions of bridging are often incompatible because of large differences in the type of data analyzed. A key question to consider is whether or not these relationships make up a uniform group that can be successfully treated by the same or similar methods. Currently, many of the groups identified in Clark's original definition are generally treated by different methods, e.g. pronominal reference, co-referential NPs with identical head nouns, abstract anaphoric reference and rhetorical relationships. This may be because they actually involved very different relationships between the anaphoric expression and their antecedents and the discourse.

6.1.1 Bridging and Presuppositions

Examples of bridging are found both with concrete and abstract presupposition triggers, as shown in Clark's inventory. However, the clearest cases of bridging are found among the definite NPs, and it is also here where most effort has been spent on finding systematic ways to resolve bridging NPs. Therefore, the rest of this chapter will concentrate on bridging relationships between the presuppositions triggered by definite NPs and the discourse context, and how these induced presuppositions should be treated in the binding theory of presuppositions. I will also present corpus evidence that bridges are often not determinate, contrary to Clark's account, and discuss implications for the analysis of such examples.

The binding theory does not really have an approach to bridging and in its standard form (e.g. van der Sandt 1992) will treat bridging anaphors by accommodation. Other ways to analyze bridging examples in the binding theory are most coherently discussed in Geurts (1999). He is quite ambivalent about the need to determine whether bridging should fall under the category of binding or accommodation, pointing out that for many examples, both processing strategies seem to be possible. Either a referent given in the discourse can act as an anchor, and license the creation of a new reference marker to which the presupposed information can be bound, or the definite description can be accommodated, and after accommodation this information can be related to the rest of the discourse record. Relating accommodated information to the discourse record is often part of the 'wish list' of what should be in an adequate representation of accommodation, but has yet to be developed. Geurts also points out that the interpretation that results from binding the bridging NP, or the interpretation that results from accommodating the bridging NP, will often be the same. This makes it difficult to say that one resolution strategy is preferred to the other.

Identification of the anchor of a bridging NP does become essential in cases where the anchor occurs in an embedded context. Failure to recognize the connection leads to global accommodation, which sometimes results in an incorrect interpretation. For example,

(5)   If Drew buys a new car, he'll ruin <u>the brakes</u> within a year with his crazy driving.

If the presupposition associated with *the brakes* is accommodated it will become part of the global context. But clearly the brakes are part of the new car which is hypothetical, so *the brakes* needs to be hypothetical too. This is why the analysis either has to bind to an inferred referent in the antecedent of the conditional, or be accommodated within the antecedent of the conditional.

The problem is that there is no clear reason to block global accommodation. We might be able to say that the resulting discourse will not be coherent, but it will fulfill the requirement of informativity, e.g. *There are brakes. If Drew buys a new car, he'll ruin the brakes within a year with his crazy driving*, is not uninformative, just not very coherent. Global accommodation does not result in inconsistency, nor would it result in what would technically be an ill-formed DRS because of trapping However, the relationships between the brakes and car do seem to be similar to the kind of implicit trapping discussed in section 5.1.3, because we want to interpret *the brakes* as *the brakes of Drew's new car.*

If we choose to "bind," then we still have to add a new reference marker for the brakes, a procedure that seems to clearly fit with the description of accommodation. In this way binding would here be quite different from normal binding, where a referent is identified with an already given reference marker.

Geurts (1999) also considers the possibility that the binding theory could be modified to put such examples into a third category for resolution, bridging, where

binding would be preferred to bridging, and bridging preferred to accommodation. However, he does not consider the development of the theory along these lines helpful for understanding bridging or presupposition. I will argue that this is a mistake, and that the corpus data suggests that we need a separate category for bridging inferences.

6.2 APPROACHES TO BRIDGING

Approaches to bridging can be classified roughly into two categories. There are proposals that depend primarily on lexical or encyclopedic information to resolve bridging NPs and as a consequence work very well when the link is a lexical relationship. Additionally, there are proposals that try to find an anchor by identifying how the presence of the bridging NP helps support some type of rhetorical relationship between the proposition with the anchor and the proposition with the bridging NP, termed 'functional approaches' below. The lexically based proposals are mainly aimed at finding methods of analysis that can be applied to real data with an acceptable (computational) cost. The proponents of functional proposals often have a larger goal, trying to find a unified account that will explain how bridging works within a greater theory of communication or discourse interpretation, further aspiring to be cognitively plausible. Because of their very different goals, the approaches differ in the definitions used and in what are seen as the central questions surrounding bridging. In addition to this theoretical work, there has been some empirical work on bridging NPs, in written corpus, including some annotation experiments. It is this latter work that actually raises some questions about the feasibility of either of the two types of approaches.

6.2.1 Lexical or encyclopedic based approaches

A large number of researchers have proposed that bridging inferences can be resolved by using lexical or encyclopedic knowledge. One method has been to try to categorize all the different potential *linking* relationships that can hold between a bridging anaphor and its anchors, and then using these categories to guide the search. Most of this work has been part of a more general attempt to categorize the use and function of definite NPs (work such as Hawkins, 1978, Prince 1981, and Loebner 1985). As an illustrative example, consider (6), where a lexical or encyclopedic approach would identify the doors as being in a part-of relationship with *Bart's new house*.

(6)   Bart's new house looked beautiful, but <u>the plastic doors</u> ruined the effect.

The three proposals that will be discussed below are all made by researchers who want to develop a means to automatically determine the anchors of the definite NP. Because of this, they are interested in explaining resolving bridging inferences using knowledge sources that would be available computationally, or with

reasoning methods that could also be computationally feasible. These practical considerations make the approaches somewhat limited.

Poesio et al. (1997) were the first to evaluate a purely lexical approach to bridging in analyzing naturally produced corpus data. They used WordNet, a computerized semantic network of lexical relationships, as a basis for identifying when two concepts were in a bridging anaphoric relationship that had already been identified by manual annotation. Poesio & Vieira (1998) classify as bridging any relationship that uses some type of lexical relationship to determine the anchor and link. This includes synonymy, hyponymy or meronymy, names, events, discourse topics, and a category that contains more complicated inferential relationships that involve recognizing relationships of "reason, cause, consequence or set-membership."[4] They took a group of 204 examples that had been earlier identified as bridging and then hand-coded into the above given categories for an earlier study (Vieira & Teufel 1997). They then set up a test implementation where they searched WordNet automatically for anchors and links. WordNet coded relationships for 107 of the 204, and of these only 34 turned out to be appropriate anchors. Two of the difficulties experienced are particular relevant for the discussion that follows. First, there was often more than one anchor identified, some of which were inappropriate, and in some cases the anchor was a potential anchor but not the one identified by the hand coders. Second, there was sometimes more than one way to describe the link in WordNet between the anchor and the bridging NP. In only 21 cases were the anchors found limited to appropriate anchors. This means a great number of the anchors found were false positives. In order to reduce this number they used what they called "a simplified focusing algorithm" that only looks for anchors in the previous 5 sentences, beginning with the first sentence and working backwards until finding a match. The bridging relationships identified were primarily cases of synonymy, hyponymy and meronymy, which is not surprising given the knowledge source used.

Poesio et al. (1997) found that bridging inferences to abstract objects were quite difficult to resolve using a strategy based on lexical relationships. The authors made one suggestion for improving identification of the anchors for these bridging NPs. Verb phrases can be transformed into their nominalizations which in some cases makes the relationship between the bridging NP and the anchor clearer. For example, the bridging NP *the proposals* has as its anchors the proposal referred to in the verb phrase, *changes were proposed*. The nominalization *the proposals* can be generated from this verb phrase, simplifying the recognition of the relationship. The authors reported that this method would resolve 7 of the 40 bridging references to events found in their study. However, it does demand generating nominal forms for all the verbs in cases where an anchor had not been found.

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[4] Note that this means that many of the examples that would be interpreted as binding in the anaphoric theory are counted together with the bridging examples in Poesio and Vieira's annotation because of the information sources required to make their resolution, i.e., information about lexical relationship that is often coded in a lexicon like WordNet.

Within the binding theory of presuppositions, Bos et al. (1995) present a resolution procedure for bridging NPs that uses information represented in Pustejovsky's (1991) generative lexicon to help resolve examples of bridging anaphors. They illustrate the approach with a few simple examples that they work out in detail, such as the bridge between *bar – barkeeper*. This is an approach that is highly dependent on the information coded in the generative lexicon, which is a mixture of encyclopedic and lexical information.

Piwek & Krahmer (2000) present a lexically based approach that uses a reworking of the binding theory in Construction Type-Theory (CTT), a deductive proof system. It incorporates an enriched definition of context, essentially adding the same type of lexical or encyclopedic information as the approaches described above. Piwek & Krahmer's work is interesting for two reasons.

The first reason is that they make a distinction between two types of bridging inferences. The first type is straightforward lexical ones, such as example (5). To resolve these, a lexical relationship is integrated in the CTT context to build a deductive proof that makes the bridging inference explicit. Examples like (2) are more complicated and are treated by a procedure that incorporates both binding and accommodation. Piwek & Krahmer propose treating the presupposition of *the chandelier* as decomposable into two parts, the information that the presupposed object is a light, and the information that the light is more specifically a chandelier. The information that the object is a light can be bound to the room on the basis of world knowledge that rooms have lights, and integrated into the CTT context. The second part of the presupposition, e.g. that the light is a chandelier, needs to be accommodated.[5] Piwek and Krahmer argue that some type of reasoning mechanism will be necessary even when bridging relationships can be analyzed in terms of lexical relationships like the first type in order to calculate the inference. They also point out that not all bridging references can be analyzed with lexical information.

The second reason why Piwek & Krahmer's work is interesting is that they acknowledge the problem that there may be more than one potential way to infer a relationship between the anchor and the bridging NP, and they suggest two conditions that can help make the bridging process *determinate*, as Clark (1975) argued it should be. An effort condition, based on the stopping rule presented in Clark (1975), encourages the shortest, consistent bridging inference defining it operationally by the complexity of the proof in CTT. In addition, a plausibility condition helps disambiguate examples when there is more than one potential anchor and one resolution would be more plausible or consistent with the speaker's intentions. In effect, this mechanism is intended to take care of examples where the lexical approach is faced with an ambiguity in choice of anchors, the same type of examples that make up the majority of the data that has led to the development of

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[5] Note that this is all done within the CTT approach in such a way that the descriptive content that the light is a chandelier is accommodated by adding a new variable to the proof.

approaches that focus more on the functional utility of the bridging inference, described in the next section.

6.2.2 Functional based approaches

This second group of proposals focuses on methods to determine the anchor and the link by recognizing the function that the connection between the sentence that contains the anchor expression and the sentence with the bridging anaphor have. These proposals were termed *coherence approaches* by Wilson & Matsui (1998). The most well-known of these proposals have been made by Hobbs (1979), Asher & Lascarides (1998a), and the relevance-theoretical approach advocated in Wilson & Matsui (1998). Because Asher & Lascarides (1998a) is the most ambitious proposal from this group, I will present it and its problems in detail.

Asher & Lascarides (1998a) define bridging as "an inference that two objects or events that are introduced in a text are related in a particular way that isn't explicitly stated" (p. 83), and they then use Clark's original inventory of relationships. But they also go one step further and consider some indefinite NPs to be in bridging relationships with the previous context. For example, they regard the relationship between the plan to commit suicide and the rope in (7) to also be bridging (taken form Asher & Lascarides1998a, p. 83, ex. (4)):

(7)   Jack was going to commit suicide. He got a rope.

Resolution is intimately connected with discourse structure and Asher and Lascarides believe that bridging is "a byproduct of computing the discourse structure." (p. 85). Their proposal approaches the problem of resolving bridging inferences from two directions: an easily identified anchor can help to identify a rhetorical relation and a rhetorical relation can help in disambiguating between two anchors. Asher & Lascarides' treatment distinguishes itself from other work on bridging in that they are willing, and indeed feel it is necessary, to use different knowledge sources depending on what is available in the context. Sometimes lexical and world knowledge *will* allow a bridging inference to be resolved and then this resolution will make a certain rhetorical relation clear. In other cases, this will not be possible, and the rhetorical relationship computed allows the bridging inference to be determined.

Asher & Lascarides resolve bridging inferences with the help of four meta-rules or axioms that have been added to the Update function in SDRT and which constrain the possible types of resolutions. The first of these is `If Possible Use Identity`. This rule encodes the preference for binding over bridging, or in other words, the preference for resolving the link to identity rather than to some other type of relationship. The second meta-rule on discourse Update is that `Bridges Are Plausible` and this rule should prevent overgenerating unlikely bridging inferences even if this is a potential relationship, if this relationship does not make sense. Asher & Lascarides discuss the possibility of restricting potential bridging inferences to those that are defined in Clark's original taxonomy which would then

also restrict the potential search space, though they point out that they are unsure as to whether or not Clark's original taxonomy covers all the different coherence relationships that are out there, and that we might need to identify. The third meta-rule is `Discourse Structure Determines Bridging,` and says that if there is a rhetorical relationship that can be identified by using information about a possible bridging inference, then that inference should be made. This would seem to make determining rhetorical structure prior to bridging, though in other cases bridging helps to determine discourse structure. This may not be an absolute rule.

Finally, the fourth meta-rule is `Maximize Discourse Coherence` and this rule makes creating the most coherent discourse structure primary to world or lexical knowledge in resolution, sometime overriding it. The following example is taken from Matsui (1995). It illustrates how discourse structural needs can override world knowledge.

(8)   John moved from <u>Brixton</u> to <u>St. Johns' Wood</u>. <u>The rent</u> was less expensive.[6]

World knowledge tells us that rents in Brixton are generally cheaper than rents in St. John's Wood. This would lead to a conclusion that the rent must be less expensive in Brixton, and the bridging NP *the rent* should be resolved to Brixton. But this results in a less coherent discourse because it is then difficult to understand the relationship between the two sentences. Why did John move? Asher & Lascarides argue that interpreters prefer to find explanations that make agents' actions intentional. If St. John's Wood is considered to be the anchor instead, then a rhetorical relation of *Explanation* can be calculated between the two sentences, and this is preferred. Therefore, despite world knowledge to the contrary, we prefer to interpret the anchor as St. John's Wood because it lets us understand the coherence between the two sentences. Note that cases where there are several anchors that will lead to different interpretations are the types of examples in particular where the link needs to be determined in order to choose between competing anchors.

Asher & Lascarides' proposal would seem to be able to handle a larger subset of examples than a pure lexical or encyclopedic approach. However, even though their examples purport to take a more discourse-oriented perspective, they, like most work on bridging, generally confine their analysis to two sentence sequences, where the anchor is in the first sentence and the bridging anaphor appears in the second. Natural language examples will probably reveal cases where there are bridging relationships over much greater distances, and where it may be difficult to find a rhetorical relationship of the kind they have envisioned, or the bridging relationship itself may not be as crucial to the discourse structure as in the examples with which they have chosen to illustrate their approach.

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[6] Example taken from Wilson & Matsui (1998), but originally from Matsui (1995).

Two potential problems with Asher & Lascarides' approach are discussed by Wilson & Matsui (1998). First, if there are two potential interpretations there may be alternative anchors each with a plausible coherence relationship. This demands some sort of ordering on coherence relationships or some other method of distinguishing between them. The second objection is that for ambiguous sentences, Asher & Lascarides' approach cannot decide between the two readings. For example, if there are two alternative anchors, but each anchor is related to the bridging anaphor by the same coherence relationship, then the identification of this relationship alone will not aid in disambiguating. I do not see why this would be an objection because if the example is clearly ambiguous, then we should therefore prefer a method that yields two readings.

Wilson & Matsui (1998) present an alternative proposal that uses coherence of interpretation to determine the anchor and the link. They use Relevance Theory (Sperber & Wilson, 1995) as a method of analysis for psycholinguistic data first presented in Matsui (1995), where subjects' intuitions about potentially ambiguous bridging examples were tested. These involved cases of two potential NP anchors to a definite NP bridging anaphor where the type of link was varied as well as the position of the anchor, factuality, plausibility, etc. In (9) - (10), both New Zealand and England are potential anchors. However, in (9), subjects showed disagreement about the anchor, whereas in (10) they unanimously chose New Zealand, the factually most plausible anchor.

(9)   Kevin moved from New Zealand to England. He hates <u>the sheep.</u> (60% England; 40% New Zealand)

(10)   Kevin moved from England to New Zealand. He hates <u>the sheep.</u> (100% New Zealand)

These examples are a challenge for each of the different approaches examined in Wilson & Matsui (1998). They argue that none of the other approaches account for intuitions for the preferred anchor shown by this experiment. Instead they believe that the notion of relevance, as defined in relevance theory could solve many of these problems, and for reasons of space the reader is referred to their article for more explanation. It is easy to sympathize with Wilson & Matsui's criticism of current proposals and their inability to analyze all examples categorized as bridging. However, the proposal by Asher & Lascarides, which utilizes several knowledge sources, seems to be the one with the greatest potential for being able to resolve bridging inferences.

6.2.3 Empirical work

Finally, some researchers working in computational linguistics have looked at corpus data, where they have tried to identify and resolve bridging anaphors. The most interesting empirical work is the annotation experiments done by Poesio & Vieira (1998). This is a method that can be used to test and evaluate whether proposed semantic categories reflect interpreters' intuitions, and has become a common methodology within computational linguistics. The standard procedure is

to develop a classification scheme which is taught to two or more annotators, who are then to classify data independently into the different categories. The resulting annotations are compared, the assumption being that a high degree of inter-annotator agreement on a classification task guarantees the reliability of our categories. If, on the other hand, there is a low-degree of inter-annotator agreement for one or more of the categories, or a consistent confusion between one or more categories, we can question the validity of the category, or question the correctness of the definition or delimitation of the category. Improving category definitions, or changing the categories looked for can often improve inter-annotator agreement. Inter-annotator agreement can be statistically measured by calculating the Kappa-value.[7]

Poesio & Vieira (1998) did two different large-scale annotation experiments of definite NPs in the Wall Street Journal in an attempt to find a classification that is reliable and where the results could be used as a key for the evaluation of a program for definite description classification and resolution, implemented in Vieira & Poesio (2000).

Each of the two experiments used different definitions of bridging. The first experiment (2 annotators, 1,040 NPs) used a classification with five categories that referred explicitly to surface characteristics of the definite NPs. In this experiment, they included co-reference relationships that demanded some type of inference as bridging, but treated co-reference relationships between noun phrases with the same head noun as anaphoric. They obtained a Kappa score of 0.68 for the first experiment. 204 NPs were identified as "associative", i.e. bridging anaphors (cf. Poesio et al. 1997). With the definition used in this experiment, bridging examples made up about 20% of all the NPs studied. This gives an idea of how frequent potential bridging examples actually are in written text. A more restrictive definition would probably result in a smaller percentage of the examples being considered bridging.

The second experiment (3 annotators, 464 definite NPs) used a different annotation scheme that asked subjects to classify definite noun phrases based on a semantic definition of the relationship to anchors and antecedents rather than the surface form. Co-reference relationships were not considered bridging. In this experiment, linguistically naive annotators were used and this could, along with the different annotation categories, account for the somewhat poorer agreement score, which was K = 0.58. It is interesting to note that 164 out of 464 NPs in this experiment were classified as co-referential by all three coders (for which there was 95% agreement) but only 7 were classified as bridging by all three, though the number of bridging descriptions identified by each annotator were 40, 29 and 49,

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[7] The Kappa statistic takes the agreement as well as the number of categories in a classification task in to the equations. A Kappa value between 0.6 - 0.8 is supposed to signify some degree of agreement and over 0.8. should allow conclusions to be drawn. See also Carletta et al. (1997) and Poesio & Vieira (1998) for an explanation of how the Kappa value can be calculated for an annotation task.

respectively. In other words, there was more disagreement than agreement about when a definite description was related to another reference marker by bridging.

These experiments show that it is difficult to arrive at any real consensus on what definite NPs should be recognized as bridging and the second most frequent source of disagreement was between examples classified as co-referential and examples classified as bridging. There was also disagreement on the anchors for bridging references. It seems that it is not easy for annotators to categorize examples in natural data with these taxonomies.

In summary, several methods have been suggested, though the only one that has been evaluated on a large amount of data, the lexically based approach of Poesio et al (1997), was not a success. In addition, annotation tasks also show that annotators have trouble determining if naturally produced NPs are bridging or binding. A potential conclusion is that we might be on the wrong track altogether and this is what I will maintain.

6.3 ANNOTATION OF EXAMPLES FROM THE LONDON-LUND CORPUS

In order to see how definite NPs function in spoken dialogue and to obtain corpus examples that could be examined in detail, I excerpted definite NPs from three of the transcripts in the LLC.[8] Definite NPs were considered to be NPs introduced either by a definite article, a demonstrative article, or a possessive. These were then annotated for anchor and category by myself, and another native speaker of American English who could be considered 'linguistically naïve'. This work complements the earlier mentioned corpus annotation work of Poesio & Vieira (1998) by providing some data on spoken language examples as well as providing data on demonstrative NPs and possessives. Each of the three transcribed conversations was an interview.[9] They had a combined length of approximately 8,972 words and contained 1,029 tone units. Each interview had three participants, two interviewers who knew each other, and a potential student who met the interviewers at the time of the recording. The interviewees were all prospective English honors students and much of the dialogue revolves around their academic background and preparedness for beginning the course, if they were to be accepted. The interviewers steer the conversation by asking questions. Participants rarely make comments unrelated to the task at hand, and this makes identifying references to private common ground less of an issue.

After a small pilot study, an annotation scheme with eight categories was developed. These categories were inspired by the semantically-based classification scheme for definite NPs used in the second annotation task done by Poesio & Vieira (1998). The categories and their definitions are presented in the table on the following page.

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[8] Some of these results were presented in Spenader (2001b).
[9] Dialogue 3-1a, dialogue 3-1 b and dialogue 3 5a.

CATEGORY(TAG)	DESCRIPTION
coreference(=)	refers to something mentioned earlier in the text
new(N)	new to you, new to text, not related, not described
related(R)	is related to something earlier in the text, but isn't the same thing - no description nearby
described(D)	self-explanatory because of how it is described, also new
calculable(C)	using information about a reference time or a reference place you can figure out what this means
known(K)	everyone knows what this is, its general knowledge, but this entity is new in the text
Expression(E)	the NP is part of an expression or idiom and does not really point out a real entity
other(O)	does not' fit into the above categories, explain why

Table 11 Categories for annotating definite NPs

The examples which were categorized as calculable (C) are often considered deictic. The purpose of this category was to separate out examples that were dependent on the time and place of the dialogue.[10] For coreference (=) and related (R) the annotators had to identify the antecedent, alternatively the anchor that they considered the interpretation of the definite to be dependent on, and if there was more than one potential anchor/antecedent, they were to take the most linearly recent one.

The level of annotator agreement in the current annotation was much lower than for the material and annotation schemes reported on in Poesio & Vieira (1998). A Kappa score calculated on a subset of the data was only = 0.45[11], compared to 0.68 for the structurally based categories, and 0.58 for the semantically based categories in the annotation experiments done by Poesio & Vieira (1998). There are two possible explanations for this result. One may be that spoken language is more vague and this may have led to less clear-cut examples of each type (cf. Eckert & Strube 2000, (p. 82), who found that 77 of 264 pronouns in annotation of spontaneous spoken dialogues were classified as "vague.") The second, more likely reason, is that a classification task cannot be done with these categories. This may be either because the categories are incorrect or because the definitions of the categories are not clear. However, I believe the main reason for the low-level of annotator agreement is that some of the assumptions that lie behind the whole task are incorrect, namely the assumption that it is possible to

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[10] There seems to be no real consensus on where the distinction between deictic items and anaphoric items should be drawn as most expressions are context-dependent (see the discussion in Levinson, 1997) so the potential distinction is ignored.

[11] This was done on the data before it was stored in a database, and there are numerous errors in how it was calculated. However, I do not believe the agreement would have been so much higher if it had been calculated precisely.

	Annotator 1				Annotator 2			
	Total	Def	Dem	Poss	Total	Def	Dem	Poss
=	137	78	27	32	113	67	16	30
N	115	56	9	50	155	82	10	63
R	90	61	11	18	57	38	10	9
D	40	31	2	7	33	22	6	5
C	29	22	4	3	32	26	5	1
K	2	2	0	0	2	0	1	1
E	18	12	0	6	25	17	5	3
Other	8	5	2	1	22	15	2	5
Total	439	267	55	117	439	267	55	117

Table 12 Tags given to definite NPs in annotation

identify a unique anchor for a bridging NP. This makes it difficult to achieve a high-level of agreement on this type of classification task.

Collapsing these categories into categories in the binding theory will result in the numbers given in Table 13. Definites tagged as co-reference (=) would be analyzed as binding in the anaphoric theory, definites marked as new(N) would be treated by accommodation. The examples most relevant for the discussion of bridging are those identified as related(R), described(D). Calculable(C) are placed in their own group and known(K), expression(E) and other(O) which included some missed or incorrectly marked definites are also placed in their own category.

Spoken language is less tidy than we might wish it to be, but I will try to fairly evaluate how the different approaches would analyze the examples ignoring everything that is irrelevant to describing the bridging inference. Looking first at cases where there was total agreement should give an idea of what kind of examples were considered to belong to each category and the complexity of the task for the annotators. In (11) the interviewer is asking Speaker A, a prospective female student with a family, about the arrangements she has made to study full time.

(11) (3-1a 32)

Speaker a This means that you've got somebody * lined up to live in as **A:[a sort of housekeeper]*** **(a)**

Speaker A *I've got a, yes, a a living in* - girl, a living in girl **(b)**

Speaker a Who can really take **B:[your place]** there ? **(c)**

Speaker A Yes - she takes **C:[my place]** yes, she's very good indeed

Speaker a Have you . tried this . at all . so far . I mean have you *got round to anything*

Speaker A *No, I haven't * -, I haven't . I mean . I've done nothing except . you know . bring up **D:[this family]** since I . left school

Speaker a Yes - it's not as though you have already tried for two or three months to see, how this works out, working

Speaker A No, no, What I did do a certain amount, I've done I did a certain amount of reading during **E: [the last few months]**

Category	Annotator 1				Annotator 2			
Type of NP	Total	Def	Dem	Poss	Total	Def	Dem	Poss
Binding	137	78	27	32	113	67	16	30
Accommodation	115	56	9	50	155	82	10	63
Bridging (R,D)	130	92	29	10	90	60	16	14
C	29	22	4	3	32	26	5	1
Removed (K,E,O)	28	29	2	7	49	32	8	9
Total	**439**	**267**	**55**	**117**	**439**	**267**	**55**	**117**

Table 13 Tags collapsed to binding theory categories

C:[my place] was identified with B:[your place], i.e. it was considered co-referential, D:[this family] was considered new to the discourse (though it is likely to be known to the two interviewers). E:[the last few months] is a time that must be calculated from the time of the discourse and as such was marked as calculable(C) by both annotators. B:[your place] was considered by both annotators to be related(R) to the noun phrase marked A:[a sort of housekeeper]. It is this final relationship that is most similar to the prototypical examples of bridging found in the theoretical literature.

How well would the proposals discussed earlier fare in resolving this last example, i.e., the relationship between A:[a sort of housekeeper] and B:[your place]? The approaches that advocate using lexical or encyclopedic knowledge resources will have trouble identifying this link, because there does not seem to be any clear lexical or encyclopedic relationship. The proposal based on defining the link more functionally would seem to work better. There is a clear parallelism between the interviewer's question in (a) and the second question in (c), where it seems as if he is asking for confirmation that his question was answered by Speaker A's statement in (b). This clarifying question is also perhaps a necessary grounding action given the overlapping speech marked with underlining between the asterisks. We can also see that the *who* in (c) is not a question adverb but the *who* of a relative clause that continues the statement in (a). As in "as a sort of housekeeper who can take your place" which is could be paraphrased as "This means that you've got somebody lined up who can take your place as a sort of housekeeper" This is an example where the utterance containing the anchor and the utterance containing the bridging NP are in a rhetorical relationship that could either support or be supported by the identification of the bridging relationship.

An example where the link is easily determined by the surface characteristics of the noun phrase is given in (12). This sequence takes place at the end of the interview where the interviewer gives Speaker A directions for finding the Tutor for Women Students.

(12)   (3-1b 1020)

Speaker A   Thank you very much and now I have to see the [@] **(1)**
Speaker B   Tutor to Women Students and **A: [the secretary]** will tell you how to find her *. all right* **(2)**
Speaker A   *thank you very much* indeed - . **(3)**
Speaker B   Now you know where **B: [the secretary's office]** is <it's just> down the corridor   and she'll let you know how to . get there **(4)**

Because of the possessive NP *secretary's,* the lexical relationship between *office* and *secretary* is not needed to resolve the bridging NP. The secretary has been mentioned earlier in (2), and this probably helps bring her into focus and contributes to the naturalness of the bridging NP.[12] There is also a discourse relationship between the utterance containing *the secretary's office* and (2), because (4) furthers Speaker B's goal to give Speaker A enough information to find the Tutor to Women Students.

There are three ways in which the corpus data seems to differ from the characterizations of bridging in the approaches presented in section 6.3: bridging NPs often have multiple anchors, many of the definite NPs identified as discourse-new are often related to the discourse in the same way as bridging NPs, and there are often several different ways to bridge the definite NP to a given anchor.

6.3.1 Multiple anchors for many bridging NPs available

As already mentioned, one of the first problems for current theories that becomes apparent when working with the corpus data is that there are often multiple anchors for many of the bridging examples. In the following excerpt the interviewer is giving the interviewee advice about how to prepare for the course she hopes to be accepted to.

(13)   (3-1a 506)

Speaker A   Well, what your your best bet is to go to the University Library or write for **C:[the English honours syllabus]** - read it and study it - do you see? Find out what **D:[the course]** is and then start reading in the various subjects, um, reading from **F:[the recommended texts that are there printed in the syllabus]** and and so prepare yourself for the degree.

F:[the recommended texts that are there printed in the syllabus] was classified as related by both annotators, but different anchors were given. The author chose D:[the course] whereas the second annotator chose C:[the English honours syllabus]. The restrictive relative clause makes it clear that the recommended texts are *in* the syllabus but they are also arguably also a part of the course. Among the 23 examples identified by both annotators as related(R), 9 were cases where the anchors identified were different. Note that these are not cases where the choice

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[12] Note however that we seldom consider 'his house' to be explicitly linked via the possessive to the antecedent of the pronoun.

between the anchors will lead to radically different interpretations, as is the cases in the potentially ambiguous examples tested by Matsui (1995) and shown here as (9) and (10), and in similar examples found in Erku & Gundel (1987). Instead, in the examples here the different choices of anchor are usually related to each other, as well as to the bridging NP.

In the next example, B:[the earliest author that you've read at all] was identified as related(R) by both annotators, though the anchor identified was different.

(14)   (3-1a 169)

Speaker a   Yes yes - well now to come back to **A:[your reading]** [@m . @] would you say that your favourite reading of . present-day literature was in . drama or ….

Until 456 (287 lines)

Speaker a   Yes, um, what about **B:[your earlier reading]**. **(a)**
               What's **C: [the earliest author that you've read at all]? (b**)
Speaker A   [@m] - - do you mean recently - *<or>*
Speaker a   *No* at any time~|
Speaker A   At any time - -#|
Speaker a   Have you read [@ sh @] . pre-Shakespearian drama have you read any Marlowe say -~|
Speaker A   Yes.

The definite NP C:[the earliest author that you've read at all] has a modifying relative clause and would fall into the category of big definite NPs. The author related it to B:[your earlier reading] and the second annotator related it to an earlier mention of A:[your reading]. There is also clearly an ambiguity in interpretation because "your earlier reading" can be interpreted either as "reading that you did at an earlier time," in which case it is not as suitable as an anchor, or as "reading from earlier works," which would make it a potential anchor. Using the NP [your earlier reading], to mean this second interpretation is not very precise, but seems to be the right interpretation given the following utterances made by the interviewer (Speaker a), though interestingly enough, Speaker A seemed to be confused as well. Note that utterance (a) and utterance (b) have a common topic, that the first utterance with the anchor seems to introduce the general topic and the second utterance with the bridging anaphor is an elaboration on the first topic.

Let's look at another example. Here Speaker A is trying to describe in what work of Shakespeare she finds true emotion.

(15)   (3-1a 229)
Speaker A   in the [@m] – **A:[Antony and Cleopatra]** - in .**B:[when she's dying]** - - in **C: [the death scene]** - - - and there I think you get - perfect emotion .

Here the first annotator resolved C:[the death scene] to the play itself, e.g. A:[Anthony and Cleopatra], interpreting it as a part-of relationship, while the second annotator resolved it to *when she's dying,* or more accurately to the event it refers to, actually the main event of *the death scene,* the event which also gives the scene its name.

Are these differences in anchor identification mistakes on the part of one of the coders, or can one bridging NP have several anchors? In the above examples, and others in the corpus, it seems incorrect to treat this as some type of error. One of Poesio & Vieira's (1998) results was that annotators often disagreed about the anchors of bridging anaphors. They comment however that the disagreements didn't seem to reflect actual mistakes.

These results should actually not be so surprising. Usually in coherent discourse, entities introduced should have strong relationships to the other elements in the discourse context. However, the fact that multiple anchors are so common is generally not taken into consideration in most work on bridging, perhaps because it only becomes a noticeable problem when the context is rich enough to supply multiple anchors.

First, we can ask if there isn't some sort of reason to prefer one of the anchors to the other? Can we perhaps define some sort of heuristic based on the type of link, with some links being better than others? We can start by examining what the link seems to be between each relationship. The link between D:[the course] and F:[the recommended texts…] in (13) is probably what Clark would call either a *probable part* or an *inducible part*, (though note how difficult it is to determine which kind of part something is without knowing more idiosyncratic information concerning the courses at that particular department) but the relationship between F:[the recommended texts…] and C:[the honours syllabus] seems to be the same. However, the C:[honours syllabus] is also clearly a part of D:[the course], and this could be seen to be a *necessary part,* though here again this is difficult to determine. But knowing exactly what relationships hold, which seems to be difficult to determine anyway, doesn't help much in determining the best anchor. A necessary part would seem to be more easily resolved in Piwek & Krahmer's method than an inducible part. We could also say that the most recent potential anchor is the best anchor to choose. But in this investigation annotators were already instructed to take the most recent and closest related anchor - so there seems to be a difference in what is "best" that sometimes makes a more distant potential antecedent seem more appropriate to some interpreters. Would looking for some type of coherence relationship actually help us choose one anchor over another? I suppose the anchor that best supports a rhetorical relation would be preferred but there is no clear rhetorical relation that can be said to hold in e.g. for example, (15), and the same is true of other examples.

Given all the potential problems with these solutions we can wonder how fruitful it is to attempt to choose "the best" anchor anyway? The answer that should now be obvious is that the idea of defining heuristics to determine "the best anchor" is very misguided in that a correct understanding of the bridging anaphors

and the discourse would seem to require making several, if not all, of the connections identified. Consider the following example:

(16)   (3-1a 117)
Speaker A: I'm I was torn between . at the age of seventeen I was torn between modern languages and - and English - and I think really I was much more suited . to doing English I mean I know lots of linguists now and I realize **A:[I <could> never . cope with that]** and I really prefer, I mean I'd far . much prefer to do **B:[English*].** <3 to 4 sylls>*~|
Interviewer B *and do* you know . anything about **C:[the content {of an English honours course here}]** .
Speaker A   Well I suppose it's [@m] -
Interviewer B Because you mentioned [@] that you know linguists *and you* - felt that you couldn't .
Speaker A   *(- coughs)*~|
Interviewer B Do what they were doing . **<and>**~|
Speaker A   Well **I'm just** not interested enough . really *. to do that*#|
Interviewer B *and you know that* there's a **D:[linguistic   content]** . **in what we do here*
Speaker A   **{yes} there certainly** is I know . I *know* I was sure that would be one of **E:[the most difficult things]**
Interviewer B *<yes>*I see.

In the above example, the definite NP, E:[the most difficult things], is tagged as related by both annotators. The author identified C:[the content of an English honors course here] as the anchor, while the second annotator identified A:[I could never cope with that], specifying *that* as referring to linguistics. Neither of these anchors can be considered wrong. The speaker clearly includes linguistics among difficult things, linguistics is part of the content of the course, and difficult things are things she cannot cope with. Additionally, the D:[linguistic content] is what Speaker A intends as part of the subset of E:[the most difficult things], and all the difficult things are things relating to doing B:[English]. Thus, in multiple ways E:[the most difficult things] is related to many different individuals and ideas in the previous context, and additionally, failure to understand any of these relationships means one has not truly understood the meaning of the text.

The above example is not atypical, and often there is more than one linguistic expression from which an anchor can be derived and that can be considered to license the use of the bridging NP. Hopefully it illustrates why annotation tasks for identifying a unique anchor for a bridging NP will probably never achieve a high level of agreement. The example should show that current proposals for dealing with bridging have perhaps too often limited themselves to the simpler examples.

6.3.2 Not all theoretically possible links are perceived

The last section pointed out some discrepancies between what is perceived by annotators and researchers and what current proposals predict would be found.

This section examines the opposite problem, things that aren't perceived as bridging but unfortunately would be treated as such if we consistently look for relationships such as those outlined in Table 10.

If bridging NPs regularly have multiple anchors in the context, then are the definite NPs identified in the corpus as new characterized by their lack of relationships to the text? How new are those examples identified as new(N)? Look at the example below, where the speaker is describing how he prepares before he attends a play.

(17)   (3-5a 212)

Speaker A: I sort of read **A:[the play]** before I go to see it usually. I like to study it a week before, and then take **B:[my impressions]** to the play...

Here, B:[my impressions] was tagged by both annotators as *new(N)*, though on reflection it is clear that it can be further modified as 'the impressions I get from reading a play before I go to see it,' or 'my impressions from the study of the play,' and could easily be considered to be bridged to A:[the play] or to the seeing event. Let's examine another example.

(18)   (3-5a 49)

Speaker A   after . Murder in the Cathedral he wrote a - preface {didn't he} of some sort   saying that - he was trying to bring {poetry} back into [@m] . drama . but . I don't think . he succeeded at all
Speaker B   you don't
Speaker A   no .   [ae?] I think you can tell in Murder in the Cathedral - especially [?i] you see if you've heard it [@m?@] I I once acted in Murder in the Cathedral . and [@m] . mean the **A:[the poetry]**, especially the choruses really drives home in that - you can tell

Here A:[the poetry] is tagged as new, but again, it could be related to many of the different semantic individuals or events introduced in the previous discourse. This is similar for most of the examples tagged as new(N). And indeed, I re-examined all the examples tagged as new(N) by both annotators and I have come to the conclusion that there are seldom examples that cannot be interpreted either as 1) related to the earlier discourse, but in a way that is difficult to describe and predict, as in the example above, or 2) seems to be something that is well known to the discourse participants, and here many of the examples of NPs modified by possessives can be found, such as references to "your application," or "your little girl." Also, "your English" is clearly related to the context of the discourse, and things like "my father" are quite predictable. Possessives seem to be more integrated in the discourse record by their very nature than definite noun phrases because they not only introduce a new object/individual, but also relate it to someone else in the discourse context.

Not all relationships are consciously perceived, and whether or not they are seems to be dependent on the interpreter. There was one consistent difference between the author and the second annotator worth commenting on. The second

annotator often tagged as new (N) examples that the author identified as described (D). This is similar to Poesio & Vieira's results, where they remark that in their study that the second most frequent sourced of disagreement was between co-referential examples and bridging. This also points to differences between interpreters and the difficulty in distinguishing new information from related information.

This shouldn't be a surprising result, though it is contrary to recent revelations that definite NPs are used at least half the time to introduce information not already part of the discourse, and do not always function with an anaphoric meaning as often believed (Fraurud 1990, Poesio & Vieira 1998). Note that there also may be some differences between spoken and written language. Fraurud's study of NPs in Swedish and Poesio & Vieira's (1998) work are both based on written language. Written language probably has more big NPs. Big NPs are well known to often introduce new information and are often easily perceived as such because their additional descriptive content makes them more specific. The definite NPs in the spoken dialogues here tended to be very short.

However, discourse is expected to be coherent, and we usually understand presupposition as a way to present information that is being treated as backgrounded, or at least treated as if it is partly known. Assertion is the normal means of presenting new information, it seems logical that partially known information is introduced into the discourse by presupposition.

The question we should be asking is whether or not there is an objectively identifiable difference between definite NPs that are perceived as new and those that are perceived as related and how can we add this crucial information to our definition of bridging. If we try to apply the methods proposed for analyzing bridging examples we will greatly overgenerate the number of definite NPs classified as bridging with those perceived so by subjects, and this points to something wrong with the definition of bridging that we are using.

6.3.3 Multiple links possible to the same anchor

Just as there may be multiple anchors, it is also possible that there may be multiple links; that is, there may be several reasons for identifying the bridging NP as related to a particular anchor. 23 examples were classified as related (R) by both annotators. 14 of these examples were identified as having the same linguistic expression in the discourse as the source of the anchor. When there was agreement about the anchor, however, this does not mean there was only one method by which to identify the link, and for some examples, many of the approaches presented would have worked. We see a simple example of this in (19) below.

(19)   (3-5a 339)
Interviewer B How many times does the ghost appear in Hamlet?
Speaker A I played **A: [the ghost]**, um, (laughs) I should know that. (several lines)
Interviewer B Why do you think he why why does he appear in the closet scene?
Speaker A Now now this is something I couldn't understand but I had to play this in
        haem-, **B:[this part].**

Both annotators categorized B:[this part] as related to A:.[the ghost]. First, from the example (which isn't shown in its entirety) we can see that there could have been several other relationships that might have been considered possible anchors (e.g. Hamlet, as in the part *in* the play), but let us treat the example as if the linguistic expression identified as the source of the anchor by both annotators is the best possible anchor.

What kind of relationship is between A:[the ghost] and B:[this part] ? It isn't a standard lexical relationship that you would find coded in e.g. WorldNet. It involves either encyclopedic knowledge that there is a character of a ghost in Hamlet, or knowledge that Hamlet is a play, the ghost appears in the play, so the ghost is either an actor or the role played by an actor. In the former case it is a co-reference relationship, but not in the latter. The resolution seems simple but is quite difficult to describe (see also example 1, NP A:[your place]). Both are played, and the fact that both are objects of the verb *play* in the dialogue probably also plays a role in understanding the link.

World knowledge, in the form of familiarity with the characters in Hamlet could also help an interpreter understand the multiple links between the same anchors and bridging anaphor.

We can also ask if there is a kind of coherence relationship that could be identified here that would support a resolution of the type proposed by Asher & Lascarides? For example, the speaker is admitting that he doesn't have an explanation for the question posed by Interviewer B, about why the ghost appears in the closet scene. The proposition *Now now this (=why the ghost appears in the closet scene) is something I couldn't understand)* is rhetorically related by some kind of contrastive, to the utterance that follows it, e.g. *I had to play this part*. Resolving *this part* to *the ghost* is necessary for making sense of the relationship between the two propositions.

These different methods by which to identify the relationship are probably necessary to add redundancy to the message. Every interpreter may not have access to all the information necessary to recognize all the possible reasons for identifying the link at the time that a bridging anaphor is used. Many examples also illustrate that different interpreters rely on different information sources to make a link in order to identify an anchor. This is most obvious in examples where the information available to the annotator and the discourse participants is clearly different. The example below is taken from the very beginning of an interview, where the interviewer is asking the potential student about the time that she will have available for study:

(20)   (3-1b 592)

Speaker -a   [@] and what about A:[your little girl] -~|

Clearly, as the speaker is introducing the individual referred to, he already knows about her existence, and at least one other discourse participant knows the referent to this NP (the addressee is her mother!) but the individual is new to the annotator,

and perhaps new to the second interviewer. But in any case, a new reference marker must be added and integrated into the discourse.

How the link is determined between anchors and bridging NPs depends on how clearly the interpreter sees a relationship with the context, and seems to allow room for a great deal of interpretational freedom -- Much more so than resolving co-reference relationships between definite NPs or pronouns and their antecedents.

It is true that not all of the approaches to bridging given in 6.2 will work to resolved every bridging NP, but it is equally important to note that in naturally produced discourse most bridging examples can be resolved by several of the approaches mentioned, and we may in fact want to know all the different relationships or links in order to understand the structure of the message.

6.4 DISCUSSION

Summarizing, current approaches to bridging encounter several problems in accounting for how annotators perceive corpus data. There are often multiple anchors as well as multiple ways of describing the link to a perceived anchor. But the available proposals for handling bridging limit identification to a unique anchor and therefore undergenerate in comparison with how interpreters generally perceive the bridging anaphor.

Using a broad taxonomy of bridging, such as that originally given by Clark (1975), and adopted by Asher & Lascarides (1998a), will identify a great number of linguistic expressions as being interpreted via a bridging inference, if applied consistently to examples in a rich context. This leads to the opposite problem, an overgeneration of the identification of bridging NPs with respect to those that are generally perceived. Thus, there is a gap that exists between the NPs and anchors identified by current proposals and those perceived by human annotators using naturally produced texts.

How can the definition of bridging be limited so that it only identifies those definite NPs that interpreters perceive as relevantly related, and still expand on the definitions so that all the multiple anchors that are perceived are also recognized?

The easiest solution to the problem of underrecognition of multiple anchors is to accept the fact that there can be more than one anchor; that is, allow all plausible relationships to be part of a set of anchors. In an annotation experiment then, annotator choice of anchor can be evaluated as to whether or not the anchor was part of the set. Some bridging examples may still be related to one unique anchor, but many will be related to the current discourse topic because they are in a non-trivial relationship with many of the individuals that are part of that topic. In the discourse representation we only use the identification of one unique anchor as a shorthand for coding more complex relationships.[13]

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[13] The second possible solution would be to try to define more clearly what the representation will be used for and then evaluate the annotation and categories on how well they function in the application. This could also help with the problem of granularity, i.e. determining how much information or how detailed the representation should be.

Can current proposals be modified to deal with multiple anchors? The lexical approach is seemingly easily modified to handle multiple anchors, but prerequisites that the bridging NP be lexically linked to all its anchors. Modifying the functionally based approaches is more difficult. If some bridging anaphors have more than one anchor, and therefore more than one link, this certainly complicates the task of determining how they function in a rhetorical relation. Asher & Lascarides' solution seems to, in some cases, require that there only be *one* possible anchor and link because the relationship is a central part of the rhetorical structure and would have to be modified to deal with these kind of examples. Note that the examples Asher & Lascarides (1998a) choose to illustrate in their article are all examples where the bridging inference and the discourse structure are intimately related, which is probably not always the case.

I believe the multiple anchors are telling us something fundamental about bridging. Bridging examples are related to and licensed by the context in which they appear, and not by some unique individual in the context. This is a conclusion that is difficult to reach if you only examine individual examples with a one or two sentence context, and that is why I think the examples that we are most familiar with are actually very misleading. Cases where there seems to be only a single anchor and the bridging examples seem to be related only to this simple semantic individual, are merely the product of a very poor context and are a special case that I think are actually quite difficult to find in naturally produced discourse. Some of the cases of a bridging NP that is licensed by only one other individual should perhaps more appropriately be treated as discourse-new rather than as being inferable.

Can current proposals be modified to deal with the overgeneration problem? This problem is much more tricky, in that it is not at all clear what underlines the perception of certain information as related to the text, while other information is perceived as new. Individual differences probably play a large role in the perception of something as new or related, and this was seen in the annotation data. However, clear *part-of* relationships often lead to definite NPs being considered bridging rather than perceived as completely new, but this is only one pattern. Here we need more data to make any substantial generalizations.

There is one simple way to remedy the overgeneration problem in the recognition of bridging NPs. A number of subgroups can be removed from the original definition of bridging. It seems more helpful to see Clark's original inventory of relationships as an incomplete list of things that make discourse coherent and connected, and not as a group that is necessarily optimally resolved by using the same methods. Because the inventory includes co-reference, pronominal reference as well as non-presuppositional items, basically all textual relationships fall into the category of bridging. They differ in their semantic characteristics to such a degree that they are better treated with different methods. But to be fair, in most discussions of bridging (with Asher & Lascarides 1998a as a notable exception) these groups are seldom discussed, with good reason. If all textual relationships are bridging, bridging is no longer a useful concept.

Below I try to motivate what types of examples should be considered bridging by identifying three characteristics that I believe we generally associate with the prototypical examples and then use these characteristics to exclude from the inventory relationships that have very different characteristics. The relationships that remain, because they share these three core characteristics, also often share other qualities and could be treated by similar methods. The reader can compare these characteristics to those given by Clark (1975) and listed in 6.1.

1) Their resolution should require an inference, using non-discourse-given knowledge.
2) They should need or require the addition of a new reference marker.
3) The bridging NP must be marked as presuppositional, to signal the need for the inference.

First, pronouns should not be subsumed under this definition of bridging. They do not contribute new existential information and they do not need non-discourse-given information for their resolution. They are also coded for gender and number, things which play a role in their resolution. They are constrained by discourse structure, or alternatively can be considered to contribute to structuring discourse in a way that is quite different from definite NPs. Their interpretation is also clearly dependent on another discourse individual and not on the context as a whole.

Second, relationship of co-reference should not be considered bridging. Putting co-reference relationships into the same category as bridging confuses two very distinct semantic processes – the addition of a new individual to the context versus retrieving or recognizing an already present individual. Whether or not an individual is already part of your discourse model is one of the most basic questions you can ask about a model. Collapsing these two categories blurs a distinction between existential information and attributive information. Some of the definitions of bridging presented in the background seem to limit co-reference bridging to examples where some inference or lexical or world knowledge is required to identify the anchor. This also confuses two different concepts, the nature of the relationship and the method or information source you can use to identify this relationship. If two linguistics expressions refer to the same referent, then whether it is necessary to use lexical or encyclopedic knowledge to understand this is an issue that has to do with the decoding process, not the interpretation of the intended message. And again, the relationship is clearly with another semantic individual and not with the context.

Other examples that do not require inference should also be removed. This would then include described (D) type examples, also those classified as unfamiliar with explanatory modifier by Hawkins (1978). First, these examples all function as a kind of argument to another constituent. It is the constituent as a whole that has a relationship with the context. Second, they do not require an inference because the relationship is explicitly marked. Third, these relationships are often unable to support an anaphoric relationship on their own. Poesio et al. (1997) observed that

they also are usually relationships that would be difficult to resolve using in a bridging relationship if the link is not explicitly marked. This is perhaps because many of the examples where the bridging NP is explicitly marked with *of it*, are qualitatively different than those without. Poesio et al. (1997) consider this a special group and refers to them as 'restrictive post-modification definites,' remarking that it presents special problems for analysis in that it is easy to identify the anchor, but hard to describe the link to the bridging NP. The NPs in these cases could seldom function well with a bridging interpretation in a context where the link isn't explicitly marked. One example of this found in the corpus was *the precision of it*, where it referred to Latin. It is possible to identify *the precision of it* as related to *Latin* but it is difficult to make the same type of bridge between *Latin* in one utterance and *the precision* in another without additional clues. This is because the link between the two elements is not conventional, lexically or encyclopedically. That the link is not conventional may be one of the reason behind the use of the modifier, it provides an explicit clue to the relationship. Additionally, because their resolution does not really involve inferences they differ from Clark's description of the bridging process. This also strongly suggests that these examples are qualitatively different from other bridging examples. Many have anchors that come after the bridging NP, which is why Poesio et al. (1997) identify them as restrictive post-modification definites. This means they are not backwards referring, i.e. also differing greatly from most anaphoric expressions.

Third, I think there should be a distinction made between semantic individuals introduced via presuppositions and those introduced via assertion. In their definition of bridging, Asher & Lascarides (1998a) make the point that the same type of information will be needed to make an inference between some indefinites and the context, as between definite NPs and the context. Therefore, these indefinites should be treated by the same method. But this confuses method of resolution with the semantic category of the information which needs to be resolved and also ignores speaker intentions in generation. Asserted and presupposed information may be related to the context in ways that seem superficially similar but their semantic contributions are clearly different. Treating indefinites and definites in a similar manner ignores the information contributed by the article.[14] Indefinite NPs are qualitatively different in their relationship to the context in that they are not signaled by any marking as anaphoric.

Finally, reference to abstract objects does not fit well with the requirements proposed above for three reasons. First, they are referring to abstract objects and not concrete individuals. They could therefore be considered a kind of co-reference relationship, but of a form where there can be semantic type changes that are instigated by the form of the referring expression. Second, there are already very well thought out proposals for dealing with these examples. The means by which

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[14] It is generally agreed that indefinites and definites have different functions in English, the language studied here. If it were not an important distinction, then we could do away with definite and indefinite marking which many languages do, but it is also generally acknowledged that they then communicate the same information by other means.

they are resolved are also quite different, e.g. the fact that they are constrained by the discourse structure distinguishes them from other bridging cases as well. They involve a reification of already discourse-given information. Third, they do not add new information or a new reference marker in the same way as other bridging examples.

The group that remains is the kinds of examples that interpreters identify as new, but related to something(s) in the discourse. This follows from their fulfillment of the first two requirements. For bridging the feature we should be most interested in is the introduction of a new individual to the discourse, not the addition of descriptive or attributive information to discourse-given individuals.

How does this all fit in with our treatment of triggered presuppositions in the binding theory of presupposition? If we treat the group of relationships that fulfill the three criteria above as licensed by the context in which they are used, rather than in relation to another discourse individual, then bridging examples need to be treated as a category separate from binding and accommodation. Definite NPs resolved by bridging need be identified for the way in which bridging information is dependent on information in the discourse, while at the same time they will introduce a new reference marker in the representation. Reconsider example (5) repeated below for convenience.

(21)   If Drew buys a new car, then he'll ruin <u>the brakes</u> in a month with <u>his crazy driving</u>.

Here, the reference marker for *the brakes* has to be added to either the antecedent or the consequent of the conditional. The antecedent of *his crazy driving* on the other hand, can be globally accommodated. The bridging NP *the brakes* will introduce a new reference marker in one of these contexts, and the information that *the brakes* are part of the car must also be added. Thus bridging involves the addition of a new reference marker and the addition of descriptive information that explicitly links the new reference marker to an already given reference marker. My suspicion is that if the rest of the representation is in order, the actual anchor chosen should not matter because the other anchors should be able to be calculated or determined from the representation when needed for interpretation. In this way the representation of bridging NPs in a richer context than (21) above should be able to account for all the relevant intuitions that interpreters may have about how the different individuals in the discourse are related, i.e. all the multiple anchors.

One final point: Some of the relationships identified as bridging in Clark's taxonomy may actually be better understood as resolved by accommodation, in particular the ones that demand a much greater "bridge," such as *inducible parts*. A case in point is the classic example given as (2) and repeated below for convenience. It seems that the bridging NP *the chandeliers* is more appropriate to consider as accommodated, because it seems that understanding its relationship to *the room* is a link created after the recognition of *the chandelier*. This is qualitatively

different from example (21) where *the brakes* in some way are predictable from *the car.*

(22)   I walked into the room. The chandeliers sparkled brightly.

I am not sure if examples like (22) should be subsumed under the notion of bridging at all. However, the relationship *room-chandelier* does fulfill the three requirements for the subgroup of bridging NPs I identified. This is unfortunate, because it shows that these criteria are not precise enough to make a distinction between examples that seem to be more new than bridged. *Inducible parts* are less related to the context than e.g. *necessary parts* and bear a strong resemblance to the examples found in the group that annotators generally identify as *new(N)*.

However, the characterization of bridging as licensed by the context in which it appears, and not by a unique discourse individual does help distinguish this example from other more prototypical examples of bridging. I would argue that we cannot consider *the chandelier* to be licensed by the context because this context is too poor. A richer context would probably add information about the room making it more likely and more clear that it is the type of room that is likely to have a chandelier.

Perhaps the number of anchors that can be identified for a particular bridging NP distinguishes those that are bridging from those that are actually accommodated. Those bridging NPs that are only loosely related to their context may be those perceived as new rather than related. This is a question that future work should address.

6.5   CONCLUSIONS

Summarizing, naturally produced examples of bridging NPs are often related to several anchors in the discourse context rather than to one unique anchor as is usually assumed. These definite NPs should more appropriately be considered to be licensed by the context in which they are used rather than by one unique individual. The understanding of bridging as being related to only one individual in the context is an effect caused by the practice of using examples with a poor or non-existent context to illustrate bridging. This new analysis accounts for the difficulty found in getting a high degree of agreement in definite NP annotation tasks.

Additionally there are good reasons to reflect on what types of relationships should be considered bridging. The original taxonomy seems to encompass an extremely heterogeneous group, many of which are currently treated by different methods. There seem to be three characteristics are associated with prototypical bridging examples: They are 1) related semantically to the context in which they are used, 2) require an inference for their resolution and 3) are marked as presuppositional. On the basis of these characteristics some subgroups considered

by many to be bridging NPs in the original definition can be excluded, such as e.g. co-reference relationships, NPs that are via their modifiers explicitly linked to the context, abstract anaphoric reference and indefinite NPs. The remaining groups share key characteristics and can therefore more easily be treated by the same, or at least similar methods.

Finally, in the binding theory bridging examples need to be treated with a separate resolution strategy. However some types of bridging still seem to be more appropriately considered to be resolved by accommodation. This distinction seems to be most apparent between those bridging NPs which are very loosely or vaguely related to their anchor and those that are related to several anchors. In a poor context the latter examples may be considered new rather than related. Where the distinction should be drawn between what is perceived as new and what is perceived as related is an area where more work is needed.

7 Conclusions and implications

By now the importance of complementing theoretical work in semantics and pragmatics with the study of naturally produced examples in context should be clear. Many of the results presented in this work could not have been obtained without looking at corpus data in detail.

One of the most helpful aspects of using corpus data is that it provides examples that have a naturally produced context. The interpretation of presuppositional expressions is context dependent, whether they are bound or accommodated, so having examples with a rich context helps in understanding these examples better. Equally important is the context following the use of a presuppositional expression. Without this latter information, little can be said about the effects of the presupposed information, about speaker intentions, hearer interpretation, and about how the presuppositional expression contributes to the communicative goals of the participants.

For example, many of the cases of bound presuppositions in chapter 4 that were argued to have discourse functions are generally not the type of made-up examples we see in most semantics literature. Without having examined the bridging examples in context I could not have seen the difficulty involved in using current theoretical assumptions of a single anchor. To do empirical work it is necessary to have a theoretical base. Many of the phenomena or uses of presuppositions that I found in the corpus deserve to be discussed in a more precise way on their own using a set of systematically chosen made-up examples. However, I would not have been able to make several observations without access to the corpus.

The binding theory argues that presuppositional expressions are anaphoric expressions, and one of the claims of chapter 4 is that bound presuppositions

behave quite similarly to discourse anaphora. But the extent to which the presuppositions induced behave like pronominal anaphors is determined by the particular trigger. We can still see discourse effects similar to anaphora in all the trigger types studied here, but they have functions beyond pronominal anaphors, even for the abstract triggers.

Another conclusion is that presuppositions are not homogeneous. The presuppositions induced by the triggers studied here all varied in the frequence with which they were used with the different types of resolution. Most lexical and structural triggers generally share the logical characteristics that are associated with presuppositions and recognized by all theories. But the tendency with which the the triggered information to be used by speakers with a certain resolution differs according to the particular trigger type. This empirical result supports many of the theoretical ideas regarding the heterogeneity of presupposition triggers discussed in the work of Henk Zeevat (e.g. Zeevat 1992, 1999, 2000, to appear).

It is not clear what lies at the root of the tendency to be bound, accommodated, or to be used with hearer-new or hearer-old information. I offered several explanations in the earlier chapters, but I will summarize them here. The function that the presuppositional expression of a particular trigger can have in discourse is one of the main factors affecting the type of resolution with which presupposed information will tend to be used. This function is in turn intimately connected to the semantic type of the triggered presupposition. Semantic objects of different types have different inherent qualities that affect when and how we refer to these objects in discourse. These effects then carry over to presupposed information depending on its type. If we can identify the characteristics of different types of semantic objects, and how they can be referred to and used linguistically, I think we will be able to see the effect that these characteristics have on the way we refer to these objects in discourse. This can then give us an explanation for the different tendencies we see in presupposition usage.

Another implication of the heterogeneous nature of presuppositions is that in examining a certain characteristic related to a presupposition trigger of a certain type, we should always complement our study by looking at examples of other triggers as well. Finding a certain behavior in a trigger is no guarantee that we will find it in others.

I examined only a small subset of all the lexical and syntactic items identified as presupposition triggers. It is therefore not at all clear that the results here are relevant for other triggers. In particular, lexical presupposition triggers seem to be quite different and there seems to be no need to consider them anaphoric. Take for example *bachelor,* which is often argued to presuppose that its referent is unmarried and male. It is necessary that the information predicated about an individual be consistent with earlier information. However, I do not see any advantage in trying to treat them as anaphors. In fact, I doubt that they should be treated as presupposition triggers at all. And while I have not conducted any corpus study, I am quite skeptical that we would ever find instances of the presuppositional information already given in the discourse with any of the characteristics typical of

anaphors, or with any of the additional functions present with bound abstract presuppositions.

In chapter 4, I proposed that some of the difficulties involved in determining an antecedent may require a framework that can model partial information more explicitly, so that information from the same induced presupposition could be resolved in different ways. This could increase the accuracy of our model of the hearer's interpretation process for these kind of examples. But as pointed out in the discussion in section 4.5, without a clearer understanding of how this should be determined, it will only complicate matters to attempt to apply it to naturally produced data. More systematic theoretical work on guidelines is a necessary prerequisite to be able to analysis to naturally produced data along these lines.

Some work in this direction is found in Kamp & Rossdeutscher (1994), where they speak of the process of "presupposition justification." They believe that the reality of presupposition usage is probably a combination of resolution techniques rather than the idealized picture where examples can be identified as resolvable by just binding or only resolvable by accommodation. Blutner (2000) also hints at some ideas for modifying OT to integrate partial resolutions in his Bi-OT treatment. His suggestion is that the different constraints that govern preferences for accommodation and binding could be weighted in some way, so that instead of taking absolute values or counting the number of reference markers accommodated, we could make more precise measurements. This would allow us to consider a greater number of output alternatives for interpretation because we could look at a higher level of detail. As the theory works now, distinctions are not made between resolutions where part of the descriptive information can be bound and the rest cannot, or where the entirety of the presupposed material must be accommodated. If changes of this type could be made then we would likely be able to analyze presupposed information in such a way that distinguishes between resolutions that are more or less context dependent.

Some of the discussion has touched on when and why speakers might choose to use a presuppositional expression instead of another expression, e.g. in discussions about speakers' intentional production of presuppositions in cases where they could have chosen an anaphoric expression instead, as in chapter 4 or where they could have chosen an expression alternative that communicated the same information via assertion or via a bound presupposition, as in chapter 5. Presupposition generation is a neglected area. This is unfortunate because generational constraints may actually come into play more often than we perhaps first realized. The binding theory is written from the perspective of the interpretation and many of the problem examples in the literature are cases of non-well formed structures that need to be explained from the perspective of production. Researchers working in bidirectional OT may be on the right track, in that a full understanding of the function of presuppositions, and their interpretation, needs to take their generation into account.

7.1 FUTURE WORK

I strongly believe that we need to look at more empirical data because we still know so little about the actual use of presuppositions. While I believe that this work has made a contribution to our knowledge, I also see many unanswered questions.

There were fewer triggered presuppositions in the corpus data than expected and therefore the fewer examples of each type of resolution than what would have been ideal for making strong conclusions. Analyzing individual examples demands an examination of the entire previous discourse context, thus looking at more data will be a time-consuming task. Just the same, several of the questions discussed in this work could have been answered more satisfactorily if we had had more cases to look at. For example, it is not clear how frequently bound presuppositions appear in long-distance relationships with potential antecedents. In the data there was only one example of a long-distance binding relationship identified as such on the basis of the reaction of the other discourse participants, e.g. example (22) in chapter 4, section 4.3.3. It would be desirable to have several more similar examples to know if this is a common occurrence with presupposition or if this particular case was special. Our understanding of many of the issues concerning accommodation raised in section 5.5 would greatly benefit from addition naturally produced data. The existence of a preference for higher levels of accommodation could be discussed in more detail if we had more examples of embedded presuppositions. Such examples would enable us to more closely examine each type of embedding as well as more examples of accommodation at different levels. However, without more naturally occurring examples, any discussion of the effect of different types of embedding on presuppositions projection is mere speculation.

The conducting of annotation task experiments would yield a more precise characterization of the interpretation of presupposed information, and tell us to what degree this interpretation is dependent on the individual interpreter. In this work, an annotation task was done with the definite NPs, and the annotation of *too* was in a more informal way confirmed by a second annotator. A more constrained annotation of a balanced set of examples of each trigger type with more annotators would be helpful.

Finally, it was beyond the ambitions of this study to look at the influence of prosody on the interpretation of presupposed material, but this is definitely an issue that should be examined more closely, either by analyzing recorded data to see how naturally produced prosodic forms of utterances are realized, or by doing listening experiments. Prosodic prominence could be varied on different parts of utterances with presupposition triggers given in a neutral context. This would show the extent to which prosodic information can influence the interpretation of presupposition. In particular, looking at the relationship between presupposition triggered under embedding and the placement of pitch accent in the utterance would be helpful for understanding preferences for level of accommodation. This type of study is also necessary for developing speech synthesis systems that incorporate presupposition.

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