On the Structure Sensitivity of the Alternatives for Accommodation*

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Abstract

Motivated by the proviso problem (Geurts (1996)), Heim (2006) suggested that accommodation is made with respect to a set of alternatives, and stipulated the set for a special case. The goal of this paper is to overcome the stipulation by providing a predictive statement of the alternatives for any given LF. Like several other responses to the proviso problem (e.g., Gazdar (1979), Geurts (1999), Singh (2007, 2009), Schlenker (2010)), our approach will make reference to syntactic structure. We will identify various difficulties with these approaches, and will use these difficulties to motivate a revised understanding of the role of structure in presuppositional reasoning. Specifically, we will propose a mechanism for generating accommodation alternatives that is limited to reusing parts of the sentence in a way designed to avoid wasting computational work.

1 Introduction

Satisfaction theories of presupposition projection (e.g., Heim (1983), Beaver (2001), Schlenker (2008)) face the proviso problem (Geurts (1996)): Why do sentences that are predicted to project the same presupposition sometimes seem to presuppose different things? For example, satisfaction theories predict that *If John flew to Toronto last week, his sister picked him up from the airport* and *Mary knows*

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that if John flew to Toronto last week he has a sister both project the presupposition that if John flew to Toronto last week he has a sister. The proviso problem is the problem of why we can infer from the former, and not the latter, that John has a sister whether or not he flew to Toronto.

One response to the problem rejects the satisfaction theory's predictions about projection, and posits that differences in presuppositional inferences are due to differences in what projects (e.g., Gazdar (1979), van der Sandt (1992), Zeevat (1992), Geurts (1999)). These proposals share a certain property that relates the presuppositions found at the root with presuppositions of embedded constituents. Roughly, this property tells us that the conditional is allowed to presuppose that John has a sister because when you look inside the conditional you find a constituent that carries this presupposition. When you look inside the knowledge attribution, you find no such thing, and this prevents the knowledge attribution from presupposing that John has a sister. Adapting terminology from Beaver (2001), I will call theories that share this property *structurally predictive theories of projection*.

Satisfaction theories are not structurally predictive, and so must find an alternative solution to the proviso problem. The standard response (e.g., Beaver (2001), van Rooij (2007), von Fintel (2008)) maintains that the theory's predictions about projection are entirely correct, and places responsibility for the different inferences on a process of accommodation (Lewis (1979)). For example, it is maintained that both of the above sentences do indeed project a conditional presupposition, but that language external systems of rational inference are responsible for the different accommodation inferences that are made in response to them.

Both responses face difficulties. Structurally predictive theories make intricate predictions across a range of constructions, but these predictions often fail to yield empirically correct results (e.g., Soames (1982), Heim (1983), Beaver (2001), Singh (2007), Schlenker (2010)). On the other hand, the standard response from the satisfaction theory has failed to generate predictive theories that extend beyond the special case of conditional presuppositions. Given the general lack of predictive theories of rational, common sense inference, the inability to make sense of the proviso problem from this perspective should perhaps occasion no surprise.

Heim (2006) suggested a framework that I will argue provides a way to resolve this tension. The innovation that will interest us most here was her proposal that the accommodation inferences performed by language external cognitive systems are *constrained* to a limited set of objects made available by the grammar. That is, grammar provides a set of alternatives for accommodation, and external systems select from them on the basis of common sense reasoning. This makes accommodation look much more like other forms of alternative-sensitive reasoning, such as implicature computation and ambiguity resolution. Like with these other inferential tasks, we will need a way to assign a set of alternatives for any given LF. Heim (2006) did not specify a general assignment that could accomplish this. The goal of this paper is to provide the required statement.

2 The Proviso Problem and Accommodation

Where sentence ψ presupposes proposition p, ψ_p, satisfaction theories of presupposition projection predict conditional sentences 'if ϕ, then ψ_p' should presuppose $\phi \rightarrow p$.[1] For example, the following sentence is predicted to presuppose that if John flew to Toronto last week, he has a sister.

(1) If John flew to Toronto last week, his sister picked him up from the airport.

It has often been pointed out (e.g., Gazdar (1979), Geurts (1996)) that this prediction seems too weak. The sentence seems to presuppose instead that John has a sister, whether or not he flies to Toronto. The standard response to this mismatch (e.g., Beaver (2001), van Rooij (2007), von Fintel (2008)) has appealed to *accommodation* (Lewis (1979)). When the context does not entail the presupposition of the sentence, the hearer may enrich the context to a new one that does. To address the mismatch in (1), the new context may be one that not only entails the conditional presupposition that if John flew to Toronto last week he has a sister, but may be one that also entails that John has a sister.[2] By allowing accommodation to be non-minimal in this sense,[3] satisfaction theories can remain consistent with the mismatch in (1).

A more serious objection for the satisfaction theory, due to Geurts (1996), comes from sentences like (2). Although this sentence also presupposes (as a

[1] By 'satisfaction theory' I mean to include theories that impose a use condition requiring that the context entail the projected presupposition of the LF. See e.g., Karttunen (1974), Stalnaker (1974), Peters (1979), Heim (1983), Beaver (2001), Beaver and Krahmer (2001), Schlenker (2007, 2008, 2009), Chemla (2009b), Fox (2008).

[2] E.g., Beaver (2001, 2006), Beaver and Zeevat (2007), Heim (2006), Pérez Carballo (2007, 2009), van Rooij (2007), Singh (2007, 2008, 2009), von Fintel (2008), Schlenker (2010). See also Karttunen and Peters (1979).

[3] That is, by allowing the new context c' to be a proper subset of $c \cap q$, where q is the projected presupposition of the sentence (e.g., the conditional presupposition in (1)).

matter of projection) that if John flew to Toronto last week he a sister, we do not infer upon hearing (2) that John does indeed have a sister:

(2) Mary knows that if John flew to Toronto last week, he has a sister

Why does the accommodation process from (1) not apply to (2)? I will assume, following the standard response, that this so-called proviso problem (Geurts (1996)) is a puzzle for the accommodation component of the satisfaction theory, rather than its projection component:

The Proviso Problem Why, when we hear different sentences that project the same presupposition, do we accommodate different propositions in response to them?

Several proposals for dealing with the contrast in (1) and (2) exist (e.g., Beaver (2006), Heim (2006), van Rooij (2007), Pérez Carballo (2007, 2009), Singh (2007)).[4] Unfortunately, these proposals fail to extend beyond the particular case of conditionals and conditional presuppositions.[5] As is well known, the proviso problem is a general one. For example, one well-known case of the proviso problem occurs in belief attributions (e.g., Heim (1992), Geurts (1999)). Although the following sentence is predicted to presuppose (as a matter of projection) that John believes it was raining (e.g., Heim (1992), Schlenker (2008)),[6] what we accommodate in response is not only that John believes it was raining, but also that it was in fact raining:

(3) John believes it stopped raining

And again, Geurts (1999) provides evidence that different constructions presupposing that John believes it was raining prohibit accommodation of the proposition that it was (in fact) raining:

(4) Mary knows that John believes it was raining

[4] I will return to the proposals of Singh (2008, 2009), Schlenker (2010) in Section 5. The discussion that immediately follows does not apply to these works.

[5] The proposals mentioned here make specific statements about conditionals and conditional presuppositions, and though Singh (2007) was not limited to conditionals in this way, it has been argued to fall short of the desired generality for other reasons. See Singh (2008, 2009), and especially Schlenker (2010), for discussion.

[6] Where $B_j\phi$ symbolizes 'John believes that ϕ,' $B_j\phi_p$ presupposes B_jp.

The proviso problem thus demands a solution that goes beyond the special case of conditionals and conditional presuppositions.[7]

3 Presupposition and Structure

As we will see below, the pattern in (1)-(4) poses no real difficulty for some competing theories of presupposition, such as those of Gazdar (1979) and DRT (e.g., van der Sandt (1992), Zeevat (1992), Geurts (1999)). We might thus wish to understand what features of these proposals distinguish them from satisfaction theories in leading to this result. One relevant feature, I think, is that these systems have access at the root to information about the presuppositions of embedded constituents. This information access allows these systems to derive a prediction relating the presuppositions of root and embedded constituents, one that is not made by satisfaction theories, and which might therefore prove useful in comparing these proposals with satisfaction theories.

Let us call a (sentential) constituent a *minimal presuppositional constituent* if it contains a presupposition trigger, and contains no sentence (other than itself) that also contains a presupposition trigger. Then the following prediction follows from the theories of Gazdar (1979) and DRT:[8]

(5) **Root and Constituent Presuppositions** A sentence S_0 will end up presupposing p only if some minimal presuppositional constituent of S_0 presupposes p.[9]

[7]Further evidence of the generality of the proviso problem comes from quantificational constructions, such as the fact that (12) below, from Schlenker (2010), allows the hearer to accommodate that every one of the speaker's ten best friends used to smoke, while the Geurts-type variant in (13) does not, even though both presuppose the same thing (that every one of the speaker's ten best friends who is smart used to smoke).

[8]To simplify exposition and facilitate comparisons with the satisfaction theory, we ignore here the fact that these theories do not distinguish between presupposition and entailment. Whenever we say of DRT that it predicts that sentence S presupposes p, we mean that S has an associated DRS with p as a syntactic presupposition that gets moved to the global DRS, and whenever we say of Gazdar (1979)'s system that it predicts that sentence S presupposes p we mean that p is a 'potential presupposition' of S that becomes an 'actual presupposition.' See Note 10.

[9]This is not true for quantificational sentences. Gazdar (1979)'s system does not readily extend to quantified sentences (Heim (1983), Beaver (2001)), and in DRT systems, where Px is the presupposition of the (minimal presuppositional) nuclear scope Bx, Bx_{Px}, a sentence with 'surface form' $[[Qx : Ax]Bx_{Px}]$ can be assigned the following two LFs: (i) $[[Qx : Px \wedge Ax]Bx]$ (so-called 'intermediate accommodation' of Px into the restrictor), and (ii) $[[Qx : Ax]Px \wedge Bx]$ (so-called

Adapting terminology from Beaver (2001) for current purposes, I will call theories committed to this prediction *structurally predictive theories of projection*. Satisfaction theories are not structurally predictive theories of projection, and in addition would seem to have no use (at the root) for information about the presuppositions of embedded constituents. This difference seems relevant to the fact that the contrasts in (1)-(4) follow straightforwardly from structurally predictive theories, but constitute a puzzle (the proviso problem) for satisfaction theories.

To see this, consider again the contrast between what is inferred from (1) and (2). All that the satisfaction theory 'knows' at the root of these sentences is that they presuppose that if John flew to Toronto last week he has a sister. This presupposition is either entailed by the context, or it is not. If not, accommodation is required, but nothing in the theory would seem to tell us why accommodation of John having a sister should be possible with (1), but not (2). The competing structurally predictive theories, on the other hand, 'know' that (1) has an embedded constituent presupposing that John has a sister while (2) does not.[10] Given (5), it is in no way mysterious why (2) cannot presuppose that John has a sister; there simply is no constituent of (2) that presupposes this. Similar remarks apply, *mutatis mutandis*, to the different presuppositions in (3) and (4).

Of course, this insight could be adapted by the satisfaction theory by making accommodation sensitive to the presuppositions of embedded constituents. Specifically, one way of capturing (5) within the satisfaction theory would be to restrict accommodation possibilities to the presuppositions of embedded constituents. Under such an assumption, the accommodation system would look into (1) and find a constituent presupposing that John has a sister, making this proposition available for accommodation. Looking into (2), it would find no such thing, and the contrast would be accounted for, and the generalization in (5) would follow as one not about projection, but one about accommodation.

'local accommodation' of Px). A constraint (the so-called 'Trapping Constraint' of van der Sandt (1992), which requires that bound variables remain bound) prevents a reading where the embedded presupposition Px can take wide scope or so-called 'global accommodation,' which would result in LF: $Px \wedge [[Qx : Ax]Bx]$. We will return to quantified sentences shortly.

[10] Gazdar (1979) collects the presuppositions of all minimal presuppositional constituents embedded in a sentence as a set of 'potential presuppositions.' Those that survive his cancellation mechanism (i.e., those that are consistent with the context, the content of the assertion, and any ignorance inferences and scalar implicatures of the sentence) end up being presupposed by the sentence as a whole. In DRT approaches, the presuppositions of minimal presuppositional constituents are syntactic objects that can get moved around to various scope sites. One such site is the root (the global DRS), and this is generally the preferred landing site as long as no antecedent 'binds' the object along the way.

While technically nothing prevents us from exploring this option, it nevertheless seems like a highly unnatural move given architectural assumptions commonly made by satisfaction theories. Once the presupposition of the root (the projected presupposition) has been computed, there would seem to be no need for access to the presuppositions of embedded constituents, nor does there seem to be any natural way to grant access to such information. Under fairly standard assumptions about the semantics/pragmatics interface, what the pragmatic system has access to from the grammar is the output of semantics, commonly thought to be a proposition (the content of the sentence) or a set of propositions (in multidimensional frameworks, e.g., Karttunen and Peters (1979), Rooth (1992)). A trace of the history of the semantic computation would seem to be both irrelevant and inaccessible to the pragmatic system. This may be one reason why most theories of accommodation from this perspective have assigned responsibility for accommodation entirely to language-external cognitive systems, the 'central systems' (Fodor (1983)) responsible for common sense, abductive reasoning.[11] It is perhaps unsurprising, therefore, given the general lack of predictive theories of abduction, that contrasts such as those in (1)-(4), as well as others to be discussed below, seem so puzzling from the perspective of the satisfaction theory. All else being equal, then, the fact that structurally predictive theories derive this apparent relation between the presuppositions of root and embedded presuppositions would seem to be an argument in their favour.

As it happens, all else is not equal. It is well-known that there are observations that contradict (5) (e.g., Soames (1982), Heim (1990), Beaver (2001), Singh (2007), Schlenker (2010)). For example, the sentences in (6) have all been argued to carry the conditional presuppositions predicted by the satisfaction theory, even though none of their minimal presuppositional constituents carry a conditional presupposition.[12]

(6) a. If John is a scuba diver, he'll bring his wetsuit
Inference: that if John is a scuba diver he has a wetsuit

b. It is unlikely that if Spaceman Spiff lands on Planet X, he will be bothered by the fact that his weight is greater than it would be on

[11] Explicit discussions of this architecture can be found in Beaver (2001), Stalnaker (2002), Thomason et al. (2006), Beaver and Zeevat (2007), von Fintel (2008). Arguments against such an architecture can be found in Singh (2007, 2008).

[12] Sentence (6a) comes from Geurts (1996), (6b) from Beaver (2001), (6c) from Singh (2007), and (6d) from Schlenker (2010). See also (11), (12), and Note 35, for more difficulties for such systems.

Earth
Inference: that if Spaceman Spiff lands on Planet X, his weight will be greater than it is on Earth

c. It's not the case that (John works for Morgan Stanley and his limo is parked outside)
Inference: that if John works for Morgan Stanely, he has a limo

d. If the applicant is 64 years old and realizes we can't hire him, he won't be disappointed by a rejection letter
Inference: that if the applicant is 64 years old we can't hire him

While structurally predictive theories have ways of capturing the conditional inference in (6a) through mechanisms that allow sentences ϕ containing presuppositional sentence S_p, $\phi(S_p)$, to be read as $\phi(p \wedge S)$,[13] the conditional inferences attested in (6b)-(6d) are beyond the reach of these mechanisms. Satisfaction theories, on the other hand, are able to generate these inferences as the projected presuppositions of (6a)-(6d). Beaver (2001) concludes that this systematic failure to derive attested conditional presuppositions constitutes a fundamental problem for structurally predictive theories. Since I see no way to modify these theories to remedy this difficulty, I will assume that Beaver's conclusion is correct, and will assume for the remainder of this article that the satisfaction theory's predictions about projection are correct, and that wherever the predictions differ from what we intuit the presupposition to be, the culprit is accommodation. As discussed just above, a fairly straightforward account of the contrasts in (1)-(4) seems to be available if we adopt the assumption that accommodation is sensitive to constituent structure. At the same time, granting the accommodation system access to such information would seem to be rather unnatural given standard assumptions about the semantics/pragmatics interface.

The rest of this paper will argue that this tension can be overcome by filling in the details of an approach to accommodation sketched in Heim (2006). I will argue that this proposal allows us to modify the architecture commonly assumed by satisfaction theories just enough to allow the accommodation system access to the presuppositions of embedded constituents while keeping all other assumptions intact. The resulting system will allow us to state a simple generalization relating

[13]DRT systems capture this property by producing a 'local accommodation' reading, while a central feature of Gazdar (1979) is that presuppositions are always entailed by the minimal presuppositional constituents in which they are contained. Thus, the conditional inference in (6a) would follow as an entailment of one of the possible readings of (6a), which we can paraphrase as 'if John is a scuba diver, he has a wetsuit and will bring it.'

accommodation possibilities with presuppositions found in embedded positions, on a par with (5) but without running into empirical difficulties such as those in (6), and others to be discussed below.

4 Structure, Pragmatic Inference, and Accommodation

4.1 Structural Constraints on Pragmatic Inference

The standard view on accommodation (e.g., Beaver (2001), van Rooij (2007), von Fintel (2008)) formulates the task as follows: *Given that the speaker has uttered S presupposing p in context c, what should be accommodated?* Heim (2006) proposes a more restricted task: *Given that the speaker has uttered S presupposing p in context c, which proposition(s) from candidate set $\mathcal{H}$ should be accommodated?* Under this view, there are two subtasks: (i) Specify $\mathcal{H}$, which, following Schlenker (2010), we will refer to as *the strengthening problem*, and (ii) Specify a method for selecting what should be accommodated from $\mathcal{H}$, which, again following Schlenker (2010), we will call *the selection problem*. Our discussion in the previous section concluded that allowing the accommodation system access to the presuppositions of embedded constituents seemed to bring a technically simple account of at least the strengthening problem within our grasp. In the context of Heim (2006)'s proposal, this information access would mean that $\mathcal{H}$ should be made up of the presuppositions of embedded constituents, possibly *inter alia*. Before implementing this idea, let me briefly state why I think this revised understanding of the kind of task that accommodation is makes its potential sensitivity to structure a natural expectation rather than a mere technical exercise.

If we assume with Heim (2006) that accommodation is restricted to a set of alternatives, then the potential structure-sensitivity of this inference would make it of a kind with other alternative-sensitive pragmatic computations, such as implicature computation and disambiguation, both of which are sensitive to structural properties of the given sentence.[14] In these other tasks, it is commonly assumed that two systems come together to help the hearer figure out what she should infer from the utterance of sentence S in context c: (i) A formal linguistic system

[14]Association with focus effects (e.g., Rooth (1992)) are also quite analogous, and may be formally identical to implicature computation in terms of the alternatives employed (see e.g., Krifka (1995), Fox and Katzir (2009)).

that provides a set of potential inferences, and (ii) Pragmatic principles that select members of the formal candidates as actual inferences.[15] Accepting this, we naturally expect that two sentences that are semantically equivalent in some respect may nevertheless allow for different pragmatic inferences if their structural properties license different sets of potential inferences. If accommodation is like this, then the idea that two sentences can project the same presupposition but give rise to different accommodation inferences is what we should expect. Moreover, we have a guide for seeking out an explanation for this fact: the structure of the sentence, and the alternative inferences that are generated on the basis of this structure. It might help to see this in the domain of ambiguities and implicature before fleshing the idea out for accommodation.

Consider first the case of ambiguities. Suppose the speaker utters *John saw the man with the binoculars* with the intention of conveying that with the use of binoculars, John saw some other man, the only other man salient in the context. The speaker can expect to accomplish this task because this is (roughly) one meaning the grammar assigns to this sentence. At the same time, this sentence may also license the inference that there are two men other than John, only one of whom has binoculars. This potential inference arises because the grammar generates an

[15] The alternatives in (i) are derived by performing various structure modifying operations to the given sentence which result in new structures from which propositions are extracted as potential inferences. Such operations include those that replace scalar items occupying terminal nodes with their Horn mates (e.g., Horn (1972), and much other work), operations that delete elements of the tree until sentential constituents are found (e.g., Gazdar (1979), and much other work), and operations that reanalyze the parse of a sentence so that the resulting structure is consistent with grammatical competence (e.g., Fodor et al. (1974), and much other work). In the case of implicatures, the negations of the propositions denoted by the alternatives become potential implicatures, while in ambiguities, the propositions themelves are the potential inferences. We will follow the commonly employed terminology that refers to both the alternative logical forms, and the potential inferences (propositions) they give rise to, as 'alternatives.' Thus, structucure sensitive operations generate alternatives, which are then fed as input to a context-sensitive pragmatic system that selects from these alternatives. As discussed in greater detail below, our concern here will be with the makeup of the alternatives themselves, and we will have little to say about the mechanisms that govern pragmatic selection. However, it might be worth pointing out that one important difference between selection from implicature alternatives and selection from ambiguity alternatives is that in the former, several formally generated candidates may in principle be inferred as implicatures, while in the latter, selection is limited to exactly one of the candidate propositions. That is, while the theory of selection in (ii) allows the conjunction of potential inferences from (i) in the case of potential implicatures (e.g., Fox (2007a)), it does not allow inference of the conjunction of alternative readings of an ambiguous sentence. The theory of selection will have to incorporate principles that lead to this result.

alternative parse of the sentence with this proposition as its content.[16] The hearer's task, then, is to figure out which of these alternative meanings to select.[17] Had the speaker used a different sentence to convey their intended meaning, say *with the binoculars, John saw the man*, the hearer's task would have been different, since this sentence uniquely fixes the intended meaning.[18] The space of potential inferences available to the hearer is thus crucially constrained by the structure used to convey a given piece of information.

Similar considerations arise with implicature computation. For example, while *John ate some of the cookies* is truth-conditionally equivalent to *John ate some or all of the cookies*, only the former may license the inference that John didn't eat all of the cookies. One way of explaining the difference is that the sentences give rise to different alternatives, a fact that follows from the syntax of the given constructions.[19] Thus, we see that the implicatures that can be drawn from a sentence depend not only on the content expressed, but also on the form that is used to express the given content.

Returning to accommodation now, when we follow Heim (2006)'s insight that accommodation is made with respect to alternatives, it no longer looks surprising (given the above precedents) that sentences that project the same presupposition should turn out to license different accommodations. Given the analogous results in the study of ambiguity and implicature, we might expect to find an explanation for the differences in accommodation possibilities in the structural properties of the different sentences. The task evidently is to spell out which syntactic properties are responsible for this. Making this structure-sensitivity precise is the specific contribution this paper aims to make. That is, we will try to provide a general statement that derives a candidate set for accommodation $\mathcal{H}$ for any given LF. A

[16]The ambiguity under consideration here arises from the grammatically licensed choice of whether to attach the PP *with the binoculars* within the NP or within the VP to the exclusion of the NP.

[17]See Crain and Steedman (1985) for a proposal that argues in favour of the proposed architecture here, where principles of syntax and semantics generate the space of potential inferences, and context-sensitive pragmatic principles disambiguate.

[18]Since movement of adjuncts out of NPs is banned, the unintended reading is no longer licensed.

[19]See e.g., Gazdar (1979), Sauerland (2004), Fox (2007b) for discussion. For example, in Fox (2007b)'s treatment, the only alternative to $\exists$ is $\forall$, which is 'innocently excludable,' which means $\neg\forall$ can become an actual scalar implicature. The sentence *some or all* is parsed as $exh(\exists) \vee \forall$. Each disjunct is an alternative, and Fox (2007b)'s innocent exclusion algorithm finds that neither alternative is innocently excludable, hence neither can become an actual scalar implicature. We will briefly discuss Gazdar (1979)'s proposal in Section 8.

task that we will not take up here is the question of how pragmatic principles select from the members of $\mathcal{H}$.[20] Until the nature of these principles is better understood, it seems reasonable to begin by making the following assumption concerning selection: We will assume that once $\mathcal{H}$ is given, any subset of $\mathcal{H}$ may in principle be accommodated.[21]

4.2 Constituents as the Source of Alternatives for Accommodation

Let us proceed, then, with the task of spelling out a proposal for generating $\mathcal{H}$, one with the specific intention of capturing the prediction in (5) as one about accommodation while avoiding the empirical difficulties faced by (5) when confronted with the data in (6). Suppose that π is a projection function assigning presuppositions to sentences of arbitrary complexity. For concreteness, we will identify π with the projection theory of Heim (1983), but in principle any projection theory that algorithmically assigns a unique presupposition to any LF could be used instead.[22] Suppose S_0 is asserted in context c. Our task is to compute $\mathcal{H}$, a set that we will call (following Singh (2007), Schlenker (2010)) the 'hypothesis space' for accommodation. We know, from (6), that we need to allow $\mathcal{H}$ to include at least the projected presupposition of S_0. Following the structurally predictive theories' account of the data in (1)-(4), we should also allow $\mathcal{H}$ to contain the presuppositions of minimal presuppositional constituents contained in S_0. The simplest way to satisfy these criteria would be to identify $\mathcal{H}$ with the set of presuppositions of all the constituents (reflexively) dominated by S_0.[23] That is:

[20]There are many proposals concerning the factors that might be involved, including reasoning about world-knowledge (e.g., Beaver (2001)), the speaker's belief state (e.g., Heim (2006), Beaver and Zeevat (2007)), the speaker's intended target common ground (e.g., von Fintel (2008)), relevance (e.g., van Rooij (2007), Singh (2007), Schlenker (2010)), logical properties of the set of alternatives (e.g., Singh (2008, 2009)), and possibly other factors. We hope to return to this in future work, and hope that our decision to focus here on alternatives without also saying something more substantive about selection will turn out, in the final analysis, to have been innocuous.

[21]Under the idea that accommodation is a form of context repair (e.g., Stalnaker (1974), Karttunen (1974), Lewis (1979), Heim (1983)), this would be subject to the further condition that the conjunction of accommodated propositions entail the projected presupposition of the sentence. See also Note 31.

[22]E.g., Two-dimensional theories like Karttunen and Peters (1979), alternative dynamic theories like Beaver (2001), pragmatic theories like Schlenker (2008), Chemla (2009b), or trivalent theories like Beaver and Krahmer (2001), Fox (2008), George (2008), Katzir and Singh (2009).

[23]Node A reflexively dominates node B iff $A = B$, or a daughter of A dominates B.

(7) Hypothesis Space Via Constituents: The hypothesis space for accommodation, $\mathcal{H}$, is generated by forming the smallest set containing the presuppositions of the constituents of S_0. That is: (i) $\mathcal{H} = \{\pi(S_i) : S_i \in A(S_0)\}$, (ii) $A(S_0) = \{S_i : S_i$ a constituent of $S_0\}$.

As a proposal for solving the strengthening problem, and given our minimal assumptions about selection from $\mathcal{H}$, the way to test this proposal is as follows. For any given sentence S_0, we predict a context-independent hypothesis space for accommodation, $\mathcal{H}$. We confirm the predictions of the theory if we find members of $\mathcal{H}$ whose conjunctions are attested as accommodations in some contexts, and we refute the theory if we generate members of $\mathcal{H}$ whose conjunctions are not allowed to be accommodated.[24] With respect to these criteria, the proposal in (7) provides a descriptively adequate statement as far as the data in (1)-(4) and (6) are concerned. We depict our predictions in schematic form immediately below in (8) and (9), and follow this with a brief discussion in words about the way these schematic depictions make sense of the relevant data. In (8) we summarize our predictions about the structures discussed earlier that project conditional presuppositions (we work through structures like (1), (2), (6c) and (6d)),[25] and in (9) we summarize our predictions about the different accommodation possibilities in the structures discussed earlier that project belief attributions as presuppositions ((3) and (4)).

(8) a. S_0 = If ϕ, ψ_p
$A(S_0) = \{S' : S'$ a constituent of $S_0\} = \{S_0, \phi, \psi_p\}$
$\mathcal{H} = \{\pi(S') : S' \in A(S_0)\} = \{\pi(S_0), \pi(\psi_p)\} = \{\phi \rightarrow p, p\}$[26]

b. S_0 = α *knows* (if ϕ, then p) = K_α (if ϕ, then p)
$A(S_0) = \{S_0$, if ϕ then p, ϕ, $p\}$
$\mathcal{H} = \{\pi(S_0)\} = \{\phi \rightarrow p\}$[27]

c. S_0 = if $\phi \wedge \psi_p$, then ξ
$A(S_0) = \{S_0, \phi \wedge \psi_p, \phi, \psi_p, \xi\}$
$\mathcal{H} = \{\pi(S_0), \pi(\psi_p)\} = \{\phi \rightarrow p, p\}$[28]

d. $S_0 = \neg(\phi \wedge \psi_p)$

[24] More accurately, we refute the theory if the above condition is met, and we produce an alternative theory that captures at least as much data with less stipulations.

[25] I trust that the reader can fill in what would be needed to account for (6a) and (6b).

[26] To avoid clutter, I omit adding $\mathcal{W}$ (the set of all worlds) as 'the presupposition' of non-presuppositional sentences like ϕ.

[27] The other constituents 'if ϕ then p,' ϕ, p are all presuppositionless.

[28] $\pi(S_0) = \pi(\phi \wedge \psi_p)$, and ξ and ϕ are presuppositionless.

$A(S_0) = \{S_0, \phi \wedge \psi_p, \phi, \psi_p\}$
$\mathcal{H} = \{\pi(S_0), \pi(\psi_p)\} = \{\phi \rightarrow p, p\}$[29]

(9) a. $S_0 = B_\alpha \psi_p$
$A(S_0) = \{S_0, \psi_p\}$
$\mathcal{H} = \{\pi(S_0), \pi(\psi_p)\} = \{B_\alpha p, p\}$

b. $K_\beta(B_\alpha p)$
$A(S_0) = \{S_0, B_\alpha p, p\}$
$\mathcal{H} = \{\pi(S_0)\} = \{B_\alpha p\}$[30]

To give a sense of how the predictions work, we begin by working through the contrast between structures like 'if ϕ, then ψ_p' (like (1) and (6a), here schematically represented as in (8a)), and 'K_α (if ϕ, then p)' (like (2), here schematically represented as in (8b)). Recall that the desired prediction is to allow accommodation of $\phi \rightarrow p$, as well as p, in (8a), but to restrict accommodation to only $\phi \rightarrow p$ in (8b). We predict these results as follows. In (8a) there are two constituents that carry a presupposition: the root S_0, and the consequent ψ_p. The candidate set for accommodation, $\mathcal{H}$, is made up of the projected presuppositions of these constituents: $\mathcal{H} = \{\phi \rightarrow p, p\}$. In (8b), however, only the root is presuppositional. The other constituents in (8b), namely, ϕ, p, and the embedded conditional 'if ϕ, p' are all presuppositionless. Thus $\mathcal{H}$ will be a singleton set in this case, so that the only allowed accommodation is the projected conditional presupposition.

Turning to the attitude ascriptions in (9), our answer to why accommodation of p is not possible in (9b) = $S_0 = K_\beta(B_\alpha p)$ is similar to our answer for why (8b) allows only accommodation of the projected presupposition: there is no constituent of S_0 with p as a presupposition. In contrast, (9a) = $S_0 = B_\alpha \psi_p$ has ψ_p as a constituent, which makes p available for accommodation.[31]

[29] $\pi(\phi \wedge \psi_p) = \pi(S_0)$, and ϕ is presuppositionless.

[30] The embedded constituents $B_\alpha p$ and p themselves are presuppositionless.

[31] Given our assumptions about selection from $\mathcal{H}$, the possibilities for (non-null) accommodation here are: (i) Accommodate both $B_\alpha p$ and p, (ii) Accommodate $B_\alpha p$ without accommodating p, (iii) Accommodate p without accommodating $B_\alpha p$. Under the assumption that accommodation is a form of context repair the third of these options would be ruled out (given the standard satisfaction theoretic prediction that $B_\alpha \psi_p$ presupposes $B_\alpha p$ (e.g., Heim (1992))). Out of the remaining possibilities, while (i) and (ii) are both attested, (i) seems to be preferred (e.g., Heim (1992), Geurts (1999), Beaver and Geurts (2010)), a matter that a theory of selection will have to account for. It is also sometimes claimed that option (iii) also occurs (see Heim (1992), Geurts (1999), Beaver and Geurts (2010) for discussion). While the issues are complex (e.g., distinguishing this option from *de re* construals seems not so trivial), note that whatever the facts about (iii), they might not have any relevance to the proposal in (7). If it should be determined that (iii) occurs through

We have thus succeeded in incorporating the structurally predictive theories' insight in (5) into a statement about accommodation to capture the contrasts in (1)-(4). As opposed to these theories, however, we are able to extend the basic insight to cases like (6) as well. For example, our account of (6c) and (6d), schematically presented above as (8c) and (8d), generates the presupposition p of the embedded constituent ψ_p as a candidate for accommodation, but it also generates the conditional presupposition $\phi \rightarrow p$ of the root as an accommodation candidate.[32] Structurally predictive theories had no way to predict the latter result, given that their projection method selects from the presuppositions of minimal presuppositional constituents. The satisfaction theory, on the other hand, is able to assign semantic presuppositions directly to constituents of any complexity. This feature allows the sentences in (6) to receive conditional presuppositions as a matter of projection, and hence (given (7)) also as a matter of accommodation. Our capacity to account for these data might thus be taken to support the division of labour proposed by satisfaction theorists in dealing with the proviso problem: there is a semantic presupposition projection function that is not structurally predictive (cf. (5)), and when the presuppositions produced by this projection function seem too weak, the culprit is accommodation.

At the same time, in contrast with standard satisfaction-theoretic approaches to accommodation, the statement in (7), adapted from structurally predictive theories for the purposes of accommodation, allows us to predict when different sentences presupposing q should be forced to restrict accommodation to q only, and when they might allow for the option to accommodate something else. The former case should be found only with those sentences that give rise to a singleton $\mathcal{H}$. Whether a sentence is like this can be predicted entirely from the structural location of presupposition triggers contained inside of it. For example, the crucial factor responsible for allowing accommodation of John having a sister in (1) (= *If John flew to Toronto last week, his sister picked him up from the airport*), but not in (2)

accommodation, then (7) could be made consistent with this result by giving up the assumption that accommodation is a form of context repair (cf. Geurts (1996), Katzir and Singh (2010)). If it turns out that (iii) is not an allowed accommodation, then we would attribute the ban on it by adopting the standard assumption that accommodation is a form of context repair.

[32]While (6a-d) all give rise to accommodation of the projected conditional presupposition $\phi \rightarrow p$, it is well known that structures of this kind also allow accommodation of the embedded presupposition p itself. For example, a change of (6d) to *If it is raining in Cambridge and the applicant realizes we can't hire him, he won't be disappointed by a rejection letter*, the accommodation is that we can't hire the applicant. Similar remarks apply to the other sentences in (6) (see e.g., Beaver (2001) for (6a,b), Singh (2007) for (6c) – see also (1)). These possibilities are straightforwardly predicted by the statement in (7).

(= *Mary knows that if John flew to Toronto last week he has a sister*), is that (1) has an embedded constituent presupposing that John has a sister, while (2) does not. It follows that if we change the structure of (2) in a way that overcomes this, we should find accommodation of John having a sister becoming possible. The following variant of sentences discussed in Gazdar (1979) provides evidence in favour of this prediction:[33]

(10) S_0 = If John flew to Toronto last week, Mary knows that he has a sister (= if $\phi, K_\alpha p$)
$A(S_0) = \{S_0, \phi, K_\alpha p, p\}$
$\mathcal{H} = \{\pi(S_0), \pi(K_\alpha p)\} = \{\phi \to p, p\}$[34]

The structure sensitivity of accommodation proposed in (7) allows us to classify (1) and (10) on one side, and (2) on the other. Without (7), the pragmatic system sees them all as sentences that project a conditional presupposition. It is not clear what else would need to be added to the system to have it tell us why the accommodation possibilities generated by these sentences should cluster as they do.

If these considerations are on the right track, we might tentatively conclude that there are two lessons to be learned from Geurts (1996, 1999)'s proviso problem. First, as assumed by most satisfaction theorists, the proviso problem is crucially about accommodation, not projection. Second, as predicted by structurally predictive theories, the presuppositions of embedded constituents are crucial indicators of what may be presupposed at the root, with the revised understanding that these indicators are about what may be accommodated, not about what projects.

If we accept this much, then the question that we face is whether (7) correctly captures the way in which accommodation is structure-sensitive. And the answer to this question lies in the negative. The reason is that the hypothesis spaces that

[33]It might be noteworthy (especially when we turn to the task of devising a solution to the selection problem) that under Gazdar (1979)'s update system, constituent clauses normally give rise to ignorance inferences. These in turn have been argued to 'cancel' presuppositional inferences (e.g., Gazdar (1979), van der Sandt (1988), Geurts (1999), von Fintel (1998), Heim (2006), Singh (2008, 2009), Katzir and Singh (2010)). We might have expected, then, that since *he has a sister* is a constituent of (10), it should not have been possible to infer that John does have a sister. Gazdar (1979) was aware of this difficulty (see his discussion of the contrast between his example (63) = *If John sees me, he will regret seeing me* and his example (64) = *If John tells Margaret, he will regret seeing me* on p.60), and included an exception for cases of this sort (see clause (iv) of his definition of clausal im-plicatures on p.59).

[34]The other constituents, ϕ, p, are presuppositionless.

(7) gives rise to are sometimes too small. Evidence for this comes from various observations that indicate that it is possible to accommodate propositions that are not the projected presupposition of any constituent contained in a sentence. For example, Geurts (1996) and Schlenker (2010) point out that conditionals like 'if S_1 and S_2, then ψ_p,' which are predicted to presuppose $S_1 \wedge S_2 \rightarrow p$ (through π), allow one to accommodate $S_1 \rightarrow p$ even though this is not the presupposition of any constituent contained in such conditionals.

(11) a. If John is a scuba diver and wants to impress his girlfriend, he'll bring his wetsuit
Accommodation: that if John is a scuba diver he has a wetsuit

b. If John is 64 years old and he knows our hiring policies, he is aware that he cannot apply for this job
Accommodation: that if John is 64 years old, he cannot apply for this job

And Schlenker (2010) points out that this problem arises in quantificational constructions as well. For example, he notes that one naturally infers from the following that every one of the speaker's ten best friends used to smoke.[35] However, this is not the presupposition of any constituent of the sentence.[36]

(12) Every one of my ten best friends who is smart has stopped smoking
Accommodation: that every one of my ten best friends used to smoke

[35] He also points out that DRT systems are unable to predict this inference, nor can they capture the inferences in (11). The general idea is that none of their predicted readings end up entailing the desired inferences. Focusing on (12), DRT systems predict two readings for this sentence, which may be paraphrased as: (i) every one of my ten best friends who is smart and used to smoke has stopped (intermediate accommodation), (ii) every one of my ten best friends who is smart used to smoke but has stopped, neither of which entails that every one of my ten best friends used to smoke.

[36] Under the satisfaction theory, quantificational constructions $Q(A)\lambda x(B(x)_{P(x)})$ are predicted to presuppose $\forall x(A(x) \rightarrow P(x))$ (that is, that every A is p). Glossing over several details (e.g., the internal structure of the relative clause *who is smart*), assuming the LF of (12) is something like *every one of my ten best friends who is smart* λ_1 [t_1 *has stopped smoking*], satisfaction theories predict the sentence to presuppose that every one of the speaker's ten best friends who is smart used to smoke. Concerning the relation with the statement in (7), note that neither the embedded relative clause *who is smart*, nor the postmovement t_1 *has stopped smoking*, presupposes that every one of the speaker's ten best friends used to smoke, which Schlenker (2010) notes is the desired accommodation.

From the perspective of satisfaction theories, this looks like another instance of the proviso problem. For example, we can again employ Geurts (1999)'s trick, and find a different construction with the same presupposition as (12), but which does not allow us to accommodate that every one of the speaker's ten best friends used to smoke.

(13) Mary knows that every one of my ten best friends who is smart used to smoke

Given the conclusions drawn in this section, we take these observations to be teaching us that the operations that derive the alternative logical forms in $A(S_0)$ must be allowed to end in something other than a constituent of S_0. In the next section we will consider two recent proposals that allow for this (Singh (2008, 2009) and Schlenker (2010)). With the relation between S_0 and the alternatives to S_0 taking on prime importance, the general question we want to ask is: What are the operations on S_0 used to generate the members of $A(S_0)$?[37] To answer this question, it will be helpful, I think, to put in place an abstract framework for discussing 'natural' operations on trees. This will allow us to state precisely what the choice points are in generating alternatives in this way, and might allow us to better understand the particular choices made by the linguistic system.

5 Substitution and Deletion Operations on Trees

There are certain natural local operations on a parse tree that can be employed to generate new parse trees.[38] Two that have been used in much recent semantic/pragmatic theory involve substituting elements of the tree with other elements from a substitution source (usually the lexicon), and deleting elements of the tree.[39] For example, through a sequence of operations involving the substitution of the terminals of S_1 with other lexical items we can transform 'if S_1 then S_2' into 'if S_3 then S_2,' while through a sequence of operations involving deletion of

[37] cf. Note 15.

[38] See e.g., Bille (2005) for an instructive survey.

[39] These operations result in structures that have no more nodes than the original. A third tree edit operation which inserts nodes into a tree is also defined, so that, e.g., 'if S_1 then S_2' can be modified to 'if $S_1 \wedge S_3$ then S_2.' The linguistic system does not seem to employ this operation when generating alternatives. See Katzir (2008) for detailed discussion.

nodes[40] we can transform 'if S_1 then S_2' into S_2 (by deleting all the nodes not dominated by S_2).[41]

Returning to the generation of alternatives for accommodation, the proposal in (7) employs only one of these options, using deletions but avoiding substitutions altogether. Recall that the way it does this is by employing a sequence of deletions to the structure S_0 until a constituent of S_0 remains. The set of accommodation alternatives, $\mathcal{H}$, is the set made up of the projected presuppositions of structures derived in this way. We saw (cf. (11) and (12)) that this proposal undergenerates, so we will need to make different choices to allow supersets of $\mathcal{H}$ to be generated. Two competing ideas found in Singh (2008, 2009) and Schlenker (2010) employ a richer set of operations than (7) to allow for this and, as we will see below, manage to extend to cases like (11) and (12).

Singh (2008, 2009) enriches the alternatives in two ways: (1) By allowing arbitrary sequences of deletions to S_0, so that structures that are derived by deletion but which are not constituents of S_0 nevertheless become members of $A(S_0)$, and (2) By allowing the system to generate alternatives by substituting terminals of S_0 with elements from the lexicon. The motivation for doing this was to make use of Katzir (2007)'s implicature alternatives for the task of accommodation: Assuming that we have independent evidence (e.g., from the implicatures that are drawn) that these objects have been produced,[42] and given the need for alternatives for purposes of accommodation, it would seem reasonable to expect that the language faculty would take advantage of these objects by reusing them rather than finding some alternative route to accommodation alternatives.[43]

[40]When non-root node v with mother v' is deleted, the children of v (if any) become children of v', preserving linearization statements.

[41]See e.g., Horn (1972), Gazdar (1979), Sauerland (2004), Katzir (2007), Fox and Katzir (2009) for applications of substitution operations to the theory of implicature, and Schlenker (2008), Fox (2008) for applications of substitution operations to presupposition projection. For the use of deletion, see e.g., Gazdar (1979), Katzir (2007) for applications to the theory of implicature, and see e.g., Gazdar (1979), Soames (1982) for applications to presupposition projection.

[42]Under Katzir (2007)'s theory of implicature alternatives, the alternatives are those derived by arbitrary sequences of deletions and substitutions of terminals for other lexical items. I refer the reader to Katzir (2007) for arguments in favour of this approach, and for arguments that a slightly richer set of substitution operations might be called for (to allow parts of the tree to be replaced by other trees that might be salient in the discourse). These arguments will not bear on anything we say here.

[43]Singh (2008, 2009) proposed that the relation between implicature and accommodation extends beyond use of the same alternatives, arguing that they are computed together in something like Gazdar (1979)'s proposal, differing by allowing potential accommodations to cancel potential implicatures (in addition to the other way around). We will discuss difficulties with the idea of

Schlenker (2010), on the other hand, employs only substitution operations. As a result, the alternative structures generated by his system have the same shape as S_0, differing only in the lexical items occupying terminal nodes. The derived structures are therefore never subconstituents of S_0; whenever it appears that we have employed a subconstituent of S_0 in generating an accommodation alternative (e.g., when we accommodate p from 'if ϕ, then ψ_p') the system mimics the effect of deletion through its methods of substitution (as we will soon see). The motivation for employing these substitutions is to assimilate these alternatives with those used in recent theories of presupposition projection that derive presuppositions by reasoning over sets of alternatives of this kind (e.g., Schlenker (2008), Fox (2008), George (2008)).[44] If the projection system employs a given set of operations, it would seem reasonable to try to extend these operations to cover accommodation, as well.

Both proposals thus have a seemingly reasonable motivational support. I will try to illustrate the key technical insights of these proposals by examining their application to the problematic (11) and (12), which I depict schematically in (14a) and (14b) below:

(14) a. S_0 = If $S_1 \wedge S_2$, then ψ_p
b. S_0 = Every A who is B $\lambda x(B(x)_{P(x)})$

Recall that what we want is for (14a) to allow accommodation of $S_1 \rightarrow p$ and for (14b) to allow accommodation of $\forall x(A(x) \rightarrow P(x))$ (even though neither sentence contains a constituent with these propositions as their projected presuppositions).

In Singh's analysis, this result is obtained by applying a sequence of deletion operations whose result is deletion of $\wedge S_2$ in (14a), and deletion of the relative clause *who is* B in (14b), leading to the following structures:

(15) a. If S_1, then ψ_p
b. Every A $\lambda x(C(x)_{P(x)})$

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identifying accommodation alternatives with scalar alternatives momentarily.

[44]Where ϕ is a sentence containing constituent S_p, $\phi(S_p)$, the projected presupposition of $\phi(S_p)$ is computed by reasoning with a set of alternatives derived by arbitrary sequences of substitutions of the elements to the *right* of S_p in ϕ. The particular reasoning does not matter to anything we say here. The important point is the motivational one. In generating alternatives for accommodation, Schlenker (2010) simply removes the restriction to substitutions to the right of S_p and allows for substitutions of elements to the left of S_p, as well.

Note that these structures are not constituents of their corresponding S_0s in (14). Nevertheless, by allowing arbitrary sequences of deletions Singh's propoal allows these structures to become elements of $A(S_0)$. The projected presuppositions of these sentences thus become elements of $\mathcal{H}$. Under the approach to projection assumed here (Heim (1983)), (15a) projects $S_1 \rightarrow p$, and (15b) projects $\forall x(A(x) \rightarrow P(x))$. And these presuppositions are precisely the desired ones.

In Schlenker's analysis, accommodation alternatives are generated by replacing all material in the tree that might be 'irrelevant' to the presupposition of some embedded constituent with other elements of the same semantic type.[45] This gives rise to a set of alternative structures with the same shape as S_0 but which might have different elements occupying terminal nodes. One crucial difference between our proposal here and Schlenker's is in our assumptions about selection from $\mathcal{H}$: While we are assuming that any subset of $\mathcal{H}$ may be accommodated, Schlenker requires that *all* the members of $\mathcal{H}$ be accommodated. In his proposal, the task of 'selection' is restricted to determining which material is (ir-)relevant to the embedded presupposition. Once this is done, the rest of the system functions deterministically to produce the set of alternatives $A(S_0)$, and the corresponding set of propositions $\mathcal{H}$, all of which end up being accommodated. To see how this applies to (14a), if we assume that S_2 is irrelevant to p, then S_2 will be a target for substitution. One element assumed to be available for substitution is the tautology, $\top$. Similarly, if $B(x)$ is irrelevant to $P(x)$ in (14b), then it may also be replaced by all predicative elements, including the tautologous one, $\top$. Thus, the following structures will be derived:

(16) a. If $S_1 \wedge \top$, then ψ_p
b. Every A who is $\top$ $\lambda x(C(x)_{P(x)})$

The presuppositions of these derived structures are precisely the desired ones: $S_1 \rightarrow p$ in (16a), and $\forall x(A(x) \rightarrow P(x))$ in (16b).[46] They turn out (given monotonicity) to also be stronger than the presupposition of any other structure derivable through substitution of elements for S_2 in (14a), and for $B(x)$ in (14b). Hence, the desired accommodations follow.

We have in place now two proposals for overcoming the undergeneration problem faced by (7). Unfortunately, in solving this undergeneration problem these

[45]Schlenker employs a variant of the standard probabilistic formulation of relevance, under which p is irrelevant to q if the probability of q conditioned on p is unchanged.

[46]This holds for both the projection system assumed here (Heim (1983)), as well as for Schlenker's own proposal in Schlenker (2008).

proposals immediately give rise to an overgeneration problem. My immediate concern is with their employment of substitution operations (though we will return to concerns with the deletions employed by Singh's analysis shortly). As soon as we allow substitutions into our theory, empirical considerations would seem to demand that we place constraints on what the allowed substitutions are. The point is familiar from the theory of implicature, where substitution of scalar items for their Horn mates is used to generate alternatives. The question there is,[47] what tells us that *some* and *all* are interchangeable while *some* and *half*, or *some* and *some but not all*, are not?[48] Nothing in the theory of implicature answers this question, so without a theory of which scalar items may be substituted for one another, we are forced to stipulate Horn mates on a case by case basis.[49]

The problem carries over in identical form when substitutions are used to generate accommodation alternatives. To see this, consider again the case of attitude predicates:

(17) S_0 = John believes it stopped raining

Recall that this sentence presupposes only that John believes it was raining, and that what we normally accommodate is this projected presupposition, as well as the proposition that it was raining. And nothing else seems to be accommodated. Assuming this is correct, this means we need the proposition that it was raining to be in $\mathcal{H}$, which in turn means we need an alternative LF in $A(S_0)$ which presupposes this (as a matter of projection). In addition, since nothing else is accommodated, we should not have any additional propositions in $\mathcal{H}$.[50]

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[47]See Kroch (1972) and Gazdar (1979) for early formulations of this concern, which was stated in its most general form in von Fintel and Heim (1999). See also Fox (2007a), Katzir (2007), Chierchia et al. (2008), Fox and Katzir (2009) for much relevant discussion.

[48]Evidence for the need to prevent *some but not all* and *half* from being alternatives is the observation that use of *some* never ends up implying 'some and not (some but not all)' (= 'some and all' = 'all'), nor does use of *some* ever end up implying 'some but not half.' For example, assuming with Fox (2007a) that scalar implicatures can generally be paraphrased by adding an overt *only* to the sentence and focusing the relevant scalar items, the fact that the following dialogue makes no sense is evidence that there is no corresponding implicature: A: *Did John eat half of the cookies?* B: # *No! He only ate SOME of them!* (cf. A: *Did John eat all of the cookies?* B: *No! He only ate SOME of them!*).

[49]See Horn (1972), Matsumoto (1995), von Fintel and Heim (1999), Katzir (2007), and Katzir and Singh (2009) for considerations that might help overcome the stipulations.

[50]Unless one can show that other members of $\mathcal{H}$ are entailed by p and $B_j p$ (as in Schlenker (2010)'s approach to (16)), or that propositions that are in $\mathcal{H}$ but which nevertheless are not accommodated can be 'cancelled' for principled reasons, say, due to conflicting implicatures (cf.

As for generating an alternative structure that presupposes that it was raining, Singh's system deletes everything other than the embedded constituent to yield *it stopped raining*, which generates the right presupposition. In Schlenker's system, since deletion operations are not allowed, he posits the existence of an identity operator of the same type as *believe*, id, which he defines as a function that returns its complement. Allowing for this, *John* id *it stopped raining* presupposes what id's complement does, namely, that it was raining. The problem is, what in the system allows us to stop at id? For example, it is not clear what prevents, say, *John knows it stopped raining*, and (as discussed by Schlenker (2010)) *John dreamed it stopped raining* from also being considered.

(18) a. John knows it stopped raining
Presupposition: that it stopped raining and John knows it was raining (e.g., Heim (1992))

b. John dreamed that it stopped raining
Presupposition: that John dreamed that it was raining (e.g., Schlenker (2010))

Without a principled way to prevent *know* and id to replace *believe*, we should, at least sometimes, expect to find the presuppositions of (18a) and (18b) accommodated in response to *John believes it stopped raining*. The problem is that this possibility seems to not be allowed.[51] The lack of a principled way to prevent this sort of proliferation of undesired substitutions would seem to be a problematic feature of substitution-based theories of alternatives.

The problem, of course, is a general one. For example, consider the following quantified sentence from Heim (1983):

(19) A/Some fat man pushed his bicycle

Heim (1983) predicts this sentence to project that every fat man has a bicycle, a prediction that seems patently false.[52] One might take this as evidence in favour

Note 33). Under such an approach, our assumption about selection (that any subset of $\mathcal{H}$ in principle may be accommodated) would have to be revised.

[51] See Singh (2008, 2009) for an account that would block at least the presupposition of (18a) from being accommodated, but would not extend in any obvious way to (18b).

[52] Heim (1983) of course was aware of the difficulty of this prediction, and pointed to local accommodation as a way to overcome it. But without a predictive statement telling us when local accommodation is preferred to global accommodation of the projected presupposition itself (or something stronger), we are far from an account of the fact that it seems very difficult to read (19) as in any way implying that every fat man has a bicycle.

of alternative projection theories that make weaker predictions, such as Beaver (2001) and Chemla (2009b), both of which predict an existential presupposition for (19). Even if we accept this, it would remain surprising under an unrestricted substitution-based theory why (19) does not readily lead us to infer (through accommodation) that every fat man has a bicycle. Under the standard assumption that *every fat man pushed his bicycle* presupposes that every fat man has a bicycle,[53] replacing $\exists$ in (19) with $\forall$ should be a way to generate the universal inference. But this does not seem to be allowed.[54] This unavailability of $\forall$ as a substitution seems to hold not only for $\exists$, but for all other quantifiers as well. For example, the experimental results of Chemla (2009a) indicate that the following sentences do not readily give rise to the inference that every fat man has a bicycle:

(20) S_0 = At least three/exactly three/at most three men fat men pushed their bicycles

A substitution-based theory would thus be faced with the task of saying why $\exists$ and $\forall$, or *believe* and *know* and *dream* etc., may not be substituted for one another. In Schlenker (2010)'s system, these subsitutions would have to be blocked at the same time as allowing substitution of id for *believe*. The challenge for such an approach, then, is to provide a principled statement from which these substitution (im)possibilities would follow.

It is not clear to me that this is a challenge that we should feel compelled to take up. For note that we have yet to see a single case of accommodation that demands we go beyond the objects already present in the given structure when deciding what to accommodate. More generally, I know of no presuppositional inferences that have clearly demonstrated the need for substituting elements in the

[53] This is a prediction that is shared by most satisfaction theories of projection, though Beaver (2001) predicts that the universal inference follows only as an entailment. This does not seem to be correct. For example, *If the restaurant is far up the hill, I'll bet every fat man at the conference pushed his bicycle there* more readily implies (i) that every fat man at the conference has a bicycle and the speaker thinks it likely that if the restaurant is far up the hill, every fat man pushed his bicycle to the restaurant, than (ii) that the speaker thinks it likely that if the restaurant is far up the hill, every fat man at the conference has a bicycle and pushed it to the restaurant. See also Schlenker (2009) and Chemla (2009a).

[54] This difficulty may be limited to Singh's system only, as one can imagine a condition on relevance that limits substitution targets to only those entities of the same type as the embedded presupposition. Such a condition could then block the substitution of $\exists$ by $\forall$ in (19). But this does not seem to be a move that Schlenker (2010) could make without losing the ability to generate the accommodation that it was raining in (17).

given structure with objects external to it.[55] If this is correct, then it would seem to be safe to work with the assumption that when generating accommodation alternatives, we have no access to any objects not already somewhere in the structure. The statement in (7), which limited access to constituents of S_0, was one way of fleshing this out. Given the interpretation of sentences like (14a,b), we concluded that such a restriction was too severe. By removing this restriction on deletions, we saw ((15a,b)) that (14a,b) can be accounted for. I will try build on these results by limiting myself to the resources provided within the given structure. I will implement this restriction by allowing only deletions of S_0 in generating alternatives.[56] In the next section, we will see that even this limitation nevertheless leaves a residue of overgeneration. In response to this we will isolate certain difficulties shared by both (7) and unrestricted deletions to lead us to a final statement that captures just the right sets of alternatives for all the data seen so far.

6 Accommodation Alternatives via Deletion Only

We begin by providing a precise statement of the alternatives derived by arbitrary sequences of deletions.

Definition 1 (Tree Inclusion) *Suppose that S, S' are parse trees. We say that S' is* included *in S if and only if S' can be derived from S by a sequence of deletions.*[57]

(21) Hypothesis Space Via Tree Inclusion: The hypothesis space for accommodation in response to S_0, $\mathcal{H}$, is generated by computing the presuppositions of those trees that are included in S_0. That is, $\mathcal{H} = \{\pi(S_i) : S_i \in A(S_0)\}$, (ii) $S_i \in A(S_0)$ iff S_i is included in S_0.

[55] It has sometimes been argued that *particular* theories of presuppositional reasoning that are limited to the given structure do not have the resources for generating attested inferences (e.g., Beaver (2001)). Beaver (2001) was careful to point out that these considerations do not argue against this kind of structure-sensitivity in general. We will return to these arguments in Section 7, where we hope to show that our particular approach manages to avoid the difficulties faced by the targets of Beaver (2001)'s criticisms.

[56] An alternative implementation could employ substitutions where the substitution source is limited to nodes in the tree (see Fox and Katzir (2009) for reformulations of deletions in terms of substitutions with constituents). In Section 8 I briefly discuss this way of implementing the restriction to the given structure.

[57] More pedantically (e.g., Chen and Chen (2006)): Let *delete*(S, v) be the tree obtained from S by removing node v (see Note 40). Then S' is included in S iff there is a sequence of nodes $v_1, \ldots, v_k$ such that $S_0 = S$, $S_{i+1} =$ *delete*(S_i, v_{i+1}) for $i = 0, \ldots, k-1$, and $S_k = S'$.

As we saw in (15) and (17), this liberalization of the statement in (7) overcomes (7)'s undergeneration problem. For example, while *Every* A $\lambda x(C(x)_{P(x)})$ is not a constituent of *Every* A *who is B* $\lambda x(C(x)_{P(x)})$, it is included in it, which makes its projected presupposition available for accommodation. At the same time, (21) allows us to avoid having to make any decisions about objects outside of the given structure.[58] Nevertheless, problems of overgeneration remain.

Recall that sentences (2) and (4) from Geurts (1999), repeated below as (22a) and (23a), respectively, do not allow accommodation of John having a sister (in (2) = (22a)) and it having been raining (in (4) = (23a)). This is no longer predicted. Since (22b) is included in (22a), and (23b) is included in (23a), nothing in the current theory tells us why we do not accommodate the presuppositions of these sentences.

(22) a. S_0 = Mary knows that if John flew to Toronto last week, he has a sister
b. $A(S_0) \ni$ Mary knows that John has a sister

(23) a. S_0 = Mary knows that John believes it was raining
b. $A(S_0) \ni$ Mary knows it was raining

By restricting ourselves to deletion operations only, we have found that the proposals that first come to mind, namely, delete until you find a constituent (7), and delete anything you like (21), lead to incorrect results. The former undergenerates, and the latter overgenerates. In trying to understand why these fairly natural statements misfire, we find that they both come with certain undesirable computational commitments. Specifically, I would like to suggest that they both give rise to wasteful computations that a properly designed system would avoid. I will try to identify these problematic design features and will argue that an alternative proposal that incorporates the desired efficiencies leads us to a more descriptively adequate statement.

[58]Note however that we do need to block $C(x)_{P(x)}$ from being an available alternative despite its being included in *Every* A *who is B* $\lambda x(C(x)_{P(x)})$. We can see the need to block this by considering a sentence like (12) = *Every one of my friends who is smart has stopped smoking*. One structure that is included in (12) is t_1 *has stopped smoking*, which receives an interpretation only under an assignment function. We can use this property to argue that it cannot become an alternative for purposes of accommodation. To see this, imagine that Sue is salient, but is not one of my ten best friends. We are not licensed to accommodate that Sue used to smoke. We can ban such structures by adapting van der Sandt (1992)'s 'Trapping Constraint' (cf. Note 9) so that accommodation alternatives must keep bound variables in S_0 bound: $S_i \in A(S_0)$ only if all occurrences of free variables in S_i are also free in S_0.

One wasteful property of both (7) and (21) is that they both pick out non-presuppositional constituents of S_0 for membership in $A(S_0)$ even though such constituents are guaranteed to have no effect on the proposition that is ultimately accommodated. For example, in (22a), three non-presuppositional constituents would end up being generated in $A(S_0)$: (1) if John flew to Toronto last week he has a sister, (2) John flew to Toronto last week, (3) John has a sister.[59] While the addition of these sentences to $A(S_0)$ is of course technically harmless, it is unnecessary work, and a well-designed accommodation would avoid this.[60]

In looking for an alternative statement, we should thus begin by dividing the sentences contained in S_0 into two sets, those that project a non-trivial presupposition and those that don't. Assuming that we employ a semantic projection function for this task, we would have a partition of the nodes of S_0 into those that denote total propositions, $T(S_0)$, and those that denote partial or three-valued propositions, $P(S_0)$. In formulating a new statement about the generation of alternatives $A(S_0)$, we will make sure that no members of $T(S_0)$ enter $A(S_0)$. We can view this step as being a way of designating the elements of $P(S_0)$ as the basic resources out of which accommodation alternatives should be construcued.

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[59]The deleted structure is not actually *John has a sister*, but rather *he*$_i$ *has a sister* (there may or may not be an index on *John* as well). When alternatives $S(x)$ with free variables in them enter $A(S_0)$ (cf. the additional constraint in Note 58), we will need a way to ensure that $S(x)$ is interpreted with respect to the same assignment function as in its interpretation as part of S_0. We will stipulate that this is so for now, and hope that we can overcome the stipulation in future work. One way of doing this would be to assume that during the course of generating and interpreting S_0, we sometimes store the results of our computations along the way, a move which could be motivated on independent grounds (e.g., Chomsky (2001), Fox and Pesetsky (2005), and much other work). Suppose, for instance, that whenever we reach a sentential node S (in a 'bottom-up' competence system), we store into a 'local memory' $\mathcal{LM}$ the structure corresponding to S, the semantic interpretation of S, and statements about the linearization of its terminals. Then we could reimplement deletion of nodes in S_0 as substitution of nodes in S_0 with elements from $\mathcal{LM}$. For instance, we would derive *he has a sister* as an alternative to (22a) by substituting the root node S_0 with $S(x)$ = *he has a sister* from $\mathcal{LM}$. The benefit of storing objects in $\mathcal{LM}$ is that they become available for later reuse, which saves us from having to run through the computations associated with S again. That is, when we reuse objects from $\mathcal{LM}$, we reuse all of the associated information stored in local memory: its structure, meaning, linearization, etc. Such an implementation would ensure that $S(x)$, when used as an alternative, receives the same interpretation as it receives as part of S_0 itself. See also O'Donnell et al. (2009) for much discussion on computation/storage tradeoffs in linguistic computations.

[60]If the system responsible for generating alternatives does indeed avoid this wasteful work, it would provide additional support for the general idea that linguistic computations that have no effect on a desired outcome are avoided (e.g., Chomsky (1995), Fox (2000), Reinhart (2006), and much other work).

Given this partition, we would expect the operations that generate alternatives to be sensitive to it, for otherwise the work done to make the partition in the first place would be wasted. And we see that (21) is wasteful in this way. Recall that the way (21) determines whether some structure S' belongs to $A(S_0)$ is by testing whether S' can be derived from S_0 by a sequence of deletions. This test, however, is totally oblivious to the classification of the sentences of S_0 into $T(S_0)$ and $P(S_0)$, since it in no ways references that division. For example, in (22a) we partition the nodes in S_0 so that the only constituent in $P(S_0)$ is S_0 itself, while all proper constituents end up in $T(S_0)$. A statement that is sensitive to this division, and in particular to the idea that $P(S_0)$ provides the resources out of which alternatives are to be generated, would in some way reference this division. But in generating $A(S_0)$, (21) ignores the partition entirely and simply deletes elements of S_0 until a new sentence is formed, and adds the result to $A(S_0)$. From the perspective of (21), the first step could just as well not have taken place. As a result of ignoring it, not only do we generate alternatives that we know cannot be in $A(S_0)$ (e.g., (22b)), we also generate alternatives whose membership in $A(S_0)$ doesn't matter one way or the other (e.g., *John flew to Toronto last week* becomes an alternative to (22a)), a consequence that motivated the partition in the first place.

A better designed system would thus make membership in $A(S_0)$ somehow dependent on $P(S_0)$. One way of doing this would be to identify $A(S_0)$ with $P(S_0)$. But this is too weak. For example, in sentences like (14a), repeated below as (24), there are two members of $P(S_0)$, namely S_0 itself, and ψ_p. By identifying $A(S_0)$ with this set, we would predict that the only accommodation possibilities are the presuppositions of these sentences, namely, $S_1 \wedge S_2 \rightarrow p$ and p. However, we saw earlier (cf. (11) = *If John is a scuba diver and wants to impress his girlfriend, he'll bring his wetsuit*) that it is possible to accommodate $S_1 \rightarrow p$ from such structures, a proposition which is not the semantic presupposition of any element of $P(S_0)$.

(24) S_0 = If $S_1 \wedge S_2$, then ψ_p

We thus cannot identify $A(S_0)$ with $P(S_0)$; given facts like those coming out of (24), $A(S_0)$ must sometimes be allowed to be a proper superset of $P(S_0)$. Keeping to the idea that $P(S_0)$ provides the basic resources from which $A(S_0)$ is to be constructed, we will allow a structure $S' \notin P(S_0)$ into $A(S_0)$ only if it contains some element of $P(S_0)$. At the same time, under the idea that S_0 itself provides all and only the resources available to the accommodation system, we will forbid any structure S' from entering $A(S_0)$ unless it is included in S_0 (derivable from S_0 by a sequence of deletions, cf. Definition 1). Thus, $A(S_0)$ will be the set of sentences that are included in S_0, and which contain some element of $P(S_0)$ or other.

We begin by discussing, in words, how this idea can be applied to some of our examples. We will then turn to a more formal statement and summary of the proposal's predictions.

(25) a. S_0 = Mary knows that if John flew to Toronto last week, he has a sister (= (2) = (22a))
$P(S_0)$: $\{S_0\}$
A structure S' can belong to $A(S_0)$ iff it contains a member of $P(S_0)$, and is included in S_0. Only one structure satisfies these conditions, namely S_0 itself. Thus:
$A(S_0) = \{S_0\}$
$\mathcal{H} = \{\pi(T) : T \in A(S_0)\}$ = {that if John flew to Toronto last week he has a sister}

b. S_0 = Mary knows that John believes it was raining (= (4) = (23a))
$P(S_0)$: $\{S_0\}$
$A(S_0) = \{T : T$ contains some member of $P(S_0)$, T is included in $S_0\}$ = $\{S_0\}$
$\mathcal{H} =$ {that John believes it was raining}

c. S_0 = If John flew to Toronto last week, Mary knows he has a sister
$P(S_0)$ = {S_0, *Mary knows he has a sister*}
$A(S_0)$ = $\{T : T$ contains a member of $P(S_0)$, T included in $S_0\}$ = $P(S_0)$
$\mathcal{H} =$ {that if John flew to Toronto last week he has a sister, that John has a sister}

d. S_0 = Every one of my ten best friends who is smart has stopped smoking
$P(S_0)$ = {S_0, t_1 has stopped smoking}
$A(S_0) = \{T : T$ contains a member of $P(S_0)$, T included in S_0, t_1 occurs as a bound variable in T[61]} = {S_0, *Every one of my ten best friends has stopped smoking*}
$\mathcal{H} =$ {that every one of my ten best friends who is smart used to smoke, that every one of my ten best friends used to smoke}

[61] cf. Note 58.

e. S_0 = Mary knows that every one of my ten best friends who is smart used to smoke
$P(S_0)$ = $\{S_0\}$
$A(S_0) = \{T : T$ contains S_0, T included in $S_0\} = \{S_0\}$
$\mathcal{H} = \{$that every one of my ten best friends who is smart used to smoke$\}$

Here is our final statement concerning the alternatives for accommodation.[62]

(26) Hypothesis Space Via Inclusion and Presuppositional Containment: The hypothesis space for accommodation in response to S_0, $\mathcal{H}$, is generated by computing the presuppositions of those trees that are included in S_0 and which contain an element of $P(S_0)$. That is, $\mathcal{H} = \{\pi(T) : T \in A(S_0)\}$, (ii) $T \in A(S_0)$ iff T is included in S_0, and T contains some element of $P(S_0)$.

We present in schematic form the predictions about accommodation possibilities for some representative sentence types discussed in this paper:

(27) a. S_0 = If ϕ, ψ_p
$P(S_0) = \{S_0, \psi_p\}$
$A(S_0) = \{T : T$ included in S_0, T contains an element of $P(S_0)\}$ = $P(S_0)$
$\mathcal{H} = \{\pi(T) : T \in A(S_0)\} = \{\pi(S_0), \pi(\psi_p)\} = \{\phi \rightarrow p, p\}$

b. S_0 = K_α (if ϕ, then p)
$P(S_0) = \{S_0\}$
$A(S_0) = \{T : T$ included in S_0, T contains some member of $P(S_0)\}$ = $\{S_0\}$
$\mathcal{H} = \{\pi(S_0)\} = \{\phi \rightarrow p\}$

c. S_0 = if $\phi \wedge \psi_p$, then ξ
$P(S_0) = \{S_0, \phi \wedge \psi_p, \psi_p\}$
$A(S_0)$ = $\{T : T$ included in S_0, T contains some member of $P(S_0)\}$

[62] While our focus has been on sentences that contain a single presupposition trigger, the statement in (26) readily extends to sentences with multiple triggers. For example, we straightforwardly predict that we accommodate both that John has a sister, and that he has a wife, from sentences like *Either John's sister will come to the banquet or his wife will* (whatever the right projection properties of disjunctions turn out to be, cf. Karttunen (1974), Beaver (2001), Schlenker (2008)). This is because each disjunct is a member of $A(S_0)$, in addition to the disjunction itself.

= $\{S_0, \phi \wedge \psi_p, \psi_p,$ if ψ_p then $\xi\}$[63]
$\mathcal{H} = \{\pi(S_0), \pi(\psi_p)\} = \{\phi \rightarrow p, p\}$[64]

d. $S_0 = \neg(\phi \wedge \psi_p)$
$P(S_0) = \{S_0, \phi \wedge \psi_p, \psi_p\}$
$A(S_0) = \{T : T$ included in S_0, T contains some member of $P(S_0)\}$ = $\{S_0, \phi \wedge \psi_p, \psi_p, \neg\psi_p\}$
$\mathcal{H} = \{\pi(S_0), \pi(\psi_p)\} = \{\phi \rightarrow p, p\}$[65]

(28) a. $S_0 = B_\alpha\psi_p$
$P(S_0) = \{S_0, \psi_p\}$
$A(S_0) = \{T : T$ included in S_0, T contains some member of $P(S_0)\}$ = $P(S_0)$
$\mathcal{H} = \{\pi(S_0), \pi(\psi_p)\} = \{B_\alpha p, p\}$

b. $K_\beta(B_\alpha p)$
$P(S_0) = \{S_0\}$
$A(S_0) = \{T : T$ included in S_0, T contains $S_0\}$ = $\{S_0\}$
$\mathcal{H} = \{\pi(S_0)\} = \{B_\alpha p\}$

(29) S_0 = if S_1, then $K_\alpha p$
$P(S_0) = \{S_0, K_\alpha p\}$
$A(S_0) = \{T : T$ included in S_0, T contains some member of $P(S_0)\}$ = $P(S_0)$
$\mathcal{H} = \{\pi(S_0), \pi(K_\alpha p)\} = \{S_1 \rightarrow p, p\}$

(30) S_0 = if S_1 and S_2, then ψ_p
$P(S_0) = \{S_0, \psi_p\}$
$A(S_0) = \{T : T$ included in S_0, T contains some member of $P(S_0)\}$ = $\{S_0$, if S_1 then ψ_p, if S_2 then ψ_p, $\psi_p\}$
$\mathcal{H} = \{\pi(S_0)$, π(if S_1 then ψ_p), π(if S_2 then ψ_p), $\pi(\psi_p)\}$ = $\{S_1 \wedge S_2 \rightarrow p, S_1 \rightarrow p, S_2 \rightarrow p, p\}$

(31) S_0 = *Every [A who is B]* $\lambda x(C(x)_{P(x)})$
$P(S_0) = \{S_0, C(x)_{P(x)}\}$
$A(S_0) = \{T : T$ included in S_0, T contains some member of $P(S_0)$, x a bound variable in $T\}$ = $\{$*Every [A who is B]* $\lambda x(C(x)_{P(x)})$, *Every A* $\lambda x(C(x)_{P(x)})\}$
$\mathcal{H} = \{\pi(S_0), \pi($*Every A* $\lambda x(C(x)_{P(x)}))\} = \{\forall x((Ax \wedge Bx) \rightarrow Px), \forall x(Ax \rightarrow$

[63] We derive 'if ψ_p then ξ' by deleting $\phi\wedge$.
[64] $\pi(S_0) = \pi(\phi \wedge \psi_p)$, and π(if ψ_p then ξ) = $\pi(\psi_p)$.
[65] $\pi(\phi \wedge \psi_p) = \pi(S_0)$, $\pi(\psi_p) = \pi(\neg\psi_p)$.

$Px)\}$

(32) $S_0 = Q(A)\lambda x(C(x)_{P(x)})$ (for any generalized quantifier Q)
$P(S_0) = \{S_0, C(x)_{P(x)}\}$
$A(S_0) = \{T : T$ included in S_0, T contains some element of $P(S_0)$, x a bound variable in $T\}$ = $\{S_0\}$
$\mathcal{H} = \{\pi(S_0)\}$

7 On Some Objections to Structure Sensitivity in Accommodation

Section 5.7 of Beaver (2001) enumerated several difficulties for structurally predictive theories of projection. In this section I would just like to point out that our statement in (26) manages to avoid all three of the objections emphasized by Beaver (2001).

First, Beaver (2001) noted that structurally predictive theories do not predict bona fide conditional presuppositions. As discussed above, we avoid this difficulty.

Second, consider a sentence like the following:[66]

(33) Perhaps if George has arrived, none of the press corps knows that George and Al are both here

Beaver (2001) notes that we tend to infer from this sentence that Al is here, and he points out that structurally predictive theories have no way of generating this inference. On the face of it, this seems to be problematic for our system as well, since the statement in (26) does not generate this proposition as a potential accommodation. To see this, we must first assign an LF to (33). Ignoring certain irrelevant details, I will write the LF as follows:

(34) S_0 = $\diamond$ (if S_1, then ψ_p)

Here, ψ_p is the quantified sentence in the consequent, and p is the proposition that George and Al are both here. The presupposition of the embedded conditional is $S_1 \rightarrow p$, and the presupposition of S_0 itself depends on the projection properties of *perhaps*. We will assume with Karttunen (1973) that $\diamond$ is a *hole* for presupposition, so that $\pi(34) = S_1 \rightarrow p$. Then we have the following analysis of the

[66] p.121 of Beaver (2001).

above:

(35) S_0 = $\Diamond$ (if S_1 then ψ_p)
$P(S_0) = \{S_0$, if S_1 then ψ_p, $\psi_p\}$
$A(S_0) = \{T : T$ included in S_0, T contains some member of $P(S_0)\}$ =
$\{S_0$, if S_1 then $\psi_p, \psi_p, \Diamond\psi_p\}$
$\mathcal{H} = \{\pi(T) : T \in A(S_0)\} = \{S_1 \rightarrow p, p\}$

Note that neither of the accommodation possibilities in $\mathcal{H}$ corresponds to the proposition that Al is here. Our only options for accommodation are that George and Al are both here (p), and that if George is here then Al and George are both here ($S_1 \rightarrow p$). But note that the latter, for whatever reason, actually leads to the inference that George is here. Thus, so long as nothing rules out accommodation of $S_1 \rightarrow p$,[67] accommodation of that, plus whatever it is that leads us to infer from this conditional that Al is here, allows us to derive Beaver (2001)'s inference.

Finally, Beaver (2001) discusses cases of so-called 'bridging,' such as the following:

(36) a. Jane sat in the car. She adjusted the rear-view mirror
b. If I go to a wedding then the rabbi will get drunk

Consider (36a). Our only accommodation possibility (under (26)) is the existential presupposition of *the rear-view mirror*. Beaver (2001) points out that what we infer from this is that she adjusted the rear-view mirror *in the car*, and notes that purely structural considerations do not generate this inference. I do not think that this is a difficulty for structure-sensitivity, per se. Rather, the issue seems to me to be one of domain restriction. For example, consider the following variant of (36a):

(37) Jane sat in the car. Every kid started yelling.

We infer from this that every kid in the car started yelling. Similarly, the claim made by (38) below is that if I go to a wedding, then every guest *at the wedding I am at* will get drunk.

(38) If I go to a wedding then every guest will get drunk

These facts therefore seem orthogonal to the issue of (the structure sensitivity of)

[67] See Beaver (2001) for considerations that might *block* p from being accommodated here, a result which would not only allow accommodation of $S_1 \rightarrow p$, but would also require it.

accommodation, and seem instead to be entirely about the mechanics of domain restriction.

8 Concluding Remarks

By characterizing the alternatives proposed in Heim (2006)'s approach to accommodation, we hope to have shown that the satisfaction theory manages to deal with the proviso problem without running into difficulties faced by structurally predictive theories, on the one hand, and other satisfaction theoretic approaches to accommodation, on the other. The proposed system has two important characteristics: the appeal to formal alternatives in general, along with a particular structure sensitive characterization of these alternatives. Both of these characteristics give rise to some 'why' questions. While I will not be able to answer these questions here, it might nevertheless be useful to raise them, and to hint at directions for their eventual resolution.

First, why should accommodation make use of alternatives at all? Technically, of course, alternatives allow us to make sense of two otherwise puzzling features of accommodation:[68] (i) that it is often non-minimal, in that the accommodated proposition is often stronger than the projected presupposition of the sentence, and (ii) that it is often non-deterministic, in that some LFs seem to allow a choice of what to accommodate. Both of these features seem puzzling given the option to accommodate the projected presupposition itself, which would seem (on the face of it) to be the simplest option.

What is simple, of course, depends on one's prior assumptions. One perspective from which (i) and (ii) might seem less puzzling would be one that assimilates accommodation to the 'interface repair strategies' investigated in Reinhart (2006). In this framework, a set of highly constrained repair strategies apply whenever the needs of context systems are not satisfied by the expressions produced by the language faculty. In the case of accommodation the unmet need would be the requirement of context satisfaction, for reasons discussed in Stalnaker (1978): If the point of assertion is to update contexts, then if there are any worlds in the context where the sentence's projected presupposition is not true, the update system would not know whether to keep or remove such worlds in the course of update.[69] A general feature of Reinhart (2006)'s interface repair strategies is that they force

[68] See e.g., Heim (1982, 1992), Thomason (1990), Beaver and Zeevat (2007), von Fintel (2008) for different perspectives from which (i) and (ii) end up looking more, or less, puzzling.

[69] See also e.g., Stalnaker (1973), Soames (1989), von Fintel (2008) for discussion.

the language faculty to generate a restricted set of alternatives from which an optimal resolution of the interface mismatch is selected. From this perspective, the non-minimality and non-determinism of accommodation look far less surprising. How to unify the proposal in (26), which is a proposal about the grammar's contribution to resolving the interface mismatch, with Reinhart's overall theory of interface strategies must remain a task for future work.

A second question relates to the particular set of alternatives used. Why should the accommodation system be limited to deletion operations? More pointedly, given that the linguistic system uses both deletions and lexical substitutions in generating implicature alternatives (e.g., Gazdar (1979), Katzir (2007)), why should accommodation avoid the latter option? To some extent, this way of formulating the question is partly an artefact of our particular deletion-based implemention of the idea that accommodation alternatives cannot access any objects outside the structure itself (cf. Notes 56, 59). The crux of the matter is not deletions versus substitutions per se, but rather the question of whether the system is able to access objects outside the structure or not. Indeed, Fox and Katzir (2009) reformulate Katzir (2007)'s alternatives using only substitutions, recapturing the structure simplifying effects of deletion through substitutions that replace nodes with nodes that they dominate.[70]

(39) Substitution Based Alternatives for Implicature: The alternatives to S_0 are those derived by successive substitutions of nodes in S_0 with: (i) their subconstituents, and (ii) elements from the lexicon.

From this perspective, we can reformulate deletion of S_2 in S_0 = 'if $S_1 \wedge S_2$ then S_3' as substitution of S_1 for $S_1 \wedge S_2$ in S_0, leading to 'if S_1 then S_3.' I leave it to the reader to convince themselves that the following substitution-based variant of (26) captures the same results that the deletion based (26) was intended to capture:

(40) Substitution Based Alternatives for Accommodation: The alternatives to S_0 are those derived by successive substitutions of nodes in S_0 with their subconstituents, so long as the resulting structure contains some member of $P(S_0)$.

Accepting the equivalence of (26) and (40) we can avoid the question of deletions versus substitutions and focus our attention on the question, why should the re-

[70]Other factors are also involved, such as which nodes are targeted, as well as the fact that context can often prune members of these formally defined alternatives due to considerations of relevance. We return to some of these matters shortly. See also Note 42.

sources available for accommodation be limited to parts of the structure, while the resources available for implicature are allowed to extend beyond the structure to also include the lexicon?

We might try to place responsibility for the contrast on association with focus.[71] It has commonly been assumed since Rooth (1992) that focus functions to invoke alternatives in a way that generally seems to license access to the lexicon. If access to the lexicon as a substitition source were dependent on focus, then this might provide a principled basis for distinguishing the ease of accessibilitiy of potential substitution sources. Specifically, we might propose that access to constituents as substitution sources is generally licensed and freely available when the need arises,[72] but that access to the lexicon requires more work, including at least association with focus. And if Fox and Katzir (2009) are correct in arguing for the view that implicature alternatives should be identified with focus alternatives, which in turn would limit the nodes that can be targeted by (39) to those that are focus marked, then the difference between the alternatives used for accommodation and those used for implicature would then follow from the assumption that implicature computation is focus-sensitive (e.g., Krifka (1995), Chierchia et al. (2008)) while accommodation is not. Moreover, given the extra effort required for lexical substitutions, we might suspect that even when both constituents and the lexicon are available as substitution sources, as in implicature computation, alternatives generated through subconstituent substitutions would be more accessible or resistant to being ignored than alternatives generated through lexical substitutions. Some evidence for this can be found. For example, recall (Section 4.1) that while (41a) and (41b) are truth-conditionally equivalent, only (41a) comes with a scalar implicature that John didn't eat all of the cookies:

(41) a. John ate some of the cookies $\rightsquigarrow$ John didn't eat all of the cookies
b. John ate some or all of the cookies $\not\rightsquigarrow$ John didn't eat all of the cookies

Gazdar (1979) provided the following rationale for this contrast. He argued that (41b), as opposed to (41a), gives rise to an *ignorance inference* that the speaker is ignorant about whether John ate all of the cookies, and it is this speaker ignorance inference which prevents the hearer from concluding that (the speaker knows that) John didn't eat all of the cookies.[73] Putting aside the correctness of the argument,

[71]See Simons et al. (2010) for potentially related discussion.

[72]With auxiliary assumptions about memory this might not even need to be stated. See Note 59.

[73]See Fox (2007b) for an alternative account, but one that also predicts the speaker ignorance

we do indeed have clear judgments that (41a) comes with a scalar implicature that John didn't eat all of the cookies, and that (41b) comes with a speaker ignorance inference about whether John ate all of the cookies. Since both inferences are pragmatic,[74] we would expect them to be 'cancellable.' This expectation is only met with the scalar implicature in (41a), however.

(42) a. John ate some of the cookies. In fact, he ate all of them.
b. #John ate some or all of the cookies. In fact, he ate all of them.

I conclude by outlining a direction from which this contrast can be explained, one that is crucially based on the idea that constituent alternatives are easier to compute than those derived through lexical substitution. The basic strategy involves reinterpreting all apparent 'cancellation' effects as the result of *ignoring* alternatives. For instance, the 'cancellation' in (42a) would really be the result of just ignorning the *all* alternative in the first sentence. The role of *in fact* in the second sentence, then, might be to bring a potentially relevant proposition to the hearer's attention. In (42b), however, the *all* alternative is not so easily ignored in the first sentence, and so it undergoes an ignorance inference. The oddness of (42b) would then follow from a contradiction between this ignorance inference and the update provided by the second sentence.[75] This would evidently require the further assumption that scalar implicatures/ignorance inferences are monotonic, contrary to what is commonly assumed. Substantiating this line of argument would require far more attention than I can provide here.[76] Nevertheless, I hope the direction is clear.

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inference predicted by Gazdar (1979).

[74]This is so even for 'grammatical theories of implicature' (e.g., Chierchia et al. (2008)). The pragmatics lies in the disambiguation of the available readings. Under the idea that there are no 'inherently' garden-path sentences (e.g., Crain and Steedman (1985)), we expect that a proposed disambiguation could be non-monotically revised upon the receipt of further evidence.

[75]Thus extending to ignorance inferences the idea that contradictions between scalar implicatures and context are odd (e.g., Fox and Hackl (2006), Magri (2009)).

[76]See Singh (2008, 2009, 2010), Fox and Katzir (2009), Magri (2009) for relevant discussion.

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