Maximize Presupposition! and Local Contexts*

Raj Singh, MIT

January 11, 2009

Heim's [18] *Maximize Presupposition!* is a principle of language use that forces speakers to sometimes use a sentence ϕ rather than a competing sentence ψ to update the context c when ϕ and ψ contribute the same new information to c. More specifically, if ϕ and ψ are competitors (in some well-defined class of competing elements), and ϕ has stronger presuppositions than ψ which are satisfied in c, and ϕ and ψ add the same new information to c, then the speaker must use ϕ in c. For example, since it is common knowledge that there is exactly one sun, it is odd to say # *A sun is shining*; this sentence is 'blocked' by its competitor, *The sun is shininig*, which is a better candidate under *Maximize Presupposition!* (henceforth MP).

All formal statements of MP that I am aware of characterize it is a global constraint, operative at the root (Sauerland [33, 34], Percus [28], Schlenker [35], Magri [27], Chemla [6]). The goal of this paper is to show that this architectural assumption needs to be revised. Building on data first discovered by Percus [28], I will argue that MP is a formal principle that is checked in the local context of each embedded sentence (Local MP). Further evidence in favour of Local MP will come from certain facts concerning the treatment of variables. More specifically, I will argue that Local MP allows us to avoid an argument from universally quantified sentences that MP is checked at the root (Sauerland [33, 34]), and in so doing captures precisely the correct use conditions argued for by Sauerland. I will also argue that Local MP has the added benefit of simplifying Heim's [15, 16] Novelty/Familiarity Condition.

1 MP as Global, Pragmatic Competition

Consider the contrasts below:

1. (a) # A sun is shining
   (b) The sun is shining

2. (a) # All of John's eyes are open[1]
   (b) Both of John's eyes are open

*Thanks to Noam Chomsky, Kai von Fintel, Danny Fox, Ted Gibson, Irene Heim, Roni Katzir, Giorgio Magri, Orin Percus, Benjamin Spector, and Bob Stalnaker.

[1] From Chemla [6] and Magri [27].

Take the contrast in (1), for instance. How would MP account for it? We should begin by setting up some background assumptions.

First, let us assume the following lexical entries for the articles:

Lexical Entry 1 (The Definite Article)

$[[theX]Y]$ *expresses that proposition which is: (a) true at index i if there is exactly one X at i, and it is Y at i, (b) false at i if there is exactly one X at i, and it is not Y at i, (c) truth-valueless at i if there isn't exactly one X at i*

Lexical Entry 2 (The Indefinite Article)

$[[a(n)X]Y]$ *expresses that proposition which is true at index i iff there is at least one individual at i that is both X at i and Y and i.*

We also assume the following definition of 'contextual equivalence,' borrowed from Sauerland [33] and Schlenker [35]:

Definition 1 (Contextual Equivalence)

LFs ϕ *and* ψ *are* contextually equivalent with respect to context c *iff* $\{w \in c : [[\phi]](w) = 1\} = \{w \in c : [[\psi(w)]] = 1\}$

Let us return now to our contrast in (1). First note that our common knowledge entails that there is exactly one sun. As such, given our definition of contextual equivalence, it turns out that (1a) and (1b) end up being contextually equivalent. If there is exactly one sun in every world of evaluation, both (1a) and (1b) are true in the same worlds in the context, namely those worlds where this one sun is shining. But if both LFs serve the same communicative function (i.e. map the same input context to the same output context), why should (1a) be odd, while (1b) is perfectly felicitous?

The contrast was first noted in Hawkins [14]. He used it to argue that definites are subject to an 'inclusiveness' condition and indefinites to an 'exclusiveness' condition, by which was meant simply that *the N* can only be used if there is exactly one N in the context, and *a(n) N* can be used only if there are many N in the context. Heim [18] presents crucial evidence against the exclusiveness condition for indefinites. For instance, the following sentence does not presuppose that there are at least two 20 ft. catfish:[2]

3. Robert caught a 20 ft. catfish

Heim proposes instead that only the definite is presuppositional (cf. our lexical entries above). In addition, she suggests that there must be a principle in force urging us to use $[[the\ X]\ Y]$ instead of $[[a(n)\ X]\ Y]$ in contexts where the presuppositions of the former are met. She speculates that perhaps a maxim guiding us to make our conversational contributions presuppose as

[2] One diagnostic for this is that you can't felicitously apply the *Hey Wait a Minute!* Test (von Fintel [7]) here: *# Hey wait a minute! I didn't know there are multiple 20 ft. catfish!* See also Sauerland [34] for relevant discussion.

much as possible might generally be operative in communication. Sauerland [33, 34], Percus [28], and Schlenker [35] generalize and formalize Heim's speculative remarks. Sweeping certain irrelevant differences in their formulations under the rug, here, roughly, is a statement of MP that is (I believe) faithful to the intentions of all these works, which I'll call 'Standard MP:'

Standard MP: MP as Global, Pragmatic Competition If ϕ, ψ are contextually equivalent alternatives, and the presuppositions of ψ are stronger than those of ϕ, and are met in the context of utterance c, then one must use ψ, not ϕ.

This statement presents Standard MP as a solution to an optimization problem: Given a set of competing LFs that all update the current context c to a new output context c', Standard MP determines that the best LF for carrying out this update is the one with the strongest presupposition satisfied in c. The reader will no doubt have noticed that the statement of Standard MP makes reference to an unanalyzed notion of 'alternatives.' To make the principle precise, therefore, it is necessary to spell out what this space of competing alternatives is. Much like work on scalar implicature, it has been thought that certain lexical items trigger MP competitions, and that the items themselves rest on certain scales. These scales have generally had to be stipulated. However, they are the only point at which stipulation is allowed. Once given, they can be used to mechanically derive the space of competing LFs. In our examples, for instance, the following lexical scales would need to be available: $< a, the >$, $< both, all >$. These can multiply more generally: $< believe, know >$, etc.[3]

Alternatives for Standard MP If $< \alpha, \beta >$ is a scale, and ϕ is an LF containing lexical item α, and ψ is an LF that is everywhere like ϕ except that at some terminal node it contains β where ϕ contains α, then ϕ and ψ are alternatives.

With this machinery in place, let us return now to our contrast in (1). As discussed above, given that it is common knowledge that there is exactly one sun, both sentences are true in the same worlds in the context. They are also alternatives to one another under standard methods of deriving alternatives. Furthermore, since the presupposition of (1b) (that there is exactly one sun) is met in the context of use, Standard MP requires that the speaker use (1b), rather than (1a). By uttering (1a), the speaker will have blatantly violated this principle of language use, generating the peculiar kind of oddness we detect

[3]Much like with scalar implicatures, it would be better if one had an intensional characterization of the alternatives. I believe that such a characterization can be provided using Katzir's [25] procedure for generating scalar alternatives. For ease of exposition here, I will simply assume the more familiar scalar approach.

upon hearing it.[4] Once we define appropriate lexical entries for *both* and *all*,[5] the same reasoning we saw here would apply, mutatis mutandis, to account for the fact that (2b) blocks (2a).[6]

2 Percus' Discovery

Percus [28] discovered a serious flaw in the formulation of Standard MP. Consider the following contrast:

4. (a) Everyone with exactly two students assigned the same exercise to both his students
   (b) # Everyone with exactly two students assigned the same exercise to all his students

Under most theories of presupposition projection (eg. Karttunen and Peters [24], Heim [17], Schlenker [36, 38, 37]), universally quantified sentences *Every A B* presuppose that every element of A satisfies the presuppositions of B.[7] Thus, (4a) is predicted to presuppose that everyone with exactly two students has exactly two students, i.e. it presupposes a tautology, which is to say it presupposes nothing at all. And since (4b) contains no presupposition trigger, it also presupposes nothing at all. It follows that no context should be capable of discriminating between the two, and MP as stated should therefore never be relevant. Yet, the same contrast we observed in (1) and (2) seems to be at play here as well. In fact, we can generalize from Percus' example and quite easily

[4] It is tempting to try to articulate in greater detail the nature of this oddness. One can, of course, just state this as a brute force blocking effect. Alternatively, Heim [18] suggested a possible derivation from implicatures. An utterance like *a sun is shining* gives rise to an implicature that the speaker wasn't in a position to assert *the sun is shining*, from which it follows that the speaker does not believe that there is exactly one sun. Sauerland [33, 34] calls these inferences 'implicated presuppositions.' Heim argues that the derivation doesn't succeed, however, because, given the contextual equivalence of the competing sentences, the maxim of quantity is made inert. As a result, MP will have to be stated as a primitive. Percus [28] argues similarly. Schlenker [35] attempts to derive MP from principles of multiagent epistemic logic put forth in Stalnaker [44], and, in Singh [40], I try to derive MP by arguing that Heim's reasoning goes through if we adopt a theory of implicature under which implicatures are computed without access to contextual information (eg. Fox and Hackl [9], Magri [27]). An alternative account might rely on processing considerations, such as that new discourse referents (eg. introduced by indefinites) are generally more costly to process than those that exploit the existence of certain information as given (eg. Gibson [12]). For our purposes here, we will simply state MP as a brute force blocking principle, and refer the reader to the above literature for relevant discussion.

[5] (1) $[[bothX]Y]$ expresses that proposition which is: (a) true at index i if there are exactly two individuals that are X at i, and both these individuals are Y at i, (b) false at i if there are exactly two individuals that are X at i, and at least one of them is not Y at i, (c) truth-valueless at i if there aren't exactly two X at i. (2) $[[allX]Y]$ expresses that proposition which is true at i iff all individuals that are X at i are also Y at i.

[6] Though see Chemla [5] for some puzzing data from French.

[7] Beaver [3] makes a slightly different prediction, but his theory of presupposition projection suffers from the same difficulty in other constructions, such as the ones to be enumerated just below ((5)-(7)). In DRT systems (eg. van der Sandt [32], Geurts [11]), the question, *What does a complex sentence presuppose?*, is almost meaningless.

generate sentences which presuppose nothing at all yet seem to be subject to some sort of MP-like competition:

5. If John has exactly two students and he assigned the same exercise to {both/ # all} of his students, then I'm sure he'll be happy

6. (Either John has exactly two students and he assigned the same exercise to {both/ # all} of his students) or he doesn't have any students at all

7. Mary believes that John has exactly two students and that he assigned the same exercise to {both/ # all} of his students

From the vantage point of Standard MP, these sentences are quite puzzling. First, globally, the competing sentences ϕ, ψ have no presuppositions. Second, embedded within them are sentences S, S' which, when uttered in isolation, enter into MP competitions. The puzzling fact is that the competition between ϕ, ψ seems to be decided on the basis of which of S, S' is presuppositionally stronger, even though this presuppositional difference is undetectable at the root. This pattern seems irreconcilable with the view that MP applies globally. Moreover, if MP is interpreted as a pragmatic constraint governing speech acts,[8] it is not prima facie clear what to make of the apparent fact that the MP triggering sentences in (4)-(7) sit in non-asserted positions (in the antecedent of a conditional, a disjunct in a disjunction, and under *believe*, none of which are positions where a speech act of assertion can normally be thought to be taking place). These observations suggest to me that we should either give up on the idea that MP operates at the root, or we should give up the idea that MP is at all relevant to accounting for the contrasts in (4)-(7).[9]

Despite this apparent tension, Percus [28] maintains both that MP is indeed behind the contrasts observed immediately above and that MP is a principle that operates globally, at the root. To account for the apparent application of MP in presuppositionless sentences, he modifies Standard MP along several dimensions. First, he introduces the notion of one lexical item (rather than a sentence or LF) being 'presuppositionally stronger' than another. The exact definition is not important for our discussion.[10] It should suffice to note that

[8] As pointed out to me by Danny Fox (p.c.) and Kai von Fintel (p.c.), it is not clear that Standard MP need be interpreted this way. As far as I can tell, only two authors who have written on the subject have explicitly taken a view on the matter: For Schlenker [35], MP should be derived as a theorem of Gricean reasoning. For Magri [27], MP applies within the grammar, hence not pragmatic by definition. All authors have expressed the view that MP applies globally. A natural interpretation of this level of application is that it operates at the level of speech act. My point here is not to attribute this view to any particular author, but to raise a potential complication for the idea that MP is a pragmatic maxim governing speech acts.

[9] Hence, possibly also for (1) and (2).

[10] "The intuitive idea is that *both* is 'presuppositionally stronger' than *all* for the following reason: if we take two simple sentences that differ only in that one contains *both* where the other contains *all*, the domain of the *both* sentence is always a domain of the *all* sentence, and sometimes a proper subset" (Percus [28], p.15). The formal definition is given in his (32), p.15: "A is 'presuppositionally stronger' than B iff the domain of $[[B]]^*$ properly includes the domain of $[[A]]^*$, where $[[A]]^*$ and $[[B]]^*$ are $[[A]]$ and $[[B]]$ adjusted to apply to sequences."

the formal definition captures precisely our intuition. For example, it works so that *the* is presuppositionally stronger than *a*, that *both* is presuppositionally stronger than *all*, etc. He then introduces a notion of the *lexical alternatives* of a lexical item:

Lexical Alternatives The *lexical alternatives* of a lexical item α are all presuppositionally stronger lexical items β of the same category.

This is an asymmetric notion of alternative. According to this definition, *both* is a lexical alternative to *all*, but *all* is not an alternative to *both*.[11] He uses this notion of lexical alternatives to generate the candidate set of alternative LFs that ultimately enter into MP competitions:

Alternative-Family The *Alternative Family* of LF ϕ is the set of LFs that can be generated by replacing a lexical item in ϕ with one of its lexical alternatives.

This definition ensures that any LF ϕ containing (eg.) the lexical item *all* can be converted into an alternative LF ψ by replacing an occurrence of *all* with *both*. Given these notions, Percus offers the following reformulation of MP:

Revised MP: MP as Global, Pragmatic Competition Let ψ be a member of the Alternative-Family of ϕ, and suppose ϕ and ψ to be contextually equivalent.[12] Then one must not use ϕ if the use of ψ would be felicitous in c.

Here is an illustration of how Percus' maxim works. Consider again sentence (4b), # *everyone with exactly two students assigned the same exercise to all his students.* This sentence has (4a) as a member of its Alternative-Family, *everyone with exactly two students assigned the same exercise to both his students.* These sentences are, of course, equivalent in all contexts. Furthermore, the use of (4a) is felicitous in all contexts. Since (4a) is a member of (4b)'s Alternative-Family, i.e. it can be generated from (4b) by replacing *all* with the presuppositionally stronger item *both*, the use of (4b) is blocked by (4a). The reader can verify that Percus' reformulation of MP captures all of (4)-(7) without losing the ability to predict either of the standard MP contrasts we introduced at the beginning ((1) and (2)).

3 The Domain Size of MP

My aim in this section is to motivate an alternative response to the data in (4)-(7). I shall begin by pointing to a consequence of Revised MP that I believe

[11] The asymmetry is not important for the system's predictions, but is there to allow the Revised MP principle to receive a simplified statement.

[12] Percus presents a slightly different version of 'contextual equivalence' than the one used here. He uses it to mean not that ϕ, ψ are true in the same worlds in c, but that they have the same value in all worlds in c. The distinction will not be crucial to anything we say here (though cf. Footnote 15), so I will stick to our formulation as above.

leads to a complicated view of the division of labour between formal semantic principles and maxims of language use. This tension will lead us to an alternative formulation of MP, one which will be shown to make empirically correct predictions that are not made by Percus' proposal.

3.1 Local MP

As originally stated, (Standard) MP was a competition-based principle that decided between competing elements based on the information contained in the context c, on the one hand, and the conditions the competing elements imposed on c, on the other. Percus' discovery teaches us that this view is not tenable. His own response was to reanalyze MP as a principle that is sensitive to the lexical items that occur in structures, and not to the conditions imposed by LFs on the context of evaluation. I would like to suggest an alternative approach that attempts to retain the original character of MP as a principle that discriminates between LFs based on the definedness conditions they impose on the context of evaluation. However, the chief architectural innovation will come in the form of allowing the context of evaluation to change throughout the interpretation of a complex sentence. In effect, the context that is relevant for the application of MP will sometimes be the global context, but will also sometimes be the local context c' of some embedded constituent, where c' can be different from c. I believe this move is a natural one to make, given that the appeal to dynamically changing contexts was to a great extent motivated by presuppositional facts in the first place (eg. Karttunen [23], Stalnaker [42, 45], Heim [17]). Given this prior motiviation for the intimate connection between local contexts and presuppositional constraints, I propose to modify Standard MP (the original statement) just enough to allow it to take advantage of a theory that employs local contexts. Here is what I propose:

Local MP: MP is Checked Locally Check that MP is satisfied for each S embedded in ϕ in S's local context c'.

This formulation evidently requires a theory of interpretation that employs local contexts. There are several on the market (eg. Heim [17], van der Sandt [32], Schlenker [37]). For our purposes in later parts of this paper, we will need to discuss the treatment of variables, and, as it stands, the CCP/DRT approaches have been most explicit on this front. For concreteness, I will follow the dynamic treatment in Heim [17], but I hope that this choice is immaterial to the broader conclusions I hope to draw.

Assuming this framework, let's see how Local MP would work on one of our examples.[13]. Consider sentence (5). The local context for the second conjunct in the antecedent, *he assigned the same exercise to* {*both / all*} *his students*, is *c+John has exactly two students*. In this context, the presupposition of *John assigned the same exercise to both his students* is met, and it indeed presupposes

[13]I assume basic familiarity with the CCP framework. All the entries relevant for our present discussion are stated in the appendix, and are either taken or adapted from Heim [17]

more than its alternative *John assigned the same exercise to all his students.* They are equivalent in this context,[14] so, by MP, *John assigned the same exercise to all his students* is (locally) blocked by the presuppositionally stronger *John assigned the same exercise to both his students.* And this is what will be held accountable for the oddness of the *all* variant of the sentence. More generally, for ϕ a (possibly complex) sentence uttered in context c, we simply check that MP is satisfied each time we wish to execute $c' + S$ for each such instruction defined by the CCP of ϕ. I hope the reader will trust that this reasoning can be extended in a general way to all the other examples discussed above.

3.2 An Empirical Argument in Favour of Local MP

I believe Local MP effectively allows one to maintain the basic spirit of Standard MP. It modifies the principle only to the extent that such modifications were independently argued to be needed to account for presuppositional phenomena, viz. the checking of presupposition-related constraints in local contexts. Given this prior motivation, it would be rather unsurprising if MP should also be checked in local contexts. More important than this for evaluating the merits of Local MP as compared with Percus' Revised MP, however, is that the two principles make different predictions in certain cases. In these cases, the data side with Local MP.

First, let us consider a sentence ϕ whose CCP is defined on context c, so that $+S$ is defined in the local context c' of each S embedded in ϕ. In such a case, it turns out that Local MP and Percus' Revised MP are equivalent. To see that this is so, suppose there is a S_j embedded in ϕ which is a partial function (eg. suppose it's a sentence containing the word *both*). Suppose further that the local context of S_j, c', satisfies its presuppositions. Thus, by Local MP, S_j should be used instead of its contextually equivalent alternative S'_j (eg. a sentence that is exactly like S_j except it contains *all* at a terminal node where S_j contains *both*). Since presuppositions are everywhere satisfied (by assumption), assuming (for current purposes) that this suffices for a sentence to count as 'felicitous,' the sentence ϕ containing S_j will be felicitous in c. It will thus block its alternative ϕ', where ϕ' is like ϕ except it contains S'_j where ϕ contains S_j. In other words, when presuppositions are everywhere satisfied, Local MP and Percus' Revised MP make identical predictions.

The two come apart, however, when presuppositions are not everywhere satisfied. Note that Percus makes the following prediction: one should never be able to find contextually equivalent members of the same Alternative-Family ϕ, ψ that are both felicitous, for the felicity of the presuppositionally stronger one (ψ, say) should block the use of ϕ. Local MP, on the other hand, is not tied to any such prediction. To see this, observe that MP simply doesn't apply if, in local context c', the presuppositions of ψ are not met. Of course, such a state of affairs gives rise to the threat of infelicity due to presupposition failure. However,

[14] Since (c + *John has exactly two students*) + *John assigned the same exercise to both his students* = (c + *John has exactly two students*) + *John assigned the same exercise to all his students.*

given the option of accommodation, this potential communicative catastrophe can be diverted, and ψ might still be felicitous. Our task, then, is to see if we can find competitors whose presuppositions are not satisfied in the context of use, but which still end up contextually equivalent, and which end up felicitous due to accommodation. Here are some examples of such cases:

8. Context: It is not common ground how many bouncers there are at Club X, and any number of bouncers is possible, including none at all.

   Speaker: I went to Club X last night. {A / the} mean looking bouncer at the door, the only one working that night, frisked me on my way in.

9. Context: It is not common ground how many delegates from France are at the convention. Any number could possibly be there, including none at all.

   Speaker: {A / the} delegate from France isn't here because there is no delegate from France![15]

To see why this is problematic for Percus' Revised MP, and not for Local MP, we must establish that the indefinite and definite conditions are contextually equivalent. Since they are obviously felicitous (no sense of presupposition failure, no sense of MP violation, or any other detectable oddness), their contextual equivalence would constitute a direct argument against Revised MP. Local MP, on the other hand, simply does not apply, since the presuppositions of the definite sentences are not met in the context of use. It thus has no say on whether the definite or indefinite should be used, and, therefore, does not predict any blocking effects between the competitors. Felicity, in these cases, seems to be regulated entirely by the possibility of accommodation.

The reader is asked to turn their attention now to example (8). Given our lexical entries for the indefinite and definite article, the indefinite and definite versions of (8) are true in the same worlds in the context set, viz. those worlds where there was a mean looking bouncer at the door, that this mean looking bouncer was the only bouncer working that night, and that this bouncer frisked the speaker on her way in. Accommodation of a bouncer happens fairly automatically here, and so the sentence is also felicitous. Sentence (8) is thus a counterexample to Percus' Revised MP.[16]

In example (9), the indefinite case results in an output context determined by the complement of the *because* clause, namely, that there is no delegate from France (since this sentence asymmetrically entails that a delegate from France isn't here). In the definite case, where the existence presupposition of

[15] A modification of an example from Danny Fox, p.c.

[16] As pointed out to me by Danny Fox (p.c.), this is only true under the Sauerland-Schlenker definition of contextual equivalence we've adopted here (truth in the same worlds). Under Percus' more stringent notion of contexual equivalence (same truth-value in all the worlds in the context set), depending on one's theory of presupposition projection, (8) might or might not count as contextually equivalent. Without getting into projection out of appositives, and 'later' sentences more generally, sentence (9) is still a counterexample, since the presupposition of the definite is cancelled.

the delegate from France is locally accommodated (so that, in effect, negation takes wide scope over the definite), the resulting output context is the same as in the indefinite case. The competitors are thus contextually equivalent,[17] and since both are felicitous, we have another counterexample to Percus' Revised MP. We have thus constructed the required pairs of contextually equivalent, felicitous competitors. Local MP, again, simply does not apply, and so predicts no blocking effects in these cases.

It might be somewhat suspect that our account relied on a process of context repair, namely, presupposition accommodation, in order to create the required felicity. Local MP is an attempt to restate MP as a contraint on update, much like the constraint of Local Satisfaction of presuppositions (Karttunen [23], Stalnaker [42], Heim [17]). This raises the question of how much contextual repair is allowed in response to such constraints on update.

3.3 Timing and Context Repair

It is crucial for this analysis that Local MP be checked *before* accommodation has a chance to take place.[18] Local MP, much like Local Satisfaction, is a formal requirement on update processes $+\phi$. They both apply at each update step, and reject LFs that fail to satisfy their demands. However, we saw above that under threat of violating Local Satisfaction, the interpretive system has a repair strategy available, namely, accommodate the missing information. We are then good to ask, why can we not repair the context in such a way as to ensure that Local MP is not violated? For instance, suppose ϕ, ψ are the relevant competitors for Local MP, and suppose that ϕ blocks ψ. Here is a logically possible repair strategy: Alter the local context c to a weaker context $c' = c \cup p$ for some proposition p, where c' does not satisfy ϕ's presupposition. This would do the trick. But empirically, we just don't find such kinds of context repair taking place. Why should this be?

One initial guess might be that such a process is generally difficult due to the inherent non-determinism in the selection of p. This can't in itself explain the general lack of such repair, however, since the proviso problem for presupposition accommodation (Geurts [10]) is a positive example of non-deterministic contextual repair.[19] I suggest that the reason we don't find such repair lies in its non-monotonicity. In Singh [41], I argued that Partee's 'bathroom sentences' teach us that repairs in response to constraints on update can only be monotonic, i.e. that the only way to repair a context in response to the violation of an update constraint is to add information to the context. What this means for us is that there is no way to repair a context to avoid a violation of Local MP. For consider an arbitrary violation of Local MP, where the interpretive system is forced to update c by a non-optimal candidate ψ. This means that there is a better candidate, ϕ, with the same assertive content as ψ, but a stronger pre-

[17] Under both the Sauerland-Schlenker definition as well as Percus'.

[18] Thanks to Kai von Fintel and Orin Percus for very helpful discussion of this point.

[19] See Beaver [3, 4], von Fintel [8], Heim [19], Pérez Carballo [29], van Rooij [30], Singh [39, 41].

supposition. Any context $c' \subset c$ will of course satisfy ϕ's presupposition, since c itself does (by assumption, we are in a case of Local MP failure). Since ϕ and ψ add the same new information to every context on which they are both defined, 'accommodating' to a richer context c' will not allow the system to escape Local MP violations. More generally, given a set of constraints on local update (Local MP, Local Definedness, Local Consistency, Local Informativity)[20], it is fairly straightforward to show that the only one that can be repaired by a mechanism of context change is Local Definedness, giving rise to the phenomenon of presupposition accommodation.

4 The Interpretation of Variables and Local MP

A prime motivation for dynamically changing contexts comes from the treatment of variables (eg. Kamp [22], Heim [15, 16], Barwise [2], Groenendijk and Stokhof [13], van der Sandt [32]).[21] We should expect, then, to be able to detect Local MP effects involving elements whose use conditions are regulated by the makeup of (dynamically changing) local assignment functions. This section analyzes some issues in the interpretation of quantifiers, indefinites, and pronouns with Local MP in mind. More specifically, I argue that once we turn to the interpretation of variables, Local MP allows us to avoid an argument from the interpretation of universally quantified sentences *against* the locality of MP (due to Sauerland [33, 34]), and, in addition, allows for a simplification of Heim's [15, 16] Novelty/Familiarity Condition. To the extent that the arguments here are sound, they might also constitute an argument in favour of the need to invoke dynamically changing assignment functions (hence contexts) as a part of semantic theory.

4.1 An Argument Against Local MP?

This section aims to address an argument due to Uli Sauerland [33, 34] that MP must be taken to apply globally, at the root. According to Sauerland, the use of MP as a conversational maxim gives rise to inferences he calls 'implicated presuppositions' (cf. Footnote 3). For example, use of the indefinite gives rise to the inference that the presupposition of the definite does not hold, use of *all* generates the inference that the presupposition of *both* does not hold, etc. Thus, *John submitted all his papers* gives rise to the implicated presupposition that the speaker does not believe the presupposition of *John submitted both his papers*, i.e. that the speaker does not believe that John has exactly two papers. Now consider what happens in the scope of universally quantified sentences:

[20] See Horn [21], Karttunen [23], Stalnaker [42], Heim [17], van der Sandt [32], Geurts [11], Beaver [3], Schlenker [37], and much other work.

[21] See also Barker and Shan [1] for a proposal that uses donkey anaphora to motivate a notion of dynamic evaluation that does not involve the update of contexts in the sense of the above works.

10. (a) Every candidate submitted all of his books
    (b) Every candidate submitted both of his books

If implicated presuppositions were generated locally, an assertion of sentence (10a) should give rise to the inference that no candidate has exactly two books.[22] But that is obviously not the correct reading of the sentence.[23] If implicated presuppositions were computed globally, the inference would be that it's not the case that every candidate has exactly two books. The latter seems correct.[24] Now, the relation between MP and implicated presuppositions is an important one,[25] but without getting into that here, let us ask: are these data problematic for Local MP?

First, recall that under most theories of presupposition projection (eg. Karttunen and Peters [24], Heim [17], Schlenker [35]), sentence (10b) presupposes that every candidate has exactly two papers. Thus, on the face of it, it should block (10a) only when this condition holds, i.e. use of (10a) should be felicitous only when it is not common ground that every candidate has exactly two papers. This is exactly the implicated presupposition Sauerland argues is the correct one for sentence (10a). Let us see precisely how Local MP predicts this fact. In Heim's semantics, the LFs of sentences (10a) and (10b) would be:

10. (a') *Every* x_i, x_i a candidate, x_i submitted all of his papers
    (b') *Every* x_i, x_i a candidate, x_i submitted both of his papers

For the interpretation of variables, contexts need to be enriched from sets of worlds to sets of world-assignment pairs.[26] The local context for $+x_i$ *submitted all/both his papers* will be $c' = c + x_i$ *a candidate*. By Local Satisfaction, the function $+x_i$ *submitted both of his papers* will be defined only if c' entails that x_i has exactly two papers. This in turn will be met only when every individual in the domain is such that he/she has exactly two papers, since x_i will be a 'new' variable (Heim [15, 17, 16]). Thus, $+x_i$ *submitted all his papers* will be blocked by Local MP only when this condition is met. As long as the context does not entail that every candidate has exactly two papers, *Every candidate submitted all his papers* will be fine by Local MP. Hence, under our notion of local checking of MP, the issue pointed out by Sauerland does not arise.

4.2 The Novelty/Familiarity Condition

Consider the following contrasts:

11. (a) A man$_i$ came in, and # a man$_i$ started yawning.
    (b) A man$_i$ came in, and he$_i$ started yawning.

[22] Every x, x a candidate, x not have exactly two books.
[23] Or, at least, if this reading is indeed available, it doesn't seem to be the preferred reading.
[24] Or at least preferred.
[25] In addition to Sauerland's papers, see Heim [18], Percus [28], Schlenker [35], Magri [27], Chemla [6], and Singh [40] for discussion.
[26] Please see the Appendix for a small CCP fragment outlining all the lexical entries assumed in the paper.

12. (a) # He$_i$ came in, and a man$_i$ started yawning.
    (b) He$_i$ came in, and he$_i$ started yawning.

Consider first the contrast in (11). Heim [15, 17, 16] has a straightforward account of this case. Recall that we are now construing contexts as sets of world-assignment function pairs $< w, g >$ to deal with variables, rather than simply identifying contexts with propositions. The use of variables is governed by Heim's Novelty/Familiarity Condition, which states something like the following:

Novelty/Familiarity Condition Let p be an atomic formula containing noun phrase NP_i. Then, for all $< g, w > \in c$: if NP_i is definite, i must be in $dom(g)$, and if NP_i is indefinite, i must not be in $dom(g)$.

Let us see how this applies to (11). The first conjunct of (11a) includes an indefinite *[a man]*$_i$, which requires that i be a new variable. Thus, c+ *[A man]*$_i$ *walked into the room* $= \{< w, g^{i/a} > \in c :< w, g > \in c$, a is a man in w, and a walked into the room in $w\}$.[27] Now the second conjunct of (11a) is clearly ruled out by the Novelty/Familiarity Condition (NFC). The second conjunct of (11b), on the other hand, which applies to this same context, is licensed, since $i \in dom(g)$ for each g.[28]

When Local MP is assumed, however, we can simplify the statement of the NFC by eliminating the constraint on indefinites. Recall that under the NFC the second conjuncts of (11a) and (11b) had definedness conditions governing their appropriate use. Under Local MP, we can get away with imposing a definedness condition only on the second conjunct in (11b). More precisely, we can assume that a sentence like *a man*$_i$ *started yawning* has no definedness condition at all, while a sentence like *he*$_i$ *started yawning* will be defined on context c only if for every $< w, g > \in c$: (i) $i \in Dom(g)$, (ii) $g(i)$ is male in w. Since both sentences update the context in the same way (by adding the information that $g(i)$ started yawning), by Local MP, you're forced to use the pronominal variant (b) instead of (a). Thus, the infelicity of (a) falls out as a violation of Local MP, rather than the Novelty/Familiarity Condition.

Turning to (12a), one can readily imagine two accounts of its oddness. One would come from the application of Local MP at the second conjunct. Given that there's already a discourse referent i in the context, the use of *a man*$_i$ should be blocked by *he*$_i$. An alternative account would have it that the problem comes at the first conjunct, where there might be presupposition failure due to the presuppositional requirements of *he*$_i$ not being met there. However, given the felicity of (12b), it is clear that this is not the source of the oddness. One can readily accommodate a new file card i containing the information that $g(i)$ is male. For instance, (12b) could easily be the first line of a novel. There is no

[27] We call $g^{i/a}$ a *modified variable assignment*, which is the unique assignment such that: (i) $dom(g^{i/a}) = dom(g) \cup i$, (ii) $g^{i/a} = a$, (iii) for all $j \in dom(g^{i/a}), j \neq i : g^{i/a}(j) = g(j)$ (Heim and Kratzer [20]).

[28] The gender presuppositions of the pronoun will also have to be met. See immediately below for a more precise statement of the definedness condition on + emphhe started yawning.

way for (12a) to enjoy such a status. Thus, Local MP seems to be the better account of these facts.[29].

Of course, as mentioned, the Novelty/Familiary Condition takes care of these cases just as well. Our reformulation in terms of Local MP simplifies the conditions on the use of (in)definites, but it doesn't obviously simplify the overall theory, since we have to postulate an additional principle (Local MP). But we saw evidence in earlier sections arguing for Local MP in cases that aren't obviously covered by the NFC (eg. *both/all*). Chemla [6] and Singh [41] provide further data that support Local MP in domains that are prima facie outside the domain of the NFC.[30] If these extensions of Local MP are on the right track, a theory incorporating Local MP without the NFC is probably to be preferred.

5 Concluding Remarks

In trying to determine the role, if any, of local contexts in a theory of anaphora and presupposition, there are many positions that can be and have been taken. Some have argued for a unification of presuppositions and anaphora (eg. van der Sandt [32], Geurts [11]), and have argued that a form of localism is necessary to account for these facts. Others (eg. Heim [17]) have kept anaphoric resolution and presupposition projection/accommodation conceptually and formally distinct, but have argued that contexts include a propositional component as well as an assignment function component, both of which get updated dynamically throughout a discourse. Another approach (eg. Groenendijk and Stokhof [13]) paid attention only to the dynamics of assignment functions, while others (eg. Stalnaker [43]) have argued that with a general enough framework for understanding propositions and propositional update, we might be able to do away with the technical apparatus of assignment function dynamics entirely. This paper tried to argue that the facts about *Maximize Presupposition!* teach us that local contexts are necessary in a theory of interpretation, involving both dynamically updated information and dynamically updated variable assignments. It is to be hoped that the facts motivating dynamically changing variable assignments in particular can be made consistent with current efforts to formulate principled definitions of the propositional makeup of local contexts (eg. LaCasse [26], Rothschild [31], Schlenker [37]).

[29] Given this, the contrast between (eg.) *Every man who read [a book by Chomsky]$_i$ liked it$_i$* and # *Every man who read it$_i$ liked [a book by Chomsky]$_i$* might also be further evidence (cf. Groenendijk and Stokhof's [13] discussion of donkey anaphora) that universal quantifiers are 'internally dynamic.'

[30] Chemla discusses cases such as # *It is raining and John believes it*, which, under Local MP, would be blocked by *It is raining and John knows it*. In Singh [41], I argue that certain constraints on embedded implicatures, and the obligatoriness of the additive particle *too* in VP-ellipsis contexts (eg. *John came to the store. Bill did* {# ∅ / *too*}), follow from Local MP. It is not obvious to me how the NFC could be extended to such domains.

A CCP Lexical Entries

- $c + (\phi \wedge \psi) = ((c + \phi) + \psi)$
- $c + \neg\phi = c - (c + \phi)$
- $c + (\phi \rightarrow \psi) = c - ((c + \phi) - (c + \phi + \psi))$
- $c+$ *[[A(n) X]$_i$ Y]* $= \{< w, g^{i/a} >\in c :< w, g >\in c$, a is X in w, and a is Y in $w\}$
- $c+He_i\ Y$ is defined iff $\forall < w, g >\in c : i \in Dom(g)$ and $g(i)$ is male in w; where defined, $c+He_i\ Y = \{< w, g >\in c : g(i)$ is Y $w\}$
- $c+$ *Every*x_i, A, B is defined iff $\forall < w, g >\in c : i \notin Dom(g)$; where defined, $c+$ *Every*$x_i, A, B = \{< g, w >\in c :$ for all a, if $< g^{i/a}, w >\in c + A$, then $< g^{i/a}, w >\in c + A + B\}$

References

[1] Chris Barker and Chung-chieh Shan. Donkey anaphora as in-scope binding. *Semantics and Pragmatics*, 1:1–42, 2008.

[2] Jon Barwise. Noun phrases, generalized quantifiers, and anaphora. In Peter Gardenfors, editor, *Generalized Quantifiers: Linguistic and Logical Approaches*, pages 1–29. D. Reidel, Dordrecht, 1987.

[3] David Beaver. *Presupposition and Assertion in Dynamic Semantics*. CSLI Publications, Stanford, CA, 2001.

[4] David Beaver. The proviso problem: Comments on von Fintel. Handout from Ohio State University Accommodation Workshop, Columbus, Ohio, 2006.

[5] Emmanuel Chemla. French *both*: a gap in the theory of antipresupposition. *Snippets*, 15:4–5, 2007.

[6] Emmanuel Chemla. An epistemic step for anti-presuppositions. *Journal of Semantics*, 25:141–173, 2008.

[7] Kai von Fintel. Would you believe it? The king of France is back! Presuppositions and truth-value intuitions. In Marga Reimer and Anne Bezuidenhout, editors, *Descriptions and Beyond*. Oxford University Press, Oxford, 2004.

[8] Kai von Fintel. What is presupposition accommodation, again? Manuscript, MIT, 2006.

[9] Danny Fox and Martin Hackl. The universal density of measurement. *Linguistics and Philosophy*, 29:537–586, 2006.

[10] Bart Geurts. Local satisfaction guaranteed: A presupposition theory and its problems. *Linguistics and Philosophy*, 19:259–294, 1996.

[11] Bart Geurts. *Presuppositions and Pronouns*. Elsevier, Amsterdam, 1999.

[12] Edward Gibson. The dependency locality theory: A distance-based measure of linguistic complexity. In Yasushi Miyashita Alec Marantz and Wayne O'Neil, editors, *Image, Language, Brain*, pages 95–126. MIT Press, Cambridge, MA, 2000.

[13] Jeroen Groenendijk and Martin Stokhof. Dynamic predicate logic. *Linguistics and Philosophy*, 14:39–100, 1991.

[14] John A. Hawkins. *Definiteness and Indefiniteness: A Study in Grammaticality Prediction*. Croon Helm, London, 1978.

[15] Irene Heim. On the semantics of definite and indefinite noun phrases. Ph.D. Dissertation, University of Massachusetts at Amherst, 1982.

[16] Irene Heim. File change semantics and the familiarity theory of definiteness. In Rainer Bäuerle, Christoph Schwarze, and Arnim von Stechow, editors, *Meaning, Use, and the Interpretation of Language*, pages 164–190. Walter de Gruyter & Co., Berlin, 1983.

[17] Irene Heim. On the projection problem for presuppositions. In *WCCFL 2*, pages 114–125, 1983.

[18] Irene Heim. Artikel und definitheit. In *Semantics: An International Handbook of Contemporary Research*. de Gruyter, Berlin, 1991.

[19] Irene Heim. A note on the proviso problem. Handout from Milan Meeting, Gargnano, 2006.

[20] Irene Heim and Angelika Kratzer. *Semantics in Generative Grammar*. Blackwell, Oxford, 1998.

[21] Laurence R. Horn. On the semantic properties of logical operators in english. Doctoral Dissertation, UCLA, 1972.

[22] Hans Kamp. A theory of truth and semantic interpretation. In Jeroen Groenendijk, Theo Janssen, and Martin Stokhof, editors, *Formal Methods in the Study of Language*. Mathematisch Centrum, University of Amsterdam, Amsterdam, 1981.

[23] Lauri Karttunen. Presupposition and linguistic context. *Theoretical Linguistics*, 1:181–193, 1974.

[24] Lauri Karttunen and Stanley Peters. Conventional implicatures in Montague Grammar. In Choon-Kyu Oh and David Dineen, editors, *Syntax and Semantics 11: Presupposition*, pages 1–56. Academic Press, New York, NY, 1979.

[25] Roni Katzir. Structurally defined alternatives. *Linguistics and Philosophy*, 30:669–690, 2007.

[26] Nicolas R. LaCasse. Constraints on connectives and quantifiers: Solving the overgeneration problem of dynamic semantics. Manuscript, UCLA, 2008.

[27] Giorgio Magri. A theory of individual level predicates based on blind scalar implicatures. Manuscript, MIT, 2007.

[28] Orin Percus. Antipresuppositions. In Ayumi Uyema, editor, *Theoretical and Empirical Studies of Reference and Anaphora: Toward the Establishment of Generative Grammar as an Empiricial Science*, pages 52–73. Report of the Grant-in-Aid for Scientific Research (B), Project No. 15320052, Japan Society for the Promotion of Science, 2006.

[29] Alejandro Pérez Carballo. A first shot at the proviso problem. Manuscript, MIT, 2007.

[30] Robert van Rooij. Strengthening conditional presuppositions. *Journal of Semantics*, 24:289–304, 2007.

[31] Daniel Rothschild. Making dynamic semantics explanatory: Presupposition projection. Manuscript, Columbia University, 2008.

[32] Rob van der Sandt. Presupposition projection as anaphora resolution. *Journal of Semantics*, 9:333–377, 1992.

[33] Uli Sauerland. Implicated presuppositions. Handout for a Talk Presented at the University of Milan Bicocca, Milan, Italy, 2003.

[34] Uli Sauerland. Implicated presuppositions. In A. Steube, editor, *Sentence and Context: Language, Context, and Cognition*. 2008.

[35] Philippe Schlenker. Maximize presupposition and gricean reasoning. Manuscript, UCLA and Institute Jean-Nicod, Paris, 2006.

[36] Philippe Schlenker. Anti-dynamics: Presupposition projection without dynamic semantics. *Journal of Logic, Language, and Information*, 16:325–356, 2007.

[37] Philippe Schlenker. Local contexts. Manuscript, ENS, Paris, and NYU, New York, NY, 2008.

[38] Philippe Schlenker. Be articulate! a pragmatic theory of presupposition projection. *Theoretical Linguistics*, To Appear.

[39] Raj Singh. Formal alternatives as a solution to the proviso problem. In Tova Friedman and Masayuki Gibson, editors, *Proceedings of SALT 17*, pages 264–281. 2007.

[40] Raj Singh. *Maximize Presupposition!* and informationally encapsulated implicatures. Manuscript, MIT, 2008.

[41] Raj Singh. Modularity and locality of interpretation. Doctoral Dissertation, MIT, 2008.

[42] Robert Stalnaker. Pragmatic presuppositions. In M. Munitz and P. Unger, editors, *Semantics and Philosophy*. NYU Press, New York, NY, 1974.

[43] Robert Stalnaker. On the representation of context. *Journal of Logic, Language, and Information*, 7:3–19, 1998.

[44] Robert Stalnaker. Common ground. *Linguistics and Philosophy*, 25:701–721, 2002.

[45] Robert C. Stalnaker. Assertion. In Peter Cole, editor, *Pragmatics*, pages 315–332. Academic Press, New York, NY, 1978.