Local Contexts and Local Meanings*

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Abstract: Stalnaker (1974, 1979) made two seminal claims about presuppositions. The most influential one was that *presupposition projection is computed by a pragmatic mechanism based on a notion of 'local context'*. Due to conceptual and technical difficulties, however, the latter notion was reinterpreted in purely semantic terms within 'dynamic semantics' (Heim 1983). The second claim was that some instances of *presupposition generation should also be explained in pragmatic terms*. But despite various attempts, the definition of a precise 'triggering algorithm' has remained somewhat elusive. We discuss possible extensions of both claims. First, we offer a reconstruction of 'local contexts' which circumvents some of the difficulties faced by Stalnaker's original analysis. We preserve the idea that local contexts are computed by a pragmatic mechanism that aggregates the information that follows from an incomplete sentence given the global context; but we crucially rely on a modified notion of entailment ('R-entailment'), whose plausibility should be assessed on independent grounds. Second, we speculate that local contexts might prove necessary (though by no means sufficient) to understand how some presuppositions are triggered. In a nutshell, we suggest that a presupposition is triggered when the semantic contribution of an expression to its local context is in some sense 'heterogeneous'. Without giving an analysis of the latter notion, we note that this architecture implies that presuppositions should be triggered on the basis of the meaning that an expression has *relative to its local context* (what we call its 'local meaning'); we sketch some possible consequences of this analysis.

'Assertion' (Stalnaker 1979) is in some respects the culmination of a research program, initiated in the early 1970's, which sought to provide an articulated notion of *context change* to analyze rich arrays of phenomena at the semantics/pragmatics interface. In this article, we focus on Stalnaker's contribution to the theory of presupposition. Two seminal suggestions were made in his work. The first and most influential one sought to explain *how the presuppositions of complex sentences are computed from the meanings of their parts* ('Projection Problem'). The second suggestion tried to explain *how the presuppositions of (some) elementary expressions are generated* to begin with ('Triggering Problem').

1. Stalnaker's first claim was that presupposition projection should be explained within an analysis which (i) countenances local contexts[1], and (ii) explicates context change in pragmatic terms (Stalnaker 1974, 1979). Local contexts were also posited by Karttunen 1974 and subsequently by Heim 1983, followed by all of dynamic semantics. But these authors took context change to be a *semantic* process, which is encoded in the lexical entries of various expressions. By contrast, Stalnaker attempted to give a purely *pragmatic* analysis of context change. Due to conceptual and technical difficulties, however, the semantic line came to dominate presupposition studies, and Stalnaker's pragmatic inspiration was in part lost in the process.

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The theory of local contexts developed in this paper is technically similar to that of Schlenker 2009b, c; some expository and technical parts are common to these papers. However the present theory is motivated in a very different way; in particular, we will take local contexts to represent the information that is 'entailed' (in a generalized sense) by the global context together with what was uttered. No such notion was present in Schlenker 2009a, b, whose definition of local context was less closely related to Stalnaker's ideas.

[1] As Stalnaker write in his replies, he himself does not use this term. What we call 'local context' would for him be the (original) context set *as modified by* a sentence or part of a sentence.

2. Stalnaker's second claim was that presupposition generation should in some cases be analyzed in pragmatic terms as well (Stalnaker 1974). This claim was made by others as well (e.g. Grice 1981, Simons 2002, Abusch 2009), but a general 'triggering algorithm' has so far remained elusive.

This paper has two goals. First, we offer a reconstruction of a notion of local context that addresses some conceptual and technical problems faced by the Stalnaker's analysis. Crucial to our reconstruction is a modified notion of entailment, whose conceptual plausibility should eventually be assessed on the basis of independent (non-presuppositional) considerations. Second, we will suggest that local contexts might prove crucial to understand how some presuppositions are triggered. The basic idea (also due to Stalnaker) is that some presuppositions are triggered when an expression makes two *heterogeneous contributions* to the meaning of a sentence. Although we will not try to say what 'heterogeneous' means here, the notion of 'contribution' will be defined on the basis of the meaning of an expression *relative to its local context* (what we will call its 'local meaning') - hence the conclusion that the local context of an elementary expression must be taken into account to determine whether a presupposition must be triggered.

1 Local Contexts and the Projection Problem

Much contemporary research starts from the idea that *a presupposition must be satisfied in the context in which it is uttered*, where the 'context' is construed as the 'context set', which encodes what the speech act participants take for granted. But the simplest version of this analysis is faced with immediate difficulties in complex sentences: *John is incompetent and he knows that he is* does not require that the speech act participants already take for granted that John is incompetent, since this proposition is asserted, not presupposed. Stalnaker 1974 solved the problem by postulating that the second conjunct is evaluated with respect to a *local* context, obtained by updating the global one with the content of the first conjunct; this explains why the presupposition of the second conjunct is in this case automatically satisfied. This analysis is summarized by the dynamic rule stated in (1): the update of a context C with a conjunction is the successive update of C with each conjunct.

(1) C[F and G] = C[F][G]

Besides their role in the analysis of presupposition projection, local contexts play for Stalnaker 1979 a role in the statement of *felicity conditions* on the utterance of any clause. Specifically, for a clause *F* to be felicitous, it should be neither trivially true nor trivially false in its local context. In other words, neither *F* nor *not F* should follow from the local context. Combined with Stalnaker's analysis of context change, this analysis makes some welcome predictions, which are illustrated in (2).

(2) a. John is in Paris and he is staying near the Louvre.
b. #John is staying near the Louvre and he is in Paris.

(2)b is quite a bit less acceptable than (2)a, and Stalnaker's analysis provides a straightforward explanation: in (2)b, the second conjunct is entailed (given standard world knowledge) by the first conjunct, which makes it infelicitous; no such problem arises in (2)a. It is immediate that the global context alone cannot distinguish these two cases, and thus that the appeal to local contexts is indeed crucial for this analysis.

Despite its appeal, Stalnaker's approach has faced two difficulties, one minor, and the other one less so.

1. First, the minor difficulty: does the local context of an expression really represent what is common belief between the speech act participants? Consider a staple of Stalnaker's analysis, his account of presupposition projection in unembedded conjunctions of the form *F and G*. Even in this case, there is little reason to assume that the addressee must necessarily *grant F* after he has heard the speaker assert it; after all, the speaker might well be wrong, and the addressee might have every reason *not* to believe him.

2. Second, the analysis failed to generalize to cases in which either (i) the beginning of a sentence does not have assertive force, or (ii) the presuppositional expression has predicative rather than propositional type. Some examples are given in (3):

(3) a. It didn't rain or it has stopped raining (*Presupposition:* none)
b. Each of my students has stopped smoking (*Presupposition:* each of my students used to smoke)
c. None of my students have stopped smoking (*Presupposition:* each of my students used to smoke)

The point of a disjunction is that one can assert it without being committed to either disjunct; this makes it difficult to see how an assertion-based analysis can be applied to (3)a, despite the fact that there are non-trivial presuppositional facts to account for (it is the *negation* of the first disjunct that serves to justify the presupposition of the second one – a fact that should follow from a principled account[2]). When the presuppositional expression is predicative rather than propositional, as is the case in (3)b-c, things are just as difficult: the complex predicate *has stopped smoking* interacts with the quantifier so as to yield a presupposition that *each* of my students used to smoke (see Chemla 2009 for experimental results that bear this out). Thus the local context of *has stopped smoking* must entail the presupposition *used to smoke*. This requirement can easily be formalized with a generalized notion of entailment (among predicates), but only if the local context in question is itself of predicative type. The difficulty
is that propositions can be the object of belief, but generally predicative elements cannot be[3]; so if local contexts must be *believed,* it is hard to see how such examples should be analyzed.

Both problems were solved by dynamic semantics (Heim 1983), but at a price: instructions to update the context were taken to be present in the very meaning of every

[2] The same fact extends to cases in which the order of the disjuncts is reversed, as in (i).

(i) It has stopped raining, or it didn't rain.

Similar data hold of the construction *unless F, G*, where the *negation* of *F* can serve to satisfy the presupposition of *G*:

(ii) Unless it didn't rain, it has stopped raining.

Thus the problem is fully general, and *ad hoc* stipulations for (3)a are unlikely to solve the problem. (It can be checked that the 'incremental' version of the theory developed here will account for (ii); and that the 'symmetric' version will account for (i)).

[3] Lewis 1979 suggested that 'De Se beliefs' should be analyzed as relations between individual and properties. But the present difficulty has nothing to do with De Se beliefs: the local context of *stopped smoking* in *No student stopped smoking* need not correspond to a property that the speaker self-attributes.

operator, which made it unnecessary to derive context change from more basic pragmatic notions. But this also made the theory excessively stipulative, because any kind of projection behavior - including ones that are never attested - could be encoded in dynamic entries for the standard connectives (Soames 1989, Heim 1990). To take a classic example, Heim's dynamic semantics did not rule out on principled grounds the 'deviant' connectives *and** in (4); in non-presuppositional cases, the latter has the same effect as *and* as defined in (3), but it predicts an entirely different projection behavior (e.g. it predicts that *John is incompetent and he knows that he is* presupposes that John is in fact incompetent).

(4) C[F and* G] = C[G][F]

Unlike dynamic semantics, Stalnaker sought to *derive* the presuppositional behavior of operators from their classical semantics, and thus his analysis avoided this problem of overgeneration.[4] It would thus be desirable to extend his insights to other connectives and operators.

Let us now consider each problem in turn.

1.1 Belief Update or Content Update?

Should local contexts encode what the speech act participants actually believe? In recent work, Stalnaker (2002) suggested that the context set should initially be seen as what is *common belief* (in the sense of epistemic logic) between the speaker and addressee. But often it would seem that the addressee need not believe a proposition that follows from a local context, in particular if the addressee is entirely skeptical of what the speaker tells him. A proponent of Stalnaker's theory could argue that all that matters is that the addressee *pretends* to accept the speaker's claim. Still, even fictional acceptance leads to difficulties. Analyzed in terms of common belief, a context (whether real or fictional) is intrinsically symmetric between the beliefs of the speaker and those of the addressee. But this symmetry makes it difficult to explain why (5)a is Moore-paradoxical while (5)b isn't:

(5) a. #It is raining but I (still) don't believe it.
b. It is raining but you (still) don't believe it.

If the context set is really updated with the first conjunct before the second one is processed, both sentences should be equally deviant: after the first update, the context set entails that it is raining; this means in particular that the speaker believes that it is raining, and that the addressee believes it too. When we come to the second conjunct, we should obtain exactly the same deviance in both cases. But in fact there is a clear difference between (5)a and (5)b: the former is Moore-paradoxical, the latter isn't; it seems that in (5)b the purported update process need not apply. A natural explanation is that the context set is *not* updated with the content of the first conjunct, but at most with the information that the speaker *believes* the first conjunct. Due to the first conjunct, (5)a can only be asserted if the speaker believes that conjunct - but this is contradicted by the content of the second conjunct; no such problem arises in (5)b, since the speaker and the addressee need not hold the same beliefs (see Schlenker 2009b for a brief discussion of possible counter-objections).

There are two ways to address this problem.

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[4] In recent work, Daniel Rothschild has offered very interesting solutions to the overgeneration problem within dynamic semantics. See for instance Rothschild 2008.

1. First, we could take the context set to represent what *would be* common belief *if* the addressee believed what the speaker said. We must also posit that this notion of local context is used for purposes of presupposition projection, but not, say, to assess the results of Moore's paradox, for otherwise we would wrongly predict that (5)b should be pragmatically deviant. In other words, presupposition projection should be analyzed in terms of some kind of 'ideal context', whereas Moore's paradox should be analyzed in terms of 'real contexts'.
2. Alternatively, we can redefine the notion of context set so that it represents *what follows from the speaker's utterance given the global context,* rather than as what is *common belief* between the speaker and addressee.

I believe that 1. corresponds more closely to Stalnaker's view, or to that of his followers; while 2. is in my opinion the simpler and more correct view. Still, any of these two solutions will do in the rest of this section, which will be concerned with the notion of entailment needed to develop Stalnaker's ideas.

1.2 Which notion of entailment?

1.2.1 The Problem

The harder problem faced by Stalnaker's analysis is that in general a local context must incorporate information that follows from the global context *together with an incomplete sentence*. This is for instance required if we wish to compute the local context of *G* in *F and G*, *F or G, if F, G*. But it is by no means clear what (if anything) follows from an *incomplete* sentence, even combined with a global context. And as was mentioned above, local contexts must also be used in the analysis of presuppositions of predicative type – so that local contexts should themselves be predicative in some cases.

The case of unembedded conjunctions, which did a lot to popularize Stalnaker's analysis, was in some respects so special as to be misleading. The assertion of a conjunction *F and G* can plausibly be assimilated to the successive assertion of *F*, and then of *G*; and this makes it natural to take the local context of *G* to include the information that follows from *F*. Things are already much harder in the case of a disjunction *F or G:* as we saw above, the local context of the second disjunct appears to include information that follows from *not F*, but why this is so has remained unclear. And in the case of quantificational statements, we must for instance determine what follows from an incomplete sentence (e.g. *No student* __), and we must do so in such a way that the resulting local context is of predicative type.

In Schlenker 2009b, c, a notion of local context was developed which (i) was derived from a classical semantics, and (ii) did work for the various positions – including predicative ones – in which local contexts are needed in Stalnaker's analysis. But this notion *failed* to capture the idea that a local context incorporates the information that 'follows' from what was uttered up to a certain point given the global context. We will now set out to reinterpret the technical results of this earlier enterprise in terms that are closer to Stalnaker's original insights. But in order to do so, we must first develop a generalized notion of entailment, which we call 'R-entailment', for 'entailment as redundancy'.

1.2.2 R-entailment: motivations

It has become routine to define generalized notions of entailments for expressions of types that 'end in t' (i.e. which yield propositional objects once they have been given all their arguments). For instance, a one-place predicate *P* entails a predicate *P'* just in case for every object d, *P'* holds of d whenever *P* does. But the notion we need is far more difficult to

develop because we want a relation of entailment to hold between expressions that are of different types (or don't have a semantic type at all); in particular, we want to determine which propositions or properties follow from an *incomplete sentence*.[5] For instance, we wish to derive the result that *p or* _ (with a hole in the second disjunct) 'entails' that *not p*; and similarly that the quantificational statement *[No N]* _ (with a hole in the verbal argument of the quantifier) 'entails' the predicate *N* (since *no student stopped smoking* yields the inference that relative to the global context the predicate *student* entails *used to smoke* – which suggests that the local context of the Verb Phrase is in this case the property of being a student[6]).

To develop the required notion, we start from the intuition that *E* entails *p* just in case *p* is redundant in the presence of *E* – hence the term of 'entailment as redundancy', or R-entailment. This is in fact the definition of entailment given in Boolean algebra when the primitive operations are taken to be $\wedge$ and =:

(6) $(p \rightarrow q) := ((p \wedge q) = p)$

Here *p* is taken to entail *q* just in case the meaning of $p \wedge q$ is the same as the meaning of *p* alone - which is another way of saying that in the presence of *p*, *q* does not make any semantic contribution. It can be checked that when = is interpreted as material equivalence, (6) simply yields a definition of material implication.

But we could also develop a stronger notion of entailment, one in which *in all syntactic environments whatsoever*, … $p \wedge q$ … has the same value as ... *p* …. For instance, taking = to be identity of value *at the world of evaluation* (i.e. material equivalence, written below as $\Leftrightarrow$), we may define two notions of entailment for a simple modal logic:

(7) Two Notions of R-entailment
a. Notion 1: $w \models (p \rightarrow_1 q)$ iff $w \models (p \wedge q) \Leftrightarrow p$
b. Notion 2: $w \models (p \rightarrow_2 q)$ iff for all syntactic environments E[_] for *q*, $w \models E[(p \wedge q)] \Leftrightarrow E[p]$

By a 'syntactic environment for *q'*, we mean any pair of strings *a, b* for which *a q b* is a well-formed sentence; in such cases, we will write the pair *a, b* as *a_b*. Thus *(p ∧_)* is an environment for *q* because for a = *(p ∧*, and for b = *)*, the string *a q b* is a well-formed sentence – namely the sentence *(p ∧ q)*. We will write *E[_]* to indicate that an environment is a sentence with a 'hole' in it.

(8) Syntactic Environment
A syntactic environment for an expression *d* is a pair of strings *a_b* for which *a d b* is a well-formed sentence (*a* and *b* may be null).

Now it can be checked that $\rightarrow_1$ is the notion we defined in (6), adapted to modal logic. But $\rightarrow_2$ is a stronger notion. First, we can note that if $w \models p \rightarrow_2 q$, then $w \models p \rightarrow_1 q$; this is because if for *all* syntactic environments *E[_]* for *q*, $w \models E[p \wedge q] \Leftrightarrow E[p]$, this result must also hold when *E* is the trivial environment which is the pair of two null strings. But the converse is not true: as soon as the language includes intensional constructions, $p \rightarrow_1 q$ need not entail that $p \rightarrow_2 q$ – the latter sentence will generally make a much stronger claim. To

[5] In this discussion (as well as in Schlenker 2009b, c), we solve the problem by making reference to the various syntactic completions that a partial sentence might have. Alternatively, one could develop related ideas within a semantic framework, making use of 'continuations'. This possibility is discussed in Barker 2008.
[6] This is in fact the prediction made by Heim 1983 and Schlenker 2009b,c.

take an extreme example, suppose the language has a universal accessibility relation and an existential modal operator ♦, and also propositions p_w that 'name' each world w, i.e. that are each true in w and in no other world.[7] In this way, we will obtain a definition of *strict* implication. This is because our more demanding notion of implication ($\rightarrow_2$) requires, among others, that all the equivalences in (9) hold at the world w:

(9) For each world w', w |= ♦($p_{w'}$ ∧ (p ∧ q)) ⇔ ♦($p_{w'}$ ∧ p)

But despite the fact that these equivalences only hold *at w,* the condition reduces to one that states that at *every* world w', *p ∧ q* must have the same value as p:

(10) For each world w', w' |= (p ∧ q) ⇔ p

This result holds because by assumption $p_{w'}$ is true in w' and in no other world, and the accessibility relation is universal. So for any formula *F*, w |= ♦($p_{w'}$ ∧ F) is true just in case *F* is true in w', hence the result. In this special case, then, $\rightarrow_2$ is just strict implication. Of course, in general a modal language won't have formulas that name all the various possible worlds, and thus R-entailment will yield a notion intermediate in strength between material implication and strict implication.

Interestingly, it is possible to find other cases in which our second notion of R-entailment ($\rightarrow_2$) gives rise to a more demanding relation than strict implication. Consider for instance a hyperintensional language with quotational operators, i.e. operators that are sensitive to the *form* of their arguments rather than just to their meaning. This is plausibly the case of verbs of speech: from *Peter said that it's raining*, one cannot infer that *Peter said that it's raining and that 2 plus 2 is 4*, despite the fact that in a standard possible worlds semantics the embedded clause has the same intension in the two cases. Still, with our second notion of R-entailment we obtain the result that *it's raining* does *not* in general R-entail *it's raining and 2 plus 2 is 4*. Take a world w in which Peter said 'it's raining' and Peter did not say '2 plus 2 is 4'. We argue as follows:

(11) a. w |= Peter said it's raining.
b. w |≠ Peter said [it's raining and 2 plus 2 is 4]
c. Hence w |≠ Peter said it's raining ⇔ Peter said [it's raining and 2 plus 2 is 4]
d. By (7)b, w |≠ it's raining $\rightarrow_2$ (it's raining ∧ 2 plus 2 is 4)

Thus R-entailment is in principle different both from material and strict implication. It is always at least as demanding as material implication; and it is sometimes less and sometimes more demanding than strict implication, depending on the rest of the vocabulary of the language. It is also worth noting that R-entailment can be defined in a special way: to determine whether *F* $\rightarrow_2$ *G* in world w, we do not need to have direct access to the value of *F* and *G* in other worlds than w. Rather, we only need to consider whether a variety of sentences containing *F* vs. *F and G* do or do not have the same value as each other *when evaluated in w* (and since these sentences might themselves contain intensional operators, $\rightarrow_2$ will often *fail* to be an extensional construction).

It is immediate that R-entailment can be applied to all pairs of expressions of a type that 'ends in t': such expressions can be conjoined (with a generalized notion of conjunction), and thus entailment as redundancy is applicable in all such cases. But in order to apply R-

[7] These are called 'nominals' in the tradition of hybrid logic (e.g. Blackburn 1994).

entailment to the analysis of local contexts, we need to further generalize the notion to ensure that an incomplete sentence can entail a predicate or a proposition.

1.2.3 R-entailment: refinements

- *R-entailment within an environment*

Let us start by explaining what it means for an expression (of predicative or propositional type) *together with its syntactic environment* to entail an expression of the same type. We henceforth restrict attention to a standard modal logic - there will be no more hyperintensionality in the fragments we consider. To sharpen our intuitions, we may for instance ask what *q* R-entails within the environment *if p, q* in a given world w. For simplicity, we systematically treat conditionals as material implications. Certainly everything entailed by *q* alone in w is R-entailed by *q* in this environment: if w |= q ⇒ q', then it also follows that w |= (if p, q) ⇔ (if p, q and q'). But since we now take the syntactic environment to be fixed, we will get many more entailments as well. In our example, in which *E[_]* is the environment *if p, _*, it turns out that *p* is also redundant:

(12) For *E[_] = if p, _*, for any propositional *q*, for any world w,
w |= E[q] ⇔ E[q ∧ p]

In other words, we can conclude that *q together with its environment* entails not just *q*, but also *p*.

- *R-entailment by an environment alone*

In the preceding example, we saw that quite a bit more is R-entailed by an expression *together with its environment* than by that expression alone. A natural question is what the environment entails *on its own*; thus we may ask what the environment *if p, _* entails *without* regard to the content of the slot _, which in our preceding example was filled by *q*.

Our notion of R-entailment can easily be extended to provide an answer. We will say that an environment *a_b* for *d* entails *d'* in world w just in case *for every expression d" that can be conjoined with d'*, w |= a (d' ∧ d") b ⇔ a d" b. To take a very simple example, it is immediate that the environment *if p, _* entails *p* itself, because for every propositional *p"*, we have that w |= if p, (p ∧ p") ⇔ if p, p".

- *Generalized R-entailment*

We are now in a position to give some definitions. We have successively explained what it means:
a. for a conjoinable expression *d* to R-entail *d'* in the environment *a_b;*
b. for *d* to R-entail *d'*;
c. for an environment *a_b* for *d* to R-entail *d'*.

Instead of introducing a different piece of notation for each notion of entailment, we will introduce a general notation, of the form *R-entail(world, d, environment, d')*, to indicate that *d* entails *d'* in the relevant environment in the relevant world. If one of these arguments plays no role – for instance because we are interested in a notion of entailment *by an environment alone* – the corresponding argument of the relation will be replaced with the symbol •.

(13) **R-entailment: Definitions**[8]

Let *d* and *d'* be two expressions of the same conjoinable type, let w be a possible world, and let *a_b* be an environment for *d* and *d'* (which means that *a d b* and *a d' b* are well-formed sentences).

a. R-entail(w, d, a_b, d') iff w |= a (d ∧ d') b ⇔ a d b

b. R-entail(w, d, •, d') iff for all strings *a'*, *b'* for which *a' d b'* is a well-formed sentence, w |= a' (d ∧ d') b' ⇔ a' d b'

c. R-entail(w, •, a_b, d') iff for all expressions *d* that can be conjoined with *d'*, w |= a (d ∧ d') b ⇔ a d' b

These definitions can be unified if we take • to go proxy for a universally quantified variable over expressions or environments, as the case may be.

One further refinement will be helpful. In pragmatics, one is often interested in what follows from an expression *given the assumptions of the speech act participants* – what is usually termed 'contextual entailment', or entailment relative to the context set. It is straightforward to define an extended notion of R-entailment *relative to C*:

(14) Let C be a set of possible worlds. For any *d'*, *E*, *d*, where *d* has a conjoinable type, *d'* is • or is an expression of the same type as *d*, and *E* is an environment of the form *a_b*, R-entail(C, d', E, d) iff for every world w of C, R-entail(w, d', E, d).

Other notions of entailment could be defined as well by extending the • notation, i.e. by replacing any of w, *d'*, *d*, or *a_b* in (13)a by variables of the appropriate type, and by quantifying these variables universally – a point to which we return below.

1.3 Incremental R-Entailment and Presupposition Satisfaction

1.3.1 Incremental R-Entailment

In order to reconstruct Stalnaker's notion of presupposition satisfaction, we must refine the definition of R-entailment given above. In (13)c, we explained what it means for a full environment, i.e. a sentence 'with a hole', to entail something. But Stalnaker's analysis is crucially incremental: the beginning of the sentence is taken into account when presupposition satisfaction is computed, but the end of the sentence is not. Still, our notion of R-entailment is sufficiently versatile to accommodate this further twist. We can preserve the definition in (13)c while replacing *b* with a variable over strings, which we universally quantify. By placing the bullet sign • appropriately, we can still call the result *R-entailment* (in effect, R-entailment comes in quite a few varieties depending on where one inserts bullet signs).

(15) Incremental R-Entailment

a. Let *d'* be an expression of a conjoinable type, let w be a possible world, and let *a_b* be an environment for *d'* (which means that *a d' b* is a well-formed sentence).
R-entail(w, •, a_•, d') just in case for all expressions *d* that can be conjoined with *d'*, for all expressions *b'* for which *a d' b'* is well-formed,
w |= a (d ∧ d') b' ⇔ a' d' b'

b. Similarly, if C is a set of worlds, R-entail(C, •, a_•, d') just in case for every world w in C, R-entail(w, •, a_•, d').

[8] If we studied a fragment with variables, *R-entail* would also have to take an assignment function as argument.

The definition in (15)b is particularly crucial for our present enterprise: it will be pivotal in our reconstruction of a Stalnakerian notion of local contexts. (It can be checked that incremental R-entailment falls out of the definitions in (13) once we apply our notational convention about •, taken to represent a meta-variable over strings which is universally quantified.)

To illustrate, consider the environment *if p, _*. We saw before that for any propositional *q*, *if p, q* R-entails *p* in the position of *q*, i.e. R-entail(w, q, if p, _, p). Since this is the case for *every* propositional *q*, we also have that R-entail(w, •, if p, _, p). Finally, on the assumption that the syntax guarantees that only a null string can be added at the end of *if p, q* to produce a well-formed sentence[9], we also have that R-entail(w, •, if p, _•, p): *p* is incrementally entailed by the beginning of the sentence *if p, _* .

1.3.2 Two Reconstructions of Presupposition Satisfaction

With these tools in hand, we can reconstruct Stalnaker's notion of presupposition satisfaction in two slightly different ways. Let us for instance consider a presupposition trigger *dd'* which appears in an environment *a_b*.

1. The simplest reconstruction consists in requiring that the beginning of the sentence (incrementally) R-entail the presupposition *d* relative to the context set C. Formally, this notion of satisfaction can be defined as follows:

(16) Satisfaction$_1$
If C is a set of possible worlds and *a_b* is an environmnent for *dd'*, Sat_1(C, dd', a_b) iff R-entail(C, •, a_•, d).

In effect, we take the local context of *dd'* to be, quite simply, the beginning of the sentence evaluated with respect to the global context set C. This immediately explains why *if p, pp'* presupposes nothing at all: in any global context C, R-entail(C, •, if p,_•, p), since the environment *if p, _* incrementally entails *p*, as was shown earlier.

In one respect, however, this reconstruction is flawed: it leaves unclear which model-theoretic object, if any, corresponds to the local context of *dd'*. For we did develop a notion of entailment between the beginning of a sentence and a propositional or a predicative expression, but we did so without defining a model-theoretic object that can play the role of Stalnaker's local contexts. Our second reconstruction provides such a definition.

2. Our second reconstruction goes as follows.

(i) First, we define the local context of *d* in a sentence *a d b* uttered in a context set C to be the strongest model-theoretic object x such that when *d'* denotes x, the environment *a_b* incrementally R-entails *d* (i.e. R-entail(C, •, a_•, d')). What does 'strongest' mean here? Since *d'* must be of propositional or predicative type, we can use ordering by entailment. In simple cases, the strongest such object x is just the conjunction of all the objects which are so entailed. This comes rather close to the notion of a local context *qua* belief state, taken to be the conjunction of all the propositions that are entailed by the state in question. But there are special cases in which there is no 'strongest' object of this type, and in which this big

[9] In the fragment *with parentheses* discussed in Schlenker 2009b, we do not have formulas of the form *if p, q*, but rather of the form *(if p . q)*. And it can be shown that a string that starts with *(if p . q* must immediately end with *)*.

conjunction would in fact be a contradiction; in such cases, it is better to say that the local context is just undefined (see Schlenker 2009b Appendix C, C.23 for a discussion of such a case).

(17) (Incremental) Local Contexts
If C is a set of possible worlds and *a_b* is an environmnent for some predicative or propositional expression *F,* incremental local context of an expression *F* in *a_b* relative to C is defined by:
LC(C, a_b) = the strongest x of the appropriate type such that if *d'* denotes x, R-entail(C, •, a_•, d')[10].

(If no such strongest x exists, the incremental local context of *F* is undefined)

(ii) Second, we take the presupposition *d* of a presupposition trigger *dd'* to be satisfied in an environment *a_b* just in case the appropriate local context entails the value of *d*.

(18) $Satisfaction_2$
If C is a set of possible worlds and *a_b* is an environmnent for some predicative or propositional expression *dd',* if LC(C, a_b) exists,
Sat_2(C, dd', a_b) iff LC(C, a_b) entails the value of *d*.

In most cases, Sat_1 and Sat_2 make the same predictions, but when the local context fails to exist, Sat_1 is defined while Sat_2 is not. In other cases, the equivalence follows indirectly because Sat_1 and Sat_2 through an equivalence with other theories, to which we now turn.

1.3.3 Alternative Reconstructions

Each of these two reconstructions turns out to be equivalent to proposals that either did without any notion of local context altogether, or had abandoned the view that local contexts can in some sense be treated in terms of belief update.

- *Sat_1 and the Transparency Theory*[11]

The first notion of satisfaction we defined above (Sat_1) turns out to be technically equivalent to the Transparency theory (Schlenker 2007, 2008a), an analysis that purported to do without any notion of local context, and to explicate presupposition projection in purely pragmatic terms.

Starting from a sentence *S* and a specification of its classical semantics (with distinguished presupposition triggers), the reasoning was as follows.

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[10] This notion is 'incremental' because the computation of LC relative to the environment *a_b* does not make any use of *b*. It would be easy to define a 'symmetric' notion of local context (LC^s) by making use of this information, as in (i) (note that the *a_b* rather than *a_•* appears on the right-hand side):

(i) LC^s(C, a_b) = the strongest x of the appropriate type such that if *d'* denotes x, R-entail(C, •, a_b, d')

See Section 1.3.3 for a brief discussion, and Schlenker 2008a, b, 2009b for further details.

[11] This discussion is in part shared with Appendix A of Schlenker 2009b.

-A presupposition was viewed as a distinguished entailment, one that 'wants' to be articulated as a separate conjunct. All things being equal, then, one should say *It is raining and John knows it* rather than *John knows that it is raining*. The requirement that presuppositions be articulated separately is called *Be Articulate*; it can be seen as a Gricean maxim of manner, since it imposes a condition on the way in which certain meanings should be expressed.

(19) Be Articulate
Say *a (d and d̲d') b* rather than *a d̲d' b*.

-A second principle of manner, *Be Brief*, limits the effects of *Be Articulate*. The intuition is that in any syntactic environment *a_b*, one should *not* say *a (d and blah) b* in case the words *d and* are certain to be eliminable without truth-conditional loss. When *Be Brief* is stated as an incremental principle, it deems an expression *d and* idle in case *no matter what follows,* these words were certain to be eliminable given what was already assumed in the conversation; we say in such cases that *d* is 'transparent'. For instance, if it is already assumed that John is in Paris, it will be idle to start any sentence with ***John is in Paris and*** .... Similarly, no matter what is assumed, a sentence that starts with *If John is staying near the Louvre,* ***he is in Paris and*** ... will contain a redundancy, because the words in bold are certain to be eliminable without truth-conditional loss.

(20) Be Brief (Incremental version; slightly generalized from Schlenker 2008a)
Let C be a context set, and let *d* be an occurrence of an expression whose type 'ends in t' in a sentence *a (d and d') b*. *d* is (incrementally) 'transparent' - and violates the incremental version of *Be Brief* - just in case for any expression *g* of the same type as *d*, for any good final b', C |= a (d and g) b' ⇔ a g b'.

It can be noted right away that *d* in *a (d and d') b* is 'transparent' – and thus violates *Be Brief* – just in case C ensures that *d* is entailed by the beginning of the sentence:

(21) Let C be a context set. *d* is transparent in *a (d and d') b* relative to C just in case R-entail(C, •, d, a_•).

With these principles in place, a theory of presupposition projection was developed by positing that *Be Brief* cannot be violated, while *Be Articulate* can be. This may be encoded by postulating that *Be Brief* is more highly ranked than *Be Articulate*:

(22) Be Brief >> Be Articulate

Together, these principles predict that in any syntactic environment a presupposition trigger *d̲d'* must be expressed as *(d and d̲d')*, unless *d* is transparent. Since we have seen that *d* is transparent just in case it is entailed by the beginning of the sentence relative to C, we have obtained an equivalence between the Transparency theory and our first reconstruction of Stalnaker's theory.

In Schlenker 2007, it was shown that for a very simple fragment with expressions of the form *(not F), (F and G), (F or G), (if F. G), (Q F . G)* (for various generalized quantifiers *Q*), the Transparency theory derives almost all the results of Heim 1983. These results immediately extend to our first reconstruction of Stalnaker's theory; sample predictions are summarized in (23).

(23) a. *(not pp')* presupposes *p*
b. *(pp' and q)* and *(pp' or q)* both presuppose *p*
c. *(p and qq')* presupposes *(if p . q)*
d. *(if pp' . q)* presupposes *p*
e. *(if p . qq')* presupposes *(if p . q)*
f. *(p or qq')* presupposes *(if (not p) . q)*
g. *(Every P. QQ')* presupposes *(Every P. Q)*
h. *(No P. QQ')* presupposes *(Every P. Q)*

- *Sat_2 and an alternative reconstruction of local contexts*

In our first reconstruction of Stalnaker's analysis, we took a local context to be in effect the beginning of a sentence, together with a specification of the global context set. Using our notion of R-entailment, in our second reconstruction we took the local context to be the strongest model-theoretic object (of the right type) which is entailed by the beginning of the sentence relative to the context set.

This second reconstruction turns out to be formally equivalent to a notion of local context that was defined *without* any notion of entailment in Schlenker 2009b, c. The idea there was that the local context of an expression is the minimal domain of objects that one needs to consider when computing the contribution of this expression to the discourse. Specifically, the local context of an expression *E* was taken to be the minimal domain of objects that the interpreter needs to consider when he computes the contribution of *E* to the meaning of the entire sentence. The intuitive idea was that the interpreter's task is to determine which worlds of the context set are compatible with the speaker's claim; in other words, he must compute a function from worlds in the context set to truth values. To do so, he has access to the context set C, and to the meaning of the words, which we take for simplicity to be functions of various types. It was assumed (i) that it is easier to perform the steps of the computation when part of the domain of a function can be disregarded, (ii) that the interpretation is performed incrementally (from left to right), and (iii) that before processing any expression, the interpreter tries to simplify his task as much as possible given what he already knows about the meaning of the sentence. From these assumptions, it followed that the interpreter should try to determine in advance of interpreting any expression *E* what is the smallest domain that he needs to consider when he assesses the meaning of *E*; this 'smallest domain' is our notion of local context.

This notion was cashed out by defining local contexts as follows (we use the term *local context'* to distinguish this notion from the preceding one):

(24) Local Contexts'
The local context' of an expression *d* of propositional or predicative type which occurs in a syntactic environment *a _ b* in a context C is the strongest proposition or property x which guarantees that for any expression *d'* of the same type as *d*, for all strings *b'* for which *a d' b'* is a well-formed sentence,

$C \models^{c' \rightarrow x}$ a (c' and d') b' $\Leftrightarrow$ a d' b'

(If no strongest proposition or property x with the desired characteristics exists, the local context of *d* does not exist[12]).

[12] See Schlenker 2009b for a discussion of the case in which local contexts do not exist.

It is immediate that a local context, so defined is just the strongest object that is R-entailed by the beginning of the sentence given the context set:

(25) The local context' of an expression *d* which occurs in a syntactic environment *a _ b* in a context C is just LC(C, a_b), i.e. the strongest model-theoretic object x of the appropriate type such that if *d'* denotes x, R-entail(C, •, a_•, d').

- *Comparisons*

1. It was shown in Schlenker 2009b that whenever local contexts exist, Sat_1 and Sat_2 are equivalent (or rather, we displayed an equivalence between the homologous notions we had developed in the Transparency theory and in our earlier reconstruction of local contexts). However there are cases in which local contexts as defined fail to exist (these are the cases that also make it impossible to define the local context as the generalized conjunction of all the objects entailed by the beginning of a sentence given the context set).

2. It should be pointed out that the results we obtain with these theories are not entirely equivalent to Heim's (1983), who developed a semanticized version of Stalnaker's ideas. Even when local contexts do exist, it is only for a particular syntactic fragment, and in the presence of some technical assumptions, that full equivalence with Heim's results is guaranteed. Technical details are provided in Schlenker 2007, 2009b.

3. A further notable point is that all the notions we have introduced can be redefined *without* a linear bias. We then obtain a 'symmetric' theory of presupposition projection. If the linear bias is due to the fact that sentences are processed and comprehended in time, one might expect that the bias – just like other processing effects – could be overcome, though at some cost. Precisely this conclusion is argued for on experimental grounds in Chemla and Schlenker 2009b.

To motivate symmetric accounts, let us note that all incremental theories under consideration predict that there should be a clear contrast between the following sentences:

(26) a. There is no bathroom or the bathroom is well hidden (after Partee).
b. The bathroom is well hidden or there is no bathroom.
a'. If there is a bathroom, the bathroom is well hidden.
b'. If the bathroom is not hidden, there is no bathroom.

(26)a-a' are correctly predicted to carry no presupposition. By contrast, theories with a left-right bias (be it dynamic semantics or the present analysis) predict that (26)b-b' should presuppose that there is a bathroom. But it is plausible that in these examples the presupposition of the first element is justified on the basis of information that appears at the end of the sentence; in fact, when the entire sentence is taken into account, (26)b becomes informationally indistinguishable from (26)a. And similarly for (26)b' and (26)a': trading on the near-equivalence between *If not F, not G* and *If G, F*, when the entire sentence is taken into account, (26)b' becomes informationally similar to (26)a' - which makes it unsurprising that they should transmit presuppositions in the same way. We take these observations to suggest that the local context of an expression *E* in a sentence *S* can to some extent be computed by taking into account *all* of *S* except *E*. This option is presumably costly, since (26)b-b' are somewhat less felicitous than (26)a-a'. Still, it appears that the left-right asymmetry we observed is *just* a bias, which can be overcome with some effort, rather than a rigid property of the system, as is postulated by standard dynamic semantics (see Chemla and

Schlenker 2009 for experimental evidence that symmetric readings are generally possible, albeit somewhat degraded; the symmetric version of the analysis is developed in greater detail in Schlenker 2009b)[13].

Stalnaker himself does not discuss the issue of incremental vs. symmetric theories of presupposition projection. Still, the view that the left-right bias reflects the fact that sentences are uttered in time, and can be overcome at some cost, is arguably in the spirit of his pragmatic analysis.

2 Local Meanings and the Triggering Problem

In the second part of this paper, I would like to suggest that a notion of local context might prove crucial to provide a general solution to the Triggering Problem. Since the latter is notoriously difficult, we will not try to solve it, but we will attempt to define boundary conditions on the *kind of input* that a 'triggering algorithm' should take. In a nutshell, our argument is as follows:

-Stalnaker and others have suggested that (some) presuppositions are generated in order to guarantee that no single expression should make two *heterogeneous contributions* to the meaning of a sentence.

-The *contribution* of an expression *d* to the meaning of a sentence should be viewed as the *difference* between the local context of *d* and the update of that local context with *d*.

-Therefore the triggering algorithm should be defined as a function of the local contribution of an expression and the meaning it has relative to that local context (what we will call its 'local meaning').

As will see, this architecture makes predictions that are significantly different from those of lexicalist views of presupposition generation; but it is too early to tell whether these predictions are correct, and we will be content to lay them out without fully assessing them.

2.1 The Project of a Triggering Algorithm

How do presuppositions get triggered? Stalnaker 1974 suggested that, in some cases at least, presuppositions are pragmatically generated rather than lexically encoded. His idea was that certain elementary clauses make two heterogeneous contributions at once, which is bad conversational practice; taking one of the two claims to be trivial (i.e. to be already entailed by the context of the conversation) solves the problem. He sketched the beginning of an analysis for the verb *know*:

> It is clear that "x knows that P" entails that P. It is also clear that in most cases when anyone asserts or denies that x knows that P, he presupposes that P. Can this latter fact be explained without building it into the semantics of the word? I think it can. Suppose a speaker were to assert that x knows that P in a context where the truth of P is in doubt or dispute. He would be saying in one breath something that could be challenged in two different ways. He would be leaving unclear whether his main point was to make a claim about the truth of P, or to make a claim about the epistemic situation of x (the knower), and thus leaving unclear what direction he intended or expected the conversation to take. Thus, given what "x knows that P" means, and given that people normally want to communicate in an orderly way, and normally have some purpose in mind, it would be unreasonable to assert hat x knows that P in such a context. One could communicate more efficiently by saying something else. For similar reasons, it would normally be inappropriate to say that x does not know that P in a context where the truth of P was in question. If the speaker's reason for believing his assertion were that he thought that P was false, or that he thought that x didn't believe that P, or didn't have reason to believe that P, then his statement would be gratuitously weak. And it would be unusual for a speaker to be in a position to know that one of these situations obtained, without knowing which.

[13] See Beaver 2008, Rothschild 2008, and Schlenker 2008b, 2009b for problems and discussion.

Interestingly, a related idea was developed in a late paper by Grice, who sought to analyze the presuppositions of definite descriptions as implicatures of manner. Specifically, Grice proposed to introduce a new maxim of manner to account for presuppositions; its statement was very close to *Be Articulate*, which was discussed above:

> if your assertions are complex and conjunctive, and you are asserting a number of things at the same time, then it would be natural, on the assumption that any one of them might be challengeable, to set them out separately and so make it easy for anyone who wanted to challenge them to do so. (Grice 1981).

Two questions immediately arise.

(i) How can Stalnaker's and Grice's suggestions be turned into predictive theories?

A triggering algorithm would be a rule that takes as input a specification of the conditions under which an expression (of propositional or predicative type) yields truth vs. untruth, and returns the presupposition of this expression. If the semantics is bivalent (so that presuppositions are seen as a pragmatic phenomenon), untruth is of course the same thing as falsity. But a triggering algorithm could also be applied to a trivalent semantics. In that case, we start by lumping together as 'untruth' falsity and presupposition failure, and we then ask whether the algorithm can determine how untruth should be divided among falsity and failure. For brevity, we will call 'bivalent meaning' the meaning obtained by lumping together in this way falsity and semantic failure.[14] So to restate the problem, a triggering algorithm should take as its input the bivalent meaning of an expression, and return a full specification of the presuppositions triggered by this expression in elementary clauses. For instance, a triggering algorithm should take as input the bivalent meaning of *stop smoking*, akin to 'used to smoke and doesn't smoke', and somehow *predict* that 'used to smoke' ends up being presupposed. In other words, a triggering algorithm must somehow select an entailment of the bivalent meaning of an expression, and 'flag' it as its presupposition.

There has been some very suggestive work on this problem, but it is fair to say that no general and predictive algorithm has been offered (but see Simons 2002, Abusch 2009 and Abrusan 2009 for interesting discussions). We will not attempt to provide one in the present paper. We will, however, ask what kind of *inputs* a triggering algorithm should take; as we will see, setting boundary conditions on these is already sufficient to make some non-trivial predictions.

(ii) What is the relationship between the triggering algorithm and the projection algorithm?

One could in principle imagine that there are two entirely different sets of rules to determine how presuppositions are generated, and how they are transmitted. But Stalnaker hints at the possibility of solving both problems at once: in his discussion of negation in the passage quoted above, he attempts to *explain* why the pragmatic principle he introduced for elementary clauses also predicts that a sentence *not F* should have the same presupposition as *F*. Obviously, a successful analysis would have to extend to *all* complex environments, not just negative ones.

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[14] There is a clear application of this notion when a presupposition is 'locally accommodated': in such cases, a presupposition trigger *d* in *d and d'* is interpreted as if it were *(d and d')*, which is to say that we compute its bivalent meaning instead of its ordinary (and potentially trivalent) meaning (this may for instance happen when we say *John hasn't stopped smoking because he never did smoke*).

2.2 Triggering from standard bivalent meanings

We start by discussing a traditional form for the triggering algorithm, in which the latter takes as its input the *standard* bivalent meaning of an expression. We will make two points:
-The form of the triggering algorithm makes rather strong predictions about the class of possible presupposition triggers.
-It might be possible to embed this theory of presupposition generation within a broader theory that encompasses presupposition projection as well.

If the semantics is taken to be bivalent, the bivalent meaning of an expression is just its usual meaning. If the semantics has more than two truth values, the bivalent meaning of an expression can be obtained by 'lumping together' falsity and undefinedness:

(27) Bivalent meaning
We write as **E** the normal type-theoretic meaning of an expression *E*.
The bivalent meaning of an expression *E* of type $\langle\tau, t\rangle$ is defined as:
$BM(E) = \lambda f_{\tau}$. 1 iff **E**(f) = 1; 0 otherwise.

It can be assumed in the rest of this paper that the initial semantics is bivalent, so that the bivalent meaning of an expression is just its usual meaning. But we will still make sure to provide definitions that could be applied to a trivalent semantics as well, since the project of a triggering algorithm is just as relevant in the trivalent case as it is in the bivalent case.

2.2.1 Form of a Triggering algorithm

Let us first restate the hypothesis that the presupposition of an elementary expression of a type that 'ends in t' is a function of its bivalent meaning:

(28) *Hypothesis 1:* triggering presuppositions from standard bivalent meanings
There is a function $\prod$ such that:
a. $\prod$ associates to every object e whose type ends in t an object $\prod(e)$ of the same type, with $e \leq \prod(e)$ (where $\leq$ is a generalized notion of inclusion / entailment for types that end in t);
b. if *E* is an elementary expression whose type ends in t, the presupposition (if any) that it triggers is given by $\prod(BM(E))$, where (as before) BM(E) is the bivalent meaning of *E*.

We immediately obtain the prediction that two expressions that have the same bivalent meaning should also trigger the same presuppositions.

(29) Prediction
If two elementary expressions have the same bivalent meaning, they must trigger the same presuppositions.

In some cases this prediction might be welcome. A simple example is provided by change of state verbs such as *start* / *begin*, *continue X-ing* / *keep X-ing*, *finish* / *end*, etc. Lexicalist frameworks would allow for pairs in which, say, *start* has no presupposition, while *begin* has the same bivalent meaning but triggers a presupposition. However such pairs appear not to exist, or to be exceedingly rare. Furthermore, it is generally believed that the same generalization holds across languages: two expressions that have the same bivalent meaning in two different languages often seem to trigger the same presupposition (obviously real fieldwork would be valuable to confirm or refute this insight).

It should be pointed out that not all non-lexicalist theories of presupposition generation satisfy the requirements we defined for a triggering algorithm. Thus Abusch 2009 develops an interesting theory in which the presuppositions of some expressions, such as *know*, are triggered by some pragmatic constraints on alternatives within a focus-based semantics. In a nutshell, the idea is that *x knows that p* triggers two alternatives, *p and x believes p*, and *p and x doesn't believe p*. From pragmatic constraints on focus alternatives, Abusch derives the fact that the disjunction of these two propositions must be presupposed to be true – hence a presupposition that *p*. While Abusch's account does not directly stipulate that an expression comes with a certain presupposition, it does so in an indirect way at the point at which it states what the *lexical* alternatives of an expression are. As she herself notes, any entailment *d* of an expression *e* could in principle come out as its presupposition if we simply decided that *e* has as its alternatives {e and d, e and not d}. For this reason, Abusch's theory does *not* make the prediction in (29).

As Abusch argues, this might be a good thing. For she cites minimal pairs that might well refute (29):

(30) a. John knows that it is raining.
b. John is right that it is raining.

In both cases, we have approximately the same bivalent meaning:

(31) *John knows that p* and *John is right that p* are both true if and only if:
(i) p
(ii) John believes that p

Still, these two expressions 'cut the pie' between assertion and presupposition in very different ways:

(32) a. John knows that that it is raining.
Presupposition: It is raining.
Assertion: John believes that it is raining.
b. John is right that it is raining.
Presupposition: John believes / claims that it is raining.
Assertion: It is raining.

This example could refute the general direction we have been exploring. Alternatively, two solution strategies could be explored.

1. We could deny that both expressions have exactly the same bivalent meaning. For instance, *be right that* can be understood with a speech act interpretation, whereas *be aware that* cannot, which might show that these expressions do not have the same bivalent meaning to begin with. Still, it would remain to explain why such a small difference should have such a drastic presuppositional effect – by no means a trivial task.

2. We could also deny that both expressions are elementary. In particular, one could argue that *is right* has a richer structure than meets the eye, one akin to *is right ~~in thinking~~ that*. Initial support for this analysis can be found in the following contrast:

(33) There are several really weird people that you invited while your mother was away.
Apparently she (only) knows part of the truth.

Who among them does she know that you brought home?

(34) There are several really weird people that your mother claims you invited while she was away. Apparently she (only) got it partly right.

*? Who among them is she right that you brought home?

The ungrammaticality of (34) is immediately explained if the structure *is right ~~in thinking~~ that* is posited: in this case, the interrogative element is extracted out of an adjunct, an operation which is independently known to violate syntactic constraints. This is only the beginning of an account, of course – it would still remain to explain why *x is right in thinking that p* presupposes that *x thinks that p*.[15]

2.2.2 Triggering and Projection

Let us suppose for a moment that we had a triggering algorithm that could 'flag' as presuppositions some entailments of elementary expressions. Would we still need to posit a *separate* projection algorithm? Possibly not.

- *Be Articulate*

As was mentioned earlier, the Transparency theory was designed to derive the theory of projection from the intuition that it is bad conversational practice to use an elementary expression that makes two heterogeneous contributions at once. As mentioned above, it was postulated that (i) a presupposition is triggered when the truth-conditional contribution of an elementary expression is analyzed by the triggering mechanism as *d<u>d</u>'*, where (in a sense that was never clarified) *d* is a 'distinguished' entailment of the entire meaning; and (ii) for this reason, *d* should be expressed as a separate conjunct.

If we assume that *d<u>d</u>'* must indeed be expressed as a conjunction involving *d* and *<u>d</u>d'*, it immediately follows that this conjunction must be of the form *(d and <u>d</u>d')* rather than as *(<u>d</u>d' and d)*. For as was mentioned above, a conjunction *(F and G)* is independently ruled out if *F* entails *G* (as in our earlier example *John is staying near the Louvre and he is in Paris*). This immediately rules out the conjunction *(<u>d</u>d' and d)*, leaving us with *(d and <u>d</u>d')* as the only possible 'articulated' competitor for the expression *d<u>d</u>'*.

The Transparency theory was designed to be compatible with any theory of presupposition generation based on Stalnaker's and Grice's intuitions. But it did without any notion of local contexts. Still, it is easy to restate it within an analysis based on local contexts. The key here is the second function of local contexts in Stalnaker's theory, which was to provide a general theory of local triviality and contradiction. If we posit that such is the *only* consideration that could rule out the articulated competitor, we also obtain the result that this condition is necessary to make the sentence acceptable.

But is it true that no further considerations can serve to rule out the articulated competitor? Several researchers (e.g. Beaver 2008) have argued that sometimes the articulated competitor is ruled out on independent grounds. Two are worth singling out. First, some expressions (e.g. discourse particles) trigger presuppositions that are so complex that their content could hardly be paraphrased in any way, let alone by a conjunct of reasonable

[15] One could conceivably treat *thinking that p* as a definite description akin to *the event of thinking that p*, which should trigger an existence presupposition in whatever way definite descriptions normally do.

length.[16] Second, sometimes the articulated competitor is ungrammatical for independent reasons – as is shown by Beaver's example *#John is taller than there is a king of France and he is tall*. There are two ways to address these objections.

1. First, we could bite the bullet and posit that competitors that are too long or syntactically ungrammatical can still be taken into account in the computation of *Be Brief*. This would mean that the latter principle is partly encapsulated, and thus does not have full access to other components of meaning (see Schlenker 2008b for related examples in the analysis of implicatures).

2. Second, however, one could also state the Transparency theory differently. In view of these objections, it may seem that the latter relies too narrowly on the *form* of a particular conjunction, whereas Grice and Stalnaker probably had in mind something far less specific.

- *Do Not Be Inarticulate*

A solution would be to prohibit expressions that are inarticulate – in other words, to replace the positive principle *Be Articulate* with a negative principle *Do Not Be Inarticulate*. As before, we must stipulate what is the presuppositional component of an atomic expression; we will continue to encode this by writing *d*_*d'* for a propositional or predicative expression with presupposition *d* and assertive component *d'*. Furthermore, we must count an expression *d*_*d'* as being 'inarticulate' whenever *d* fails to be trivial in its local context.

(35) Do Not Be Inarticulate (1st version)
  a. An expression *E* is inarticulate if ∏(E) is not locally trivial.
  b. It is bad conversational practice to be inarticulate.

Unlike the Transparency theory, this analysis does not rely on a pragmatic *competition* between an expression and a modification of it obtained by articulating the presupposition as a separate conjunct. Rather, it seeks to reconstruct Stalnaker's original intuition, but in a way that ties presupposition projection to presupposition generation. Of course, there is no real 'derivation' at this point; all we can do is hope that an adequate theory of presupposition generation will derive the result that one is inarticulate unless the presupposition of an expression follows from its local context. Still, the general architecture envisaged here has potentially interesting extensions.

2.3 Local Meanings

- *A Speculation*

Grice's and Stalnaker's ideas were based on the intuition that sometimes an expression makes two heterogeneous contributions to the meaning of a sentence. But the contribution of an expression to the meaning of a sentence is most naturally assessed as the difference between the local context c' of that expression, and the intersection of c' with the meaning of the expression; for simplicity we will henceforth call 'local meaning' the latter notion, which we define as follows:

[16] This observation was made independently by Christopher Potts and Louise McNally.

(36) The (bivalent) local meaning of a propositional or predicative expression *E* which occurs in an environment *a_b* in a (global) context C is defined as:

LM(E, C, a_b) = LC(C, a_b) ∧ BM(E)

where LC(C, a_b) is the local context of *E*, ∧ is generalized conjunction, and BM(E) is the bivalent meaning of *E* (both LC(C, a_b) and BM(E) were defined above).

Now suppose that the triggering algorithm only has access to (i) the local context of am atomic expression, and (ii) its local meaning. Then it should be defined as a function π which has the following form (note that with respect to a. below the definition of π is identical to that of ∏ in (28), except that π takes two arguments rather than one):

(37) *Hypothesis 2:* triggering presuppositions from local meanings
There is a function π such that:
a. π associates to every pair of objects c', e that have the same type ending in t an object π(c', e) of the same type, with (c' ∧ e) ≤ π(c', e) (where ∧ is a generalized notion of intersection / conjunction and ≤ is a generalized notion of inclusion / entailment for types that end in t);
b. if *E* is an elementary expression whose type ends in t, and if c' is its local context (given the global context and the syntactic environment), the presupposition (if any) that *E* triggers is given by a π(c', BM(E)), where (as before) BM(E) is the bivalent meaning of *E*.

In other words, given information about the local context of an expression *E* and its local contribution, the Triggering algorithm should select an entailment of the local meaning of *E* and give it presuppositional status. We can now state in a more precise fashion *Do Not Be Inarticulate:*

(38) Do Not Be Inarticulate (2nd version)
The utterance of an expression *E* in a local context c' is inarticulate unless π(c', BM(E)) is locally trivial in c' (i.e. unles c' ≤ π(c', BM(E))).

To take a very simple example, suppose the context set C does not contain any information, and the speaker utters the sentence S = *John knows that it's raining*. The triggering algorithm should deliver the result that π(C, C ∧ BM(S)) = π(C, BM(S)) = **it is raining**; if this is the case, C will *fail* to entail π(C, C ∧ BM(S)), and thus the speaker will have been inarticulate, which results in a pragmatic violation. So in this very simple example, we obtain the same predictions as before.

In more complex examples, this architecture makes a general prediction which was not made by our earlier analyses: two expressions that have the same local meaning and are evaluated in the same local context should trigger the same presupposition.

(39) If two expressions *E* and *E*' are evaluated with respect to the same local context c', and have the same local meaning with respect to c', they trigger the same presupposition.

Importantly, this architecture predicts that there could be expressions that trigger a presupposition when they appear in some local contexts but not in others – what we will henceforth call 'part-time triggers'. Let us now examine this prediction in greater detail.

- *Are there Part-Time Triggers?*

There are some reasons to think that part-time triggers might exist. To make the point concrete, we will the behavior of the verb *announce*, which is arguably a part-time trigger: in some contexts, it does not entail the truth of its complement; in other contexts, it entails a*nd presupposes* the truth of its complement. It contrasts rather minimally with the verb *inform*, which seems to lexically entail – and presuppose - the truth of its complement.

Importantly, *inform* and *announce* have similar bivalent meanings, except that the latter only entails the truth of its complement in the presence of special contextual assumptions. We thus predict that when the local context guarantees that *x announces to y that p* entails that *p* is true, *announce* and *inform* should trigger the same presupposition. In effect, the prediction is now that if two expressions have the same local meaning in the same local context, then they must trigger the same presupposition.

Let us consider some cases. The following sentences are about a group of responsible 30-year olds; in each case I include what I take to be the relevant inferences.

(40) a. Mary has announced to her parents that she is pregnant.
=> Mary is pregnant.
b. Mary hasn't announced to her parents that she is pregnant / I doubt that Mary has announced to her parents that she is pregnant.
=> Mary is pregnant.
c. Has Mary announced to her parents that she is pregnant?
=> Mary is pregnant.
d. None of these ten women has announced to her parents that she is pregnant.
=> Each of these ten women is pregnant.

In each case, we obtain the pattern of inference which is characteristic of presuppositions: an entailment of the positive sentence is preserved under negation and in questions, and it gives rise to a universal inference under the quantifier *no*. In addition, the presupposition arguably fails to project when it is justified by a conjunct that precedes the trigger:

(41) a. I doubt that Mary is pregnant and that she has announced it to her parents
≠> Mary is pregnant.
b. Is Mary pregnant, and has she announced it to her parents?
≠> Mary is pregnant.
c. If Mary is pregnant, has she announced it to her parents?
≠> Mary is pregnant.

On the basis of these data alone, we would have reason to conclude that *announce* is a *bona fide* presupposition trigger.

But in other cases this analysis makes entirely incorrect predictions. Suppose we are now discussing a group of teenage patients in a mental hospital, and that we say:

(42) a. John has announced that he has met Elvis.
≠> John has met Elvis.
b. John hasn't announced that he has met Elvis.
≠> John has met Elvis.
c. Has John announced that he has met Elvis?
≠> John has met Elvis.
d. (At least,) none of these ten patients has announced that he has met Elvis
≠> Each of these ten journalists has met Elvis.

Clearly, these examples do not imply that Elvis is alive. Importantly, no amount of tinkering with the notion of 'accommodation' can save the presuppositional analysis in this case. For

any kind of accommodation (be it 'global' or 'local') should yield in (42)a an inference that Elvis is indeed alive. The contrast between (40) and (42) is thus a bit of a puzzle for lexical theories of presupposition. (I believe that if *announce* is replaced with *inform*, these examples become harder, or require a special intonation to indicate that the verb is used ironically).

Going back to the examples in (40), we can manipulate and possibly reverse the judgments by modifying the context. Let it now be assumed that we are talking about a group of playful 7-year-olds (replacing *women* with *girls* in (40)d). It seems to me that the examples can then be uttered naturally without presupposing or entailing that the relevant individuals are pregnant. The generalization appears to be that when background assumptions guarantee that *x announces that p* contextually entails *p*, then *x announces to y that p* behaves like *x informs y that p,* and generally presupposes *p*. If Mary is a responsible 30-year old, she is unlikely to announce that she is pregnant unless she really is. By contrast, if *x* is a playful 7-year-old, that is reason enough to block the inference from *x announces that x is pregnant* to *x is pregnant*, and no presupposition - nor entailment – emerges.[17]

- *Part-Time Triggers and Local Contexts*

If what counts for purposes of presupposition generation is the contribution that the bivalent meaning of an expression makes within its *local* context, we would expect to find cases in which *announce* triggers a presupposition that *p* because it entails *p* in its local rather than in the global context. There might indeed be cases of this sort.

(43) At a costumed party, we encounter someone with a mask. We do not know whether this is Ann, an 11-year old, or Mary, a 30-year old.
If this is Mary, the person in front of us has / has not announced to her parents that she is pregnant.

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[17] I believe that it is not necessary to manipulate the degree of reliability of the subject to modify the presuppositional facts. Suppose that we are discussing a group of men who all have mistresses, but whose reliability is otherwise unknown. It seems to me that the examples in (i) are normally understood as presuppositional, while those in (ii) aren't:

(i) a. Smith has announced to his mistress that he is fired.
=> Smith is fired
b. Smith hasn't announced to his mistress that he is fired.
=> Smith is fired
c. Has Smith announced to his mistress that he is fired?
=> Smith is fired.
d. None of ten men has announced to his mistress that he is fired.
=> Each of these ten men is fired.

(ii) a. Smith has announced to his mistress that he will leave his wife within a year.
≠> Smith will leave his wife within a year
b. (Wisely,) Smith hasn't announced to his mistress that he will leave his wife within a year.
≠> Smith will leave his wife within a year
c. Has Smith (foolishly) announced to his mistress that he will leave his wife within a year?
≠> Smith will leave his wife within a year
d. (Wisely,) None of ten men has announced to his mistress that he will leave his wife within a year
≠> Each of these ten men will leave his wife within a year.

Even unfaithful men don't typically announce that they have been fired unless this is indeed so. By contrast, they may well tell their mistresses that they will leave their respective wives without thereby intending to do so. In this case, then, the nature of the embedded proposition suffices to yield a presuppositional contrast between (i) and (ii).

Evaluated with respect to the global context, *the person in front of us has announced to her parents that she is pregnant* does not entail that she is indeed pregnant, since the person in question could be Ann rather than Mary. On the other hand, with respect to its local context, the entailment does go through. So the form of the triggering algorithm which we postulated above would lead us to expect that in this particular context *announce* should display the same presuppositional behavior as *inform*:

(44) At a costumed party, we encounter someone with a mask. We do not know whether this is Ann, an 11-year old, or Mary, a 30-year old.
If this is Mary, the person in front of us has / has not informed her parents that she is pregnant.

I believe that it indeed plausible that in both cases we obtain an inference that Mary is pregnant. The crucial case is the one involving negation. On the assumption that no presupposition was generated, we would not expect to obtain an inference that Mary is pregnant from the sentence: *If this is Mary, the person in front of us has not announced to her parents that she is pregnant*. On the other hand, this inference is expected if a presupposition is generated under the scope of negation, which by the standard rules of presupposition projection percolates past the negation.

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The Stalnakerian notion of local context gave a key impetus to dynamic semantics; but it also lay the groundwork for a pragmatic – and arguably more explanatory – analysis of presupposition projection. His suggestions about presupposition generation have not yet had quite the same effect; but it can be hoped that pragmatic solutions to the Triggering Problem – or at least to some instances of it – will be further developed in the coming years.

References

Abusch, Dorit: 2009, Presupposition Triggering from Alternatives. *Journal of Semantics,* Advanced access, doi:10.1093/jos/ffp009

Barker, Chris: 2008, Notes on presupposition and order of composition. Ms., NYU. Available on Semantics Archive at: http://semanticsarchive.net/Archive/mQ3MTU0N

Beaver, David: 2008, As brief as possible (but no briefer). *Theoretical Linguistics* Volume 34, Issue 3, Pages 213–228.

Blackburn, Patrick: 1994, Tense, Temporal Reference and Tense Logic, *Journal of Semantics* 11, 83–101.

Chemla, Emmanuel: 2008a, Presuppositions of quantified sentences: Experimental Data. *Natural Language Semantics* vol. 17, n°4, pp. 299-340.

Heim, Irene: 1983, On the Projection Problem for Presuppositions. In D. Flickinger et al. (eds), *Proceedings of the Second West Coast Conference on Formal Linguistics*, 114-125. Reprinted in Davis 1991.

Rothschild, Daniel: 2008, Presupposition Projection in Dynamic Semantics. Manuscript, Columbia University.

Schlenker, Philippe: 2007, Anti-Dynamics: Presupposition Projection Without Dynamic Semantics. *Journal of Logic, Language and Information* 16, 3: 325-256. DOI 10.1007/s10849-006-9034-x

Schlenker, Philippe: 2008a, *Be Articulate:* A Pragmatic Theory of Presupposition Projection. *Theoretical Linguistics,* 34, 3: 157-212

Schlenker, Philippe: 2008b, Presupposition Projection: Explanatory Strategies. *Theoretical Linguistics* 34, 3: 287-316

Schlenker, Philippe: 2009a, Presupposition Projection: the New Debate. *Proceedings of SALT 2008*.

Schlenker, Philippe: 2009b, Local Contexts. *Semantics & Pragmatics,* Volume 2, Article 3: 1-78, doi: 10.3765/sp.2.3

Schlenker, Philippe: 2009c, Presuppositions and Local Contexts. To appear in *Mind*.

Simons, Mandy: 2003, Presupposition and Accommodation: Understanding the Stalnakerian Picture. *Philosophical Studies* **112:** 251–278, 2003. DOI 10.1023/A:1023004203043

Singh, Raj: 2007a, On the Interpretation of Disjunction: Asymmetric, Incremental, and Eager for Inconsistency. Manuscript, MIT.

Soames, Scott: 1982, How Presuppositions Are Inherited: A Solution to the Projection Problem. *Linguistic Inquiry* 13: 483-545.

Soames, Scott: 1989, Presupposition. In D. Gabbay and F. Guenthner (eds), *Handbook of Philosophical Logic IV*, 553-616.

Stalnaker, Robert: 1974, Pragmatic Presuppositions. In Munitz, M. and Unger, P. (eds.) *Semantics and Philosophy*. New York: New York University Press. Reprinted in Davis 1991.

Stalnaker, Robert: 1978, Assertion. In Cole, P. (ed.) *Syntax and Semantics,* vol. 9: *Pragmatics*: 315-322.

Stalnaker, Robert: 2002, Common Ground. *Linguistics and Philosophy* 25: 701-721.