23

On the Projection Problem
for Presuppositions

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The projection problem is the problem of pre-
dicting the presuppositions of complex sen-
tences in a compositional fashion from the
presuppositions of their parts. A simple illus-
tration is provided by the following three sen-
tences.

(1) The king has a son.

(2) The king's son is bald.

(3) If the king has a son, the king's son is bald.

Restricting our attention to existence presup-
positions resulting from definite descriptions,
we observe that (3) inherits the presupposition
that there is a king, which both of its constit-
uents carry, but doesn't inherit the presuppo-
sition that the king has a son, which its right
constituent carries. The solution I will advo-
cate was in some sense already arrived at by
Karttunen (1974), but its full potential was
not realized at the time, perhaps because an
appropriately sophisticated view of context
change and its relation to truthconditional
meaning was not available then.

1. COMPLEMENTARY STRENGTHS AND WEAKNESSES OF TWO RECENT THEORIES

I start with a brief comparison between two
well-known recent treatments of the problem,
one due to Gazdar (henceforth G.), the other
to Karttunen and Peters (henceforth K.&P.).

1.1 Explanation vs. Mere Description

G.'s strongest objection to K.&P.'s theory is
that it merely describes the projection facts in-
stead of explaining them. Recall what we just
observed about (3). To predict this observa-
tion, K.&P. appeal to the assumption that the
grammar of English supplies three pieces of
information for each lexical item: The first
piece pertains to the item's purely truthcon-
ditional content. For the word "if," let's say
this is the information that "if" is material im-
plication.[1] The second piece specifies what the

item contributes in the way of presuppositions. E.g., for the word "the," this includes at least the information that "the" contributes the presupposition that the noun it combines with has a non-empty extension. (For "if," we presumably have the information that it contributes nothing.) The third piece of information becomes relevant only for items that are functors rather than arguments, and it concerns the item's permeability for the presuppositions of its arguments. E.g., for "if" (a functor taking two propositional arguments), this is the information that "if" lets through the full presupposition of its left argument, as well as as much of the presupposition of its right argument as doesn't follow from the left argument. In other words:

(4) If A has p as its truthconditional content and p′ as its presupposition, and B has content q and presupposition q′, then the presupposition of "If A, B" is p′ & (p → q′).

Let's refer to these three pieces of information as the "content property," "presupposition property," and "heritage property" of the item in question. G.'s point of criticism is that the K.&P.-theory treats these three properties as mutually independent. None of them is derived from the other two. The theory thus implies—implausibly—that someone who learns the word "if" has to learn not only which truthfunction it denotes and that it contributes no presupposition, but moreover that it has the heritage property specified in (4). It also implies that there could well be a lexical item—presumably not attested as yet—whose content and presupposition properties are identical to those of "if," while its heritage property is different.[2] We have to agree with G. that a more explanatory theory would not simply stipulate (4) as a lexical idiosyncrasy of "if," but would somehow derive it on the basis of general principles and the other semantic properties of "if."

   G. further claims that his own theory is explanatory in just this respect. While he, too, takes every basic expression to be lexically specified for a content and a presupposition property, he manages to get away without heritage properties. In their stead, he invokes a general and quite simple theory of how utterances change the context in which they occur. In the case of (3), for instance, G. assumes that

one of the existence presuppositions of the consequent gets cancelled by a conflicting conversational implicature of (3): (3) implicates that, for all the speaker knows, the king may not have a son, which is not consistent with a presupposition to the effect that the king must have a son. The cancellation that ensues is dictated by a completely general strategy of maintaining consistency during context change; it does not depend upon a heritage property or other idiosyncratic property of "if."

1.2 Differing Predictions

It has been observed[3] that G. systematically makes inadequate predictions for examples of the following two types.

(5) If John has children, then Mary will not like his twins.

(6) If John has twins, then Mary will not like his children.

Intuitively, (6) as a whole presupposes nothing, in particular not that John has children. (5), by contrast, is slightly strange, at least out of context. It somehow suggests that it is a matter of course that someone with children will have twins among them. K.&P. predict just these judgments. But G. unfortunately predicts the opposite, i.e., that (5) presupposes nothing while (6) carries a substantial presupposition, viz. that John has children. These examples suggest to me that there is something fundamentally wrong with G.'s idea that presupposition projection in conditionals is a matter of cancellation.

   The literature also contains a battery of examples designed to show that G.'s predictions are superior to those of K.&P. One group of such examples is supposed to discredit K.&P.'s assumption that conditionals presuppose the conditional p → q′ (cf. (4) above) rather than q′ simpliciter. I agree with Soames (1982) that none of these examples are convincing. The remaining groups of genuine counterexamples to K.&P. are disjunctions whose disjuncts carry contradictory presuppositions (e.g., "He either just stopped or just started smoking.") and conditionals in which a presupposition of the antecedent fails to sur-

vive (e.g., "If I later realize I haven't told the truth, I will tell you.").

1.3 Subsentential Constituents and Quantification

In computing the presuppositions of sentences from the presuppositions of their parts, one must eventually attend to parts that are not complete sentences themselves. This presents no difficulty to K.&P., since their theory assigns presuppositions to expressions of any syntactic category and semantic type and employs projection rules above and below the sentence level that are not different in kind. G. remains silent about presupposition projection below the sentence level, and it is not obvious how he would handle it. Presumably, nonsentential phrases don't have presuppositions that are propositions; in the extended sense that they have any presuppositions at all, those are of other semantic types. But then G.'s mechanism of context change is not applicable to them: presuppositions that are not propositions are not the sort of thing that can get added to a context, at least not with contexts construed as sets of propositions. Given that G.'s main point is that presupposition projection is an epiphenomenon of the laws governing context change, his solution to the projection problem remains incomplete until this issue is addressed.

Quantified sentences provide a particularly interesting illustration of the task that G. faces here. Consider (7).

(7) Every nation$_i$ cherishes its$_i$ king.

The parts of (7), at the relevant level of analysis (logical form), are something like the following three:

(8) every x_i, x_i (is a) nation, x_i cherishes x_i's king

The third part of (8) contains the definite description "x_i's king," which one might want to say carries the existence presupposition expressed in (9).

(9) x_i has a king

But whatever (9) expresses is not a proposition: the free variable in it makes it incomplete. Would G. say that (9) expresses a poten-

tial presupposition of a part of (7) and hence of (7) as a whole? If so, what would it mean for this presupposition to get added to the context?

2. THE CONCEPTUAL PRIORITY OF CONTEXT CHANGE

The following is an attempt to combine the descriptive coverage of the K.&P.-theory with the explanatory adequacy demanded by G.

2.1 Admittance Conditions

We start by reformulating the heritage property of "if," currently stated as in (4). As Karttunen (1974) has shown, a stipulation like (4) is reducible to a stipulation like (10) combined with a general principle along the lines of (11).

(10) If "If A, B" is uttered in context c, then c is the local context for A, and c + A (read: "c incremented by A") is the local context for B.

(11) A context c admits a sentence S just in case each of the constituent sentences of S is admitted by the corresponding local context.

A context is here construed more or less like in G.'s theory, i.e., as a set of propositions, or more simply, as a proposition, namely that proposition which is the conjunction of all the elements of the set. (See e.g., Stalnaker (1979).) (11) appeals to a relation of "admittance" which is to hold between contexts and sentences. This relation is taken to be interdefinable with the relation "presuppose" that relates sentences to the propositions they presuppose, under the following equivalence:

(12) S presupposes p iff all contexts that admit S entail p.

Given their interdefinability, either relation can be used in the formulation and treatment of the projection problem. Following Karttunen (1974), we approach the problem in terms of the "admit" relation: How do the admittance conditions of a complex sentence derive from the admittance conditions of its parts? E.g., we want to predict that for a context c to admit (3), c has to entail that there is a king, but needn't entail that the king has a son. (10) in conjunction with (11) tells us that c will

admit (3) just in case (i) c admits (1), and (ii) c + (1) admits (2). Given that we already know the admittance conditions for (1) and (2), this amounts to the following: (i) c has to entail that there is a king, and (ii) c conjoined with the proposition that the king has a son has to entail that there is a king and he has a son. Requirement (ii) will hold automatically whenever (i) does, so the admittance condition for sentence (3) is merely (i). We have now shown that (10) together with (11) can do the job of the previous stipulation (4).

2.2 Context Change Potentials

The general principle (11) need not worry us any further, but (10) is still a stipulation specifically about "if" and is apparently independent of that item's content and presupposition properties. G.'s objection, as reported in 1.1 above, therefore still applies. Next I will show that (10) is actually nothing but an incomplete specification of what I call the "context change potential" (henceforth CCP) of "if." I will suggest that, while the CCP of "if" cannot be derived from its other properties, one *can* derive the content property from the CCP. More generally, the truthconditional aspect of the meaning of any expression is predictable on the basis of its CCP. Since the CCP also determines the heritage property, I can then answer G.'s objection: A two-fold lexical specification of each item, in terms of CCP and presupposition property, can replace the three-fold specification that appeared to be needed in the K.&P.-theory.

What are CCPs? Intuitively, they are instructions specifying certain operations of context change. The CCP of "It is raining," for instance, is the instruction to conjoin the current context with the proposition that it is raining. (If we construe propositions as sets of possible worlds, as we will here, "conjoin" means "intersect.") The CCPs of complex sentences can be given compositionally on the basis of the CCPs of their constituents. We will illustrate this shortly. We will always write "c + S" to designate the result of executing the CCP of sentence S on context c.

There is an intimate connection between the CCP of a sentence and its truthconditional content:

(13) Suppose c is true (in w) and c admits S. Then S is true (in w) with respect to c iff c + S is true (in w).

(Informally: To be a true sentence is to keep the context true.) Something like (13) has occasionally been used to define CCP in terms of truthconditional content (see e.g., Stalnaker (1979)). I want to exploit it for the opposite purpose: to give an—albeit only partial—definition of truth of a sentence in terms of the CCP of that sentence. The partiality results from the fact that (13) says nothing about the truth of S when c is false. I believe, without offering justification here,[4] that (13) is nevertheless good enough as a truth-definition for sentences. If this is so, then a compositional assignment of CCPs to the sentences of a language can fully replace a compositional assignment of truthconditions of the sort normally envisaged by semanticists, without any loss of empirical coverage.

I indicated that, by specifying the CCP of an expression, the need for a separate specification of its heritage property is obviated. Suppose, e.g., the CCP of "if" is as described in (14).

(14) c + If A, B = c\(c + A\c + A + B)

("M\N" stands for the intersection of M with the complement of N, as usual.) Suppose further, as seems natural, that admittance conditions are conditions on the definedness of the CCP, i.e., that c + S is defined iff c admits S. It is apparent from (14) that c + If A, B is only defined when both c + A and c + A + B are. Under our assumptions, this means that c admits "If A, B" only if c admits A and c + A admits B. In this way, the heritage property of "if" falls out from its CCP (14).

To give another example: If (15) describes the CCP of "not," we can read off immediately that c will admit "Not S" only if it admits S.

(15) c + Not S = c\c + S .

In other words, (15) determines that negation is a "hole" in the sense of Karttunen (1973).

Of course, (14) and (15) are motivated independently of the heritage properties of "if" and "not." They are just the CCPs that one would be led to assume if one's only goal were to arrive via (13) at the standard truthconditions for "if"- and "not"-sentences. (The

reader should convince herself of this.) So it is fair to say that we have reduced two seemingly independent semantic properties, the content and the heritage property, to just one, the CCP. The current theory no longer implies that content and heritage properties will vary independently across lexical items, or that they need be learned separately, and it is hence no less explanatory than G.'s.

2.3 Accommodation

Suppose S is uttered in a context c which doesn't admit it. We have said that this makes c + S undefined. What does that mean in practice? Does it mean that context change simply comes to a halt at this point and communication breaks down? That would be an unrealistic assumption. In real-life conversations, people deal with this kind of situation effortlessly: They simply amend the context c to a slightly richer context c′, one which admits S and is otherwise like c, and then proceed to compute c′ + S instead of c + S. Following Lewis (1979), I call this adjustment "accommodation." Accommodation accounts for the common observation that utterances can convey their presuppositions as new information.

The informal characterization of accommodation that I just gave contains a hidden ambiguity, which comes to light when we look at an example: Suppose S presupposes p, and "Not S" is uttered in a context c which fails to entail p, hence doesn't admit "Not S." Some sort of accommodation is called for. One can imagine two quite different ways in which it might occur: (A) The "global" option: Amend c to c & p and, instead of c + Not S, calculate c & p + Not S. Following (15), you will end up with c & p\c & p + S. (B) The "local" option: Amend c to c & p so that you can calculate c & p + S instead of c + S. Then substitute the result of this calculation in the place of "c + S" in (15), so that you end up with c\c & p + S. A is more like pretending that c & p obtained instead of c all along (hence the word "global"). B is rather like adjusting the context only for the immediate purpose of evaluating the constituent sentence S (hence "local"). The results are obviously different, so which way do people proceed in real life? I

suggest that the global option is strongly preferred, but the local option is also available in certain circumstances that make it unavoidable. Consider a concrete example.

(16) The king of France didn't come,

uttered in a context which is compatible with France having no king. By the global option, we end up with a context that entails that France has a king; this is presumably how we tend to read (16) in isolation. Under the local option, the resulting context will only entail that either France has no king or he didn't come. We will read (16) this way if we are for some reason discouraged from assuming France to have a king, e.g., if the speaker continues (16) with "because France doesn't have a king." Note that by stipulating a *ceteris paribus* preference for global over local accommodation, we recapture the effect of G.'s assumption that presupposition cancellation occurs only under the threat of inconsistency.[5]

I am here stopping far short of a general and precise formulation of the laws governing accommodation and their interaction with the instructions contained in the CCPs.

3. THE INTERPRETATION OF VARIABLES

While the theory I have sketched builds in many ways on that of K.&P., it also shares a problematic feature with G.'s: It treats presupposition projection as a side-effect of the rules governing context change. It is therefore not straightforwardly applicable below the level of complete sentences (cf. 1.3). Like G., I am faced with the difficulty of assigning CCPs to constituent sentences with variables free in them, i.e., to expressions that don't express propositions.

3.1 Contexts as Sets of Sequence-World-Pairs

We can solve our problem if we abandon the identification of contexts with propositions. The information accumulated in a context need not all be propositional; much of it is rather like information as one finds it represented in a card file, i.e., a collection of cards with a (more or less informative) description

[on] each card. Depending on the facts, such a file may be true or false: true if there is at least one collection of individuals that can be lined up with the cards so that each individual fits the description on the corresponding card; false otherwise. If contexts are like files, then context changes in response to utterances are like updating operations: additions of further cards and/or additions of further entries on already established cards. This metaphor is naturally applicable to utterances *containing variables.* The context change induced by, say, "x_7 is a nation" consists of writing the entry "is a nation" onto card number 7, where this card is either created on the occasion or found among the already established cards, as the case may be.[6]

Technically, files and, I suggest, contexts can be identified with properties of sequences of individuals, i.e., with sets of pairs $\langle g,w \rangle$, where g is a sequence of individuals (a function from the set of natural numbers into the domain of individuals), and w is a world. Since each such set of pairs determines uniquely a proposition:

(17) Let c be a set of sequence-world-pairs. Then the proposition determined by c is {w: for some g, $\langle g,w \rangle \in$ c}.

we don't give up any of the advantages of identifying contexts with propositions when we identify them with properties of sequences instead. In particular, we can still evaluate contexts in terms of truth and falsity, as shown in (18), and can retain the truth definition for sentence (13) which relies on that.

(18) c is true in w iff for some g, $\langle g,w \rangle \in$ c.

We can now assign CCPs to sentences with free variables, e.g., to sentence (9):

(19) c + (9) = c $\cap$ {$\langle g,w \rangle$: g(i) has a king in w}

(As for the CCPs for "if" and "not" that I formulated earlier, (14) and (15) carry over just as they stand into the new framework.) We can also formulate admittance conditions for sentences with free variables. E.g., in order to admit (20):

(20) x_i cherishes x_i's king,

a context must, informally speaking, "entail that x_i has a king." By this I mean that it has to be a context c such that, for every $\langle g,w \rangle \in$ c, g(i) has a king in w.

3.2 Presuppositions of Quantified Sentences

So how are we going to predict the presuppositions of a sentence like (7)? We have almost everything we need, except for the CCP of "every." Considering the truthconditions to be captured, the following formulation suggests itself.

(21) c + Every x_i, A, B = {$\langle g,w \rangle \in$ c for every a if $\langle g^i/a,w \rangle \in$ c + A, then $\langle g^i/a,w \rangle \in$ c + A + B}

("$g^i/_a$" stands for the sequence that is like g, except that $g^i/_a(i) = a$.) We need a further stipulation to ensure that (21) always yields adequate truthconditions: x_i must somehow be required to be a "new" variable at the time when "every x_i" is uttered. In terms of the file metaphor, we want to require that the file which obtains prior to the utterance doesn't yet contain a card number i, so that a fresh card will be set up when x_i is encountered in the evaluation of A. More technically, the stipulation we need is this:

(22) For any two sequences g and g' that differ at most in their i-th member, and for any world w: $\langle g,w \rangle \in$ c iff $\langle g',w \rangle \in$ c.

Given (22), (21) will derive the intended truthconditions for a sentence like (7), but not without (22). (The reader should verify this for himself by computing c + (8) for a choice of c that violates (22), e.g., c = {$\langle g,w \rangle$: g(i) = France}.) For our present purposes, we take (22) to be a lexical property of "every," i.e., part of its presupposition property. In other words, we stipulate that no context that violates (22) will admit a sentence of the form "Every x_i, A, B."[7]

Back to the issue of presupposition projection in "every"-sentences. (21) determines that c + "Every x_i, A, B" can only be defined if c + A and c + A + B are. Applied to (8), this means that c will not admit (8) unless (i) c admits "x_i is a nation," and (ii) c + "x_i is a nation" admits (20). We suppose (i) to be trivially satisfied. As for (ii), we determined in the previous section that c + "x_i is a nation" = c $\cap$ {$\langle g,w \rangle$: g(i) is a nation in w}, and furthermore that this will admit (20) just in case the following entailment holds:

(ii) For every $\langle g,w \rangle \in$ c $\cap$ {$\langle g,w \rangle$: g(i) is a nation in w}, g(i) has a king in w.

Now suppose that in every world in which c is true, every nation has a king. This is clearly a sufficient condition for (ii) to hold. It turns out that it is also a necessary condition; one can prove this by exploiting (22). We therefore conclude that a context that is to admit (8) must entail that every nation has a king. In other words: (7) presupposes that every nation has a king. The reasoning by which we arrived at this prediction may strike you as somewhat complicated. But bear in mind that all the machinery we had to invoke (in particular (21) and (22)) was needed independently to predict the truthconditions.

For the type of example discussed so far, i.e., universally quantified sentences with the presupposition-inducing element (here: a definite description) in the "consequent" (i.e., in the B-part of "Every x_i, A, B"), our predictions coincide with those of Karttunen and Peters (1979): If B presupposes X, "Every x_i, A, B" presupposes "Every x_i, A, X." But when the presupposition-inducing element is in the "antecedent," i.e., in A, as in (23), my claims differ from theirs.

(23) Everyone who serves his king will be rewarded.

According to K.&P. (1979), (23) presupposes nothing. I am committed, by the assumptions I have introduced so far, to the claim that (23)—normally, at any rate—presupposes that everyone has a king. I say "normally," because the prediction stands only to the extent that there is no local accommodation. As we observed in connection with (16), local accommodation may produce what looks like presupposition cancellation. Limitations of space prevent me from exploring the implications this might have for cases like (23). I can only hope the reader will agree with my impression that a theory which assigns a universal presupposition to (23) as the unmarked case is tolerably close to the actual facts, or at least as close as K.&P.'s analysis or any other simple generalization that comes to mind.

What about quantifiers other than universal? Concerning "no," we find conflicting factual claims in the literature. According to Cooper (1983), (24) should presuppose that every nation (in the relevant domain of discourse) has a king; for Lerner & Zimmermann (1981), it presupposes merely that some nation does.

(24) No nation cherishes its king.

Here as elsewhere, the theory I am advocating gives me no choice: Once I have assigned "no" a CCP that will take care of its truthconditional content, it turns out that I have to side with Cooper. But again, this applies only for the "ordinary" cases which don't involve any local accommodation. When the latter is brought into play, the universal presupposition will appear to be weakened in various ways or even cancelled.

3.3 Indefinites

Karttunen and Peters (1979) point out a difficulty with sentences like (25).

(25) A fat man was pushing his bicycle.

Their rules assign to (25) a presupposition that they admit is too weak: that some fat man had a bicycle. On the other hand, a universal presupposition that every fat man had a bicycle would be too strong. What one would like to predict is, vaguely speaking, a presupposition to the effect that the same fat man that verifies the content of (25) had a bicycle. But it is neither clear what exactly that means nor how it could be worked into K.&P.'s theory.[8]

I have argued elsewhere[9] that indefinites are not quantifying. The logical form of (25) thus lacks the part corresponding to "every x_i" in (8):

(26) x_i (was a) fat man, x_i was pushing x_i's bicycle

(26) is just a sequence of two open sentences with free occurrences of x_i, which are interpreted as though conjoined by "and." The CCP of (26) is simply:

(27) $c + (26) = (c + x_i$ was a fat man$) + x_i$ was pushing x_i's bike

This gives adequate truthconditions—provided that x_i is a new variable. We therefore stipulate that a context must conform to (22) if it is to admit a sentence containing an indefinite indexed i.

Now what about presupposition projection? (27) shows that for c to admit (26), $c + $ "x_i was a fat man" must entail that x_i had a bicycle. It turns out that, due to (22), this entailment will hold just in case every fat man in any world compatible with c had a bicycle. So we are

prima facie committed to an unintuitively strong universal presupposition for (25).

I suggest that our actual intuitions are accounted for by the ready availability of a certain kind of accommodation in the evaluation of indefinite sentences. In the case of (25), when c fails to entail that every fat man had a bicycle, the following appears to happen: First, $c + $ "x_i is a fat man" is computed, call the result of this c'. Then c' is found not to admit "x_i was pushing x_i's bicycle." So it is amended to c'', which presumably is c' & x_i has a bicycle. From there, $c'' + $ "x_i was pushing x_i's bicycle" is calculated. The net result is a context which entails that x_i was a fat man, had a bicycle, and was pushing it, but entails nothing about fat men having bicycles in general.

This sort of accommodation seems to happen with the ease typical of global, rather than local, accommodation. In fact, it *is* global accommodation if we take the defining feature of globality to be that the accommodated piece of information (here that x_i had a bicycle) remains in the context *for good*. (Notice that this criterion distinguishes appropriately between the global and local accommodation options as exemplified above for example (16).) In other words, I speculate that the relative ease with which a missing presupposition is accommodated in the midst of evaluating an indefinite sentence can be subsumed under the general observation that global accom-

modation is more common than local accommodation. Incidentally, this speculation relies crucially on the non-quantificational analysis of indefinites: only because x_i remains free in (26) does the information that x_i had a bicycle end up being entailed by the context ever after.

4. FINAL REMARK

Many non-trivial aspects of presupposition projection could not even be alluded in this paper, e.g., the heritage properties of "or," modal operators, and propositional attitude verbs. As for the latter two, I expect that the present approach will make reasonable predictions when combined with a treatment of modality in terms of quantification over possible worlds.[10] But I don't expect my readers to take this on faith.

ACKNOWLEDGMENTS

NOTES

1. I don't believe that, but it doesn't matter here.

2. G.'s point is not affected by the fact that Karttunen and Peters (1979) use a "heritage function" which assigns heritage properties to pairs consisting of the content and presupposition properties. For notice that this function is defined point by point, not as a general procedure.

3. Peters, personal communication. G.'s problem with (6) is also pointed out by Soames (1982), whose proposal, however, continues to be affected by the problem with (5).

4. I discuss this point somewhat further in Heim (1982).

5. The examples mentioned at the end of section 1.2 may also be amenable to a treatment in terms of local accommodation.

6. For a more explicit motivation of the file metaphor and the corresponding technical concepts, see Heim (1983).

7. This stipulation is derived from the indefiniteness of quantifying NPs in Heim (1982) and (1983).

8. A solution very different from the one sketched below is developed in Cooper (1983).

9. See Heim (1982) and (1983) for details.

10. E.g. along the lines of Kratzer (1981).

REFERENCES

Cooper, R. (1983). *Quantification and Syntactic Theory.* Dordrecht: Reidel.

Heim, I. (1982). "The Semantics of Definite and Indefinite Noun Phrases." Ph.D. diss., University of Massachusetts.

Heim, I. (1983). "File Change Semantics and the Familiarity Theory of Definiteness." In A. von Stechow, R. Bauerle, and C. Schwarze (eds.), *Meaning, Use and Interpretation.* Berlin: W. de Gruyter.

Karttunen, L. (1973). "Presuppositions of Compound Sentences." *Linguistic Inquiry* 4:169–193.

Karttunen, L. (1974). "Presupposition and Linguistic Context." *Theoretical Linguistics* 1:181–194. [Reprinted in this volume, Chapter 24]

Karttunen, L., and S. Peters (1979). "Conventional Implicature." In Ch.-K. Oh and D. Dinneen (eds.), *Syntax and Semantics.* Vol. 11: *Presupposition.* New York: Academic Press.

Kratzer, A. (1981). "The Notional Category of Modality." In H. Riesser and J. Eikmeyer (eds.), *Words, Worlds and Contexts,* Berlin: W. de Gruyter.

Lewis, D. (1979). "Scorekeeping in a Language Game." In R. Bauerle, V. Egli, and A. von Stechow (eds.), *Semantics from Different Points of View.* Berlin: Springer-Verlag. [Reprinted in the volume, Chapter 25]

Lerner, J., and T. Zimmermann (1981). "Mehrdimensionale Semantik: Die Präsupposition and die Kontextabhangigkeit von 'nur.'" Working paper 50, SFB 99.

Soames, S. (1982). "How Presuppositions Are Inherited: A Solution to the Projection Problem." *Linguistic Inquiry* 13:483–545.

Stalnaker, R. (1979). "Assertion." In P. Cole (ed.), *Syntax and Semantics.* Vol. 9: *Pragmatics.* New York: Academic Press. [Reprinted in this volume, Chapter 17]