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proposizioni, nell'altro di azioni. Non sembra esista altra maniera di identificare delle azioni, salvo darne una descrizione linguistica o una raffigurazione equivalente, sicché qualunque operazione cognitiva si compia a proposito di azioni, la si compie in riferimento a descrizioni d'azioni; inoltre, gran parte delle proposizioni che effettivamente formiamo sono descrizioni d'azioni, come ci informano i sociologi, oppure sono modellate sulla forma della descrizione di un'azione, sicché anche in questo senso i due discorsi teorici — quello sull'azione, quello sulla proposizione — rischiano di sovrapporsi. Ci si può domandare a questo punto se non si abbia sbagliato strada, e quali altri strumenti concettuali possano essere adatti a descrivere teoricamente la distinzione che, intuitivamente, si dà.

Quel che vorrei suggerire è, per ora, quanto segue. Se si lascia cadere la valorizzazione della verità come discriminante per la semantica, può darsi che ci si ritrovi davanti, non la temuta invasione dei barbari, la calata della soggettiva, relativistica pragmatica; ma una distinzione fra pragmatica e semantica piú nitida di prima, perché con meno poste in gioco dall'una e dall'altra parte. Vorrei citare, per un confronto un po' arduo ma suggestivo, la nozione di «programma narrativo» sorta come strumento d'analisi nelle ricerche di semiotica del testo. Si tratta di strutture che possiamo considerare d'ordine semantico, ma non perché abbiano delle relazioni con il giudizio di verità/falsità, bensí per la funzione di schemi basilari che rivestono sia nei confronti dell'azione — da analizzare come esecuzione di un programma narrativo — sia nei confronti del discorso — da analizzare come loro trasformazione in una realizzazione testuale, includente giochi d'enunciazione (si veda A. J. Greimas, J. Courtès [1979]).

Questo spunto viene d'altronde a convergere con quelle tendenze recenti in pragmatica, che differenziano dai fatti sistematicamente articolati e convenzionalmente cristallizzati della semantica lo studio dei processi pragmatici come motivati e connessi a relazioni e interpretazioni (inter)soggettive di carattere dinamico (oltre a Grice [1975] si vedano, ad esempio, R. Lakoff [1979] e G. N. Leech [1979]).

PIETER A. M. SEUREN

A great deal has happened since, almost fifty years ago, Morris provided his seemingly clearcut distinction between syntax, semantics and pragmatics. Whereas, according to his distinction, syntax should be the description of combinations of elements into the sentences of a language, semantics should define the relations of utterances of sentences with the things referred to, and pragmatics should define the relations of utterances of sentences with the context and situation of utterance.

It was not clear, at the time, that this tripartite distinction embodied at least one hidden assumption that might turn out to be explosive. The assumption was that the three types of description were *autonomous* with respect to each other. No account was taken of the theoretical possibility that syntactic constructions might be best described as transforms of semantic analyses, or that reference relations might depend essentially upon elements of context and situation. Nowadays, these theoretical possibilities have been and are being explored. In general, the clarity of Morris' distinction has made way for a great deal of opacity.

In our days it still is customary to distinguish between semantics and pragmatics (to limit ourselves to these two). But authors differ consider-

ably regarding the way they draw the distinction. In the wake of Austin's and Searle's work a theory of speech acts has got off the ground, and a widespread feeling arose that the theory of so-called indirect speech acts would constitute a prime object for pragmatics. The perlocutionary force of utterances, to speak with Austin, is obviously closely related to factors of context and situation, including the famous Speaker and Listener. Thus, a variety of pragmatics sprang up specializing in conversational and other interactional analyses. This variety is sometimes called 'pragmalinguistics'.

But at the same time, a different kind of pragmatics began to blossom, springing from the same root of indirect speech acts. This development was initiated by H. P. Grice in the late 60's. Grice distinguished, in principle, between hard-boiled entailments, or logical consequences, of sentences (if p is true, then in any case q is true as well), and conclusions that speakers usually, or normally, draw in ordinary verbal interaction, though the conclusions are not warranted by any unshakable logic. The latter he called 'implicatures', and the verb is 'implicate'. Now many began to feel that it would be proper to assign the description of entailments to semantics, but the description of implicature to pragmatics. The rationale underlying this division of labour was not always made explicit, but on the whole it seems that the feeling was that semantics ought to deal with anything that could be handled by a logical system, with the concomitant apparatus of truth-value assignments and model-theory, but that pragmatics should take account of the mechanics of verbal interaction.

Here, things begin to hot up a little. Let us, indeed, adhere to the distinction just made. Two essential questions then present themselves: (a) which conclusions are unshakable, and therefore logico-semantic, and which are merely suggestive ('invited inferences')? And (b) are all shakable inferences, i.e., implicatures, due to the mechanics of verbal interaction, and if so, what role is played by logic and what role is played by pragmatic factors?

Let us give some examples. As regards question (a), it has been said that a sentence like:

(1) Not all doors were locked.

implicates that some doors were locked. Yet it is legitimate to ask whether this is a mere implicature or an entailment. My feeling is that if not at least some doors were locked, sentence (1) cannot possibly be true. The following sentence strikes me as contradictory:

(2) Not all doors were locked because none was.

As opposed to:

(3) It is not true that all doors were locked, because none was.

The converse, however, does present an implicature:

(4) Some doors were locked.

implicates, but clearly does not entail, that not all doors were locked. An analogous case is presented by a sentence like:

(5) Ron needn't know that his bunny has died.

which is sometimes said to merely implicate that Ron may know that his bunny has died. Yet the following sentence sounds contradictory:

(6) Ron needn't know that his bunny has died, because he can't know it: the poor animal died two minutes ago and Ron is right now on a flight to Chicago.

Notice, again, that the contradiction is gone when I say:

(7) It is not necessary that Ron knows that is bunny has died: he can't even know it, since he is on a flight to Chicago.

Conversely, again, the sentence:

(8) Ron may know that is bunny has died.

merely implicates, but does not entail, that it is not necessary that Ron knows it.

As regards question (b), Grice distinguishes between conventional and conversational implicatures. The former belong to 'what is actually said', i.e. to the semantics of the sentence in question; the latter are clearly due to the mechanics of interaction. It is not made clear whether conventional implicatures should be reckoned to be computable by means of a calculus. But it is clear that he intends conversational implicatures to result from a number of 'conversational maxims' that form an implicit covenant among the interaction partners. One of these maxims is 'be as informative as you can', i.e., 'do not use the weaker if you can use the stronger expression'. Since *all* is considered stronger than *some*, and *necessary* stronger than *possible*, (4) should implicate (1), and (8) should implicate (5). Likewise, since *none* is more informative than *not all*, and *impossible* more than *not necessary*, (1) should implicate (4), and (5) should implicate (8), — assuming that this is implicature and not entailment.

That an explanation along such lines will inevitably meet with some obstacles, is quickly seen when one considers that the simple assertive operator 'it is the case that' is obviously stronger than *possible* (but weaker than *necessary*). Yet, clearly, (8) in no way implicates that it is not the case that Ron knows that his bunny has died.

A special case is formed by what is commonly called *presupposition*. For a long time it was thought that presuppositions are entailed both by non-negative sentences and by their negations. As is well-known and easy to understand, this led to severe logical problems in any two-valued logical system. If both p and not-p entail q, then q can only be a necessary truth. But the things that are called presuppositions are far from necessary truths. The only way that remains open for a logically coherent definition of this notion of presupposition, is a three-valued logical system.

Wilson [1975], however, asks question (a) with regard to presupposition, and concludes that all those who had believed that, if p presupposes q, both p and not-p entail q, were mistaken. In those cases where we wish to speak of presuppositions, she says, p entails q, but not-p merely implicates q. If Wilson were right in this respect, her observation would get us, in principle, off the logical hook, although we would still want to see by virtue of what logical property q is entailed when p presupposes q: no logical system is known that yields as entailments the things we treat as presuppositions. Wilson's thesis that negated sentences do not entail but merely implicate their presuppositions, is based on observations such as:

(9) Bob does not know that his bunny is dead, because his bunny isn't dead.

(10) The present king of France is not bald: there is no king in France these days.

These sentences are not contradictory, although (9), presupposes that Bob's bunny is dead, and (10) presupposes that there is, nowadays, a king of France. This is in stark con-

trast with the non-negated versions of (9) and (10), which do yield contradictions:

(11) Bob knows that his bunny is dead, but it is not dead.

(12) The present king of France is bald, but there is no king of France, these days.

Hence, she concludes, presuppositions may be entailed by non-negative sentences, but they are certainly merely implicated by negated sentences. Consequently, from a purely logical point of view, presuppositions are just like entailments (although, again, we would want to see *how* these presuppositional entailments are computed), but they have the special property that they are implicated by negative sentences (and here we ask: is the implicature conventional or conversational, and in either case, how does it work?).

Although Wilson's correction is important and correct in certain ways (the observations given in (9)-(12) are correct), her conclusion is faulted by a category of cases she must have overlooked. It is generally known that natural languages have so-called Negative Polarity Items (NPI) and Positive Polarity Items (PPI). NPI's are grammatical, lexical or idiomatic features requiring a negation in a simple assertive sentence: *at all, all that, ever, can possibly, budge, mind that, matter that, any more*, etc. PPI's, on the other hand, though allowing for a negation in simple assertive sentences, make such negative sentences 'marked' in the sense that a so-called echo-effect is produced. A few examples of PPI's are *the lot, still, absolutely, be delighted that, ...* The number of NPI's and PPI's in any language is surprisingly large. Here follow a few sentences with NPI's:

(13) Harry isn't happy at all.

(14) Harry isn't all that happy.

(15) Harry doesn't live in Paris any more.

Examples with PPI's and negation:

(16) He did not smash up the lot.

(17) Harry does not still live in Paris.

We notice the echo-effect of the latter two sentences.

In this context we observe a remarkable property of NPI's and PPI's. We see that the negation required by NPI's is always presupposition-preserving, whereas the negation allowed for (with echo) by PPI's eliminates presuppositions. In sentences (9) and (10) the presuppositions of the first conjuncts are eliminated due to incompatibility with the second conjunct. But if we use a NPI in the first conjunct, this elimination is no longer possible, and we are landed with a contradiction. Sentence (15), for example, contains the NPI *any more*, and also presupposes that Harry has lived in Paris for some time in the recent past. This presupposition cannot be cancelled by the negation, as is shown by the contradictoriness of:

(18) Harry doesn't live in Paris any more: he has never set foot in France.

On the other hand, the positive of sentence (17):

(19) Harry still lives in Paris

has the same presupposition as (15), but asserts that Harry's living in Paris is still going on. *Still* being a PPI, we see that this presupposition is lost in (17). This means that there are cases in language where both p and not-p entail q, without q being a necessary truth. This puts us back where we were: we need a logico-se-

mantic definition for presupposition, and a pragmatic definition will not do.

A further example. Compare (9), where the presupposition is cancelled, with:

(20) Bob doesn't mind that his bunny is dead, because his bunny isn't dead.

This latter sentence is clearly contradictory, and we now know that this is due to the NPI *mind that* that keeps its presupposition under negation. *Be delighted that*, on the other hand, is a factive PPI, and, predictably, we have no problem with:

(21) Bob is not delighted that his bunny is dead, because it isn't dead.

Further examples are easily provided.

We thus distinguish two negations in language, a *minimal negation* which is presupposition-preserving, and a *radical negation*, which cancels presuppositions. The two negations are not only distinguished by their behaviour under NPI's and PPI's, but also by further criteria. Thus, radical negation is characterized by intonational features; it can only occur in so-called canonical position, i.e., with the finite verb; it must have the surface form *not*. Minimal negation may occur in other positions as well (Not many smokers like your idea of high tax on tobacco), including incorporation into lexical items (*uneasy*, *impolite*, *difficult*, *far from*, etc.). Yet, these conditions are not sufficient for a complete grammatical characterization of the two negations, as appears from the fact that the negation in (22a) is minimal, but in (22b) radical, without our being able to say why this should be so:

(22)a. Only few people did not believe in the teacher's sincerity.

b. The teacher's sincerity was not believed in by only few people.

More research will have to be done to provide clarity in such cases.

Given the fact that we have already distinguished two negations, it is natural to think of a three-valued logical system to account for presupposition. We will distinguish three truth-values: true, false and radically false. Radical falsity is assigned when there is presupposition-failure. The two negations are truth-functional in the following way. Minimal negation over p is read as 'the presuppositions are OK, but the assertion of p is false!'. Radical negation is: 'there is presupposition failure in p'. This gives the truth table (with 1, 0, and * for the three values, and $\sim$ and $\simeq$ for minimal and radical negation, respectively):

p	$\sim$p	$\simeq$p
1	0	0
0	1	0
*	*	1

Lack of space forbids a further elaboration of the calculus (but see Seuren [1979]).

One thing is clear now. If both p and $\sim$p entail q, then (radical) falsity of q is incompatible with either the truth or the minimal falsity of p, and is thus compatible only with the radical falsity of p. q is now no longer a necessary truth, but only necessary for a classical truth-value of p (i.e., 1 or 0). We thus define $p \gg q$ (p presuppose q) as: $p \Vdash\!\!- q$ and $\sim p \Vdash\!\!- q$ (both p and not-p entail q).

If we now look at sentences (1) and (5) again, we notice that a presuppositional solution readily presents itself. We stipulate that *all* and *necessary* carry the following presuppositions: 'all a (P(a))' presupposes 'some a (P(a))', and 'necessary (p)'

presupposes 'possible (p)'. Observationally, 'all a (P(a))' entails 'some a (P(a))', but, as we have seen, 'not all a (P(a))' equally entails that, whereby we notice that the negation, not being in canonical position, must be minimal. Likewise, 'must (p)' entails 'may(p)', but also 'needn't (p)' entails 'may(p)'. Notice that *need* followed by a bare infinitive without *to* is a NPI. We thus have a presuppositional, and more precisely a logico-semantic, account of the sentences (1) and (5).

Nothing has been said, so far, about non-presuppositional implicatures, or about presuppositional implicatures in intensional contexts. The latter can be handled, in principle by means of a formalized theory of interpretation domains, as is shown in Seuren [1979]. For these cases, as well as for presuppositions under negation, one single pragmatic principle is needed: the third value of radical falsity is assigned only under duress. That is, only in order to avoid textual incoherence, contradiction or other absurdities. In well-ordered, unmarked discourse, the third value ought to remain dormant.

Secondo intervento

PAOLO LEONARDI

Leggendo i primi interventi dei miei quattro interlocutori e rileggendo il mio stesso primo intervento, m'è parso che nessuno di noi sia riuscito, in modo soddisfacente, a distinguere o a proporre come qualcosa di diverso da una distinzione il rapporto fra semantica e pragmatica. Nel dire che la pragmatica è il fondamento della semantica (Parret) o che c'è una pragmatica integrata con la semantica (Récanati) o che la semantica ha un carattere cristallizzato e convenzionale (statico) mentre la pragmatica ne ha uno dinamico (Sbisà) si coglie la difficoltà di una distinzione che si cerca di affermare: «vorrei quasi dire che sono la stessa cosa, ma sono due cose diverse». (Ho poi dei dubbi specifici su ciascuna di queste affermazioni. P.e., dire che la pragmatica è il fondamento di una ricostruzione linguistica che si dà a livelli piú astratti come semantica (e come sintassi), assume che sia possibile usare il linguaggio prescindendo dall'usarlo secondo una regola, regola che l'uso introdurrebbe mano a mano — una cosa questa che in realtà neanche Parret assume, dopo averla proposta. Al massimo qui abbiamo due astrazioni: la semantica e la pragmatica.)

Diverso dagli altri m'è sembrato comunque il contributo di Seuren, che piú linguista che filosofo contende il fenomeno delle presupposizioni alla pragmatica per mostrarlo semantico. Ciononostante non condivido neppure la delimitazione proposta da Seuren: la semantica, per lui, ha a che fare con i sistemi logici, la pragmatica invece con la meccanica dell'interazione verbale. Nella prima si danno, p.e., inferenze indiscutibili come le implicazioni logiche, nella seconda si suggeriscono inferenze discutibili come le implicazioni conversazionali. Per discutere parte di ciò che dice Seuren, ma anche per una certa insoddisfazione per la prudenza e la genericità degli spunti che ho avanzato nel mio primo intervento, voglio innanzitutto sviluppare alcuni di questi.

Ho proposto tre cose: (i) che, accettando una distinzione iniziale negli studi linguistici tra problemi semantici e problemi pragmatici, la semantica

distinzione disciplinare si trova messa in questione in quanto la semantica risulta una disciplina dalla fisionomia abbastanza precisa, ma la pragmatica no: essa appare piuttosto come un campo complesso di fenomeni parte dei quali va riportata allo studio semantico, e parte ad altri tipi di studio, come quello retorico. Dal discorso di Seuren emerge un altro tipo di complementarietà: quello fra le rappresentazioni schematiche degli usi possibili e i principi motivanti le selezioni effettive di tali usi, con un rimando reciproco paragonabile a quello tra figura e sfondo. Un'analisi del linguaggio secondo i principi liberamente griceani enunciati da Leonardi, infine, non può non coinvolgere sia fattori riguardanti le interpretazioni semantiche codificate degli strumenti linguistici adoperati, sia fattori spiccatamente interazionali tra cui, in primo luogo, l'instaurarsi (o meno) di un vincolo di fiducia tra gli interlocutori. Piú che darci «una ragione che distingue fra semantica e pragmatica» per preferire la teoria conversazionale alle sue alternative, Leonardi infatti ci dà una ragione che supera la vecchia distinzione disciplinare, coinvolgendo in una descrizione del fenomeno-linguaggio tanto la funzione interpretativa dei parlanti quanto i punti di riferimento che essa si dà.

Alla fin fine non pare una grave carenza che proprio quelle che Parret cita come *decisive subtheories* (teoria degli atti linguistici, logica della conversazione, etnometodologia ...) non usino la distinzione semantica/pragmatica: si tratta di pratiche di ricerca che tendono a fornire descrizioni di alcune dinamiche proprie al fenomeno-linguaggio, che, nel fare questo, spesso hanno esplicitamente discusso dei livelli di descrizione relativi all'oggetto della loro ricerca; e che proprio per questo possono anche non preoccuparsi affatto di ricercare garanzie ulteriori.

PIETER A. M. SEUREN

Remarkably, all authors contributing to this Round Table seem to agree (although they use different terminologies) that Morris' original clear-cut distinction between semantics, pragmatics and syntax is untenable, and that this is mainly due to his assumption that all three forms of description are autonomous with respect to each other. All four authors agree to the extent that they assume that no description at one level can be given without reference to one or two other levels.

All authors but one seem to share the view that the notion 'pragmatic description of a language' is a valid notion. At least, I take it that Leonardi, who proposes a pragmatics as a conversational theory, very much along Gricean lines, does consider, or leave open, the possibility of a pragmatic description of a language. Parret puts forward the view that pragmatics is, somehow, more basic than semantics. Récanati neatly distinguishes between truth-conditional and pragmatic semantics, both specifying conditions of use (=meaning), and between semantics and 'pragmatics proper', the latter being the study of actual use of sentences. Sbisà takes an even dimmer view of semantics than Parret, and proposes to do away with truth-conditional semantics altogether. The one author who does not believe in the concept of 'pragmatic description of a language' is me.

With the exception of Récanati, who does not pronounce himself on the matter, all others but me express a preference for pragmatics, in one sense or another, over semantics. I, on the other hand, speak out for a minimal pragmatics and a maximization of semantics. It is perhaps useful to specify my reasons for this *prise de position*.

My main reason for favouring se-

mantics at the cost of pragmatics is a very pragmatic one. Not too much weight (though a little is all right) must be attached to programmatic or a priori statements about what distinctions should or should not be made, or about possible directions of research. A more pragmatic scenario is preferable: first see what theories are available, then see where they fail, and finally try to make a better theory. In the case at hand, the theories available are virtually all semantic, not pragmatic. What has been proposed till today, by various authors, as 'pragmatic theories' does, in general, not deserve that name. With the exception of Gazdar's formal pragmatics (but see van der Sandt [1980]), little more has been offered than suggestive thoughts. This is not so with semantics: we have a (fortunately small) number of precise and solid semantic theories. It is fair, therefore, to say that semantics is in a far better shape than pragmatics. True, the semantic theories fail in that they do not carry the 'semantic programme' (about which more in a moment) through to the end. But I shall propose the outlines of a calculus that does better in this respect. It is, therefore, the availability of a theory that does a fair bit of the job, that makes me speak out for semantics.

What, then, is this 'semantic programme'? Here I retrench a little, and speak only of a 'minimal semantic programme'. It has been customary, since Tarski, to see as a minimal task for semantics the specification of truth-conditions and of entailments for sentences. This is based on the insight that one cannot say that one has understood a sentence if not at least criteria are available for deciding, given a state of affairs and reference relations, whether a given sentence is or is not true, and if not at least glaring contradictions are picked out. Clearly, this cannot be the whole task of semantics, since we know that there are non-truth-conditional aspects to meaning, in particular aspects to do with speech-acts. But a *minimal* programme is this: the specification of truth-conditions and entailments for the sentences of a language. Recently, this minimal programme has been extended with the task of specifying the implicatures of sentences, i.e., suggested inferences, whose denials do not result in contradiction, but rather in surprise, creating a marked discourse.

For example,

(1)a. The present king of France is not bald.

implicates that there is a king of France, but does not entail that, since there is no contradiction, merely surprise, in:

(1)b. The present king of France is not bald, because there is no king of France.

Likewise,

(2)a. Harry believes that his son lives in Kentucky.

implicates, but does not entail, that Harry has a son: there is no contradiction in:

(2)b. Harry believes that his son lives in Kentucky, but he hasn't even got a son.

since Harry may be under all sorts of delusions, one of them being that he has a son, and another that that son lives in Kentucky. But we somehow feel that it is more normal to assume that Harry is in full possession of his wits. One notes the contrast with, e.g.:

(3)a. Harry realizes that his son lives in Kentucky.

which does lead to contradiction in:

(3)b. Harry realizes that his son lives in Kentucky, but he hasn't even got a son.

We say, therefore, that (3a) entails that Harry has a son, but (2a) only implicates that.

Let us take it to be a minimal semantic programme that a semantic description of L specifies the truth-conditions, the entailments and the implicatures of the sentences of L. It would not matter much if it turned out that all or part of this programme is best carried out by a bit of machinery more properly called 'pragmatics'. But it so happens that it seems that one integrated piece of machinery can do the job. At least, we have at our disposal one calculus, which nobody will hesitate to call 'semantic', that does most of the job. This calculus is an extension of existing logical machinery. Here follows a quick sketch.

The logic is three-valued, and has the following truth-tables:

$\wedge$	1	0	*	q
1	1	0	*	
p 0	0	0	*	
*	*	*	*	

'and'

$\vee$	1	0	*	q
1	1	1	1	
p 0	1	0	0	
*	1	0	*	

'or'

$\supseteq$	1	0	*	q
1	1	0	0	
p 0	1	0	0	
*	1	1	1	

radical implication

$\supset_L$	1	0	*	q
1	1	0	0	
p 0	1	1	1	
*	*	*	*	

linguistic implication

NB: $\supseteq(p, q) =_D \vee(\simeq p, q)$, and $\supset_L(p, q) =_D \vee(\sim p, \wedge(p, q))$.

The notion of presupposition is defined truth-conditionally as follows: $a \gg b =_D a \Vdash b$ AND $\sim a \Vdash b$ (a and b may be any proposition). That is, if we have a class of propositions each of whose members is such that an entailment can be derived from both the proposition and its minimal negation, then presupposition is defined truth-functionally.

In order to define the relevant structural properties of propositions, we posit a mapping system (grammar) relating surface structures to their logical analysis. This system is subject to at least the following condition: all surface words that carry lexical meaning function in logical analysis as predicates. This means, in effect, that semantic analyses of sentences will have all lexically meaningful material under a V-node (predicate-node). This applies not only to verbs, but also to adjectives, adverbs, nouns, prepositions, quantifiers, etc., i.e., to all words that are not just elements indicating grammatical structure (such as *to*). The more formally-minded may prefer the expression: all lexically meaningful material is represented logically as a function from reference objects to truth-values. But although such a way of speaking contributes to further formal understanding, the empirically important question is, rather: how do we realize this reductive programme, whereby all meaningful lexical material is reduced to predicates? What arguments can be given for such a severe reduction of grammatical categories? What will logical form look like under such a programme? I shall not try to answer these questions in full, but be content, here, with the statement that the programme is obviously realistic for many surface categories, such as verbs, adjectives,

nouns, adverbs, and that the theory presented is at risk to the extent that the reduction programme turns out to be unrealistic. No conclusive arguments have been put forward to date, however, showing that the programme is indeed beyond hope.

Why, the reader will wonder, is such a programme needed? The answer is simple: predicates provide a natural point of attachment for presuppositions. Each predicate will have associated with it a set of conditions that must be fulfilled by the reference objects of its terms if the sentence figuring the predicate is to be called true. Let us speak of *lexical conditions*. Predicates thus define sets of individuals, or of ordered n-tuples of individuals, to which the predicates can be truthfully applied.

As regards non-fulfillment of the lexical conditions, traditionally there are two answers. Either a predicate picks out its set of (ordered n-tuples of) individuals from the whole universe of discourse. In that case non-fulfillment leads to simple falsity. Or the predicate singles out its extension, i.e., its associated set of (ordered n-tuples of) individuals, from an already given sub-domain within the universe. In that case a two-valued system will necessarily assign falsity when the lexical condition are not fulfilled but the individuals in question fall within the predetermined sub-domain, and will fail to assign a value when the individuals denoted by the terms fall outside the sub-domain, the function being undefined for those cases. This is the well-known truth-value gap.

In either case, we run into difficulties. With predicates as functions over the whole universe, the assignment 'false' fails to distinguish between simply false and category mistakes. This does make a difference for the entailments, since when a proposition is simply false, it still follows that the reference objects denoted by the terms fall within the associated sub-domains. Not so with category mistakes, where this kind of entailment does not follow, this being the definition of category mistakes. In other words, the sub-domains in question are a reality in the semantics of natural language, and any adequate semantic theory has to take them into account.

If, however, we define predicates over predetermined sub-domains only, and leave them undefined for individuals outside the sub-domain, as we must in a two-valued system of valuations, then we run into the highly unsatisfactory situation of having to deny a truth-value to a proposition when it contains a category mistake, but having to assign the value 'true' to its negation:

(4)a. John speaks algebra.

would be truth-valueless, since the predicate *speak* requires that its object be the name of a language or of a linguistic element of some kind, — conditions not fulfilled by *algebra*. Yet, we cannot deny that, for any given person named *John*, the negation of (4a) is true:

(4)b. John does not speak algebra.

The solution I propose is a combination of the two traditional answers. All predicates are defined over the whole universe, but in two stages. First, there are *preconditions*, defining the sub-domain. Non-fulfillment of these results in radical falsity. Then there are *satisfaction conditions*, whose non-fulfillment results in simple, or minimal, falsity. The satisfaction conditions are checked after the preconditions. The lexical conditions thus consist of (a) preconditions, and (b) satisfaction conditions. Radically false propositions are made true by the radical negation

operator.

This gives us precisely the class of propositions from whose assertion and minimal negation the presuppositional entailments can be derived. If a proposition is either true or minimally false, then at least the preconditions associated with the (highest) predicate are fulfilled in the proper way by the reference objects (denotations) of the terms. Any proposition stating that such a precondition is fulfilled by the denotation of a term, is a presupposition of the proposition in question. Using 'a', 'b', 'c' as variables over any propositions, the following theorems hold:

Th-1 IF $a \gg b$, THEN $\Vdash \supseteq(a, b)$ AND $\Vdash \supseteq(\sim a, b)$

Th-2 IF $a \gg b$ AND $b \gg c$, THEN $a \gg c$

Th-3 IF $a \gg b$ AND $b \Vdash c$, THEN $a \gg c$

Th-4 IF $a \Vdash b$ AND $b \gg c$, THEN $a \Vdash c$.

I omit the proofs: the interested reader will have little difficulty working them out for himself.

Th-2 explains (3a) in the following way:

p: Harry realizes that his son lives in Kentucky

q: Harry's son lives in Kentucky

r: Harry has a son

Now: $p \gg q$ and $q \gg r$; hence $p \gg r$. Hence the contradiction in (3b).

This is, in principle, sufficient for the calculus of presuppositions in propositions not containing quantification (O-order calculus). The calculus for quantified propositions (higher order calculus) can be built upon the O-order calculus given, but space forbids doing so here. What has to be done yet is the calculus of implicatures (in O-order propositions).

Since logic by itself is unable to provide implicatures (logic contains no elements accounting for 'suggested' or 'invited' inferences), an extraneous element must be added to the logic for it to yield implicatures. This extraneous element is the *pragmatic principle* (see my first contribution). The pragmatic principle states that the calculus and the truth-value assignments will proceed on the assumption that all presuppositions are fulfilled, so that all propositions entering the machinery of semantic interpretation will have a classical value, unless the proposition itself leaves open the possibility of a presupposition not being fulfilled, or the context of discourse (including available knowledge) entails the falsity of a presupposition.

Let us formulate this a little more precisely. We shall write '$p > q$' for 'p implicates q'. We will say, for any proposition p, that $p > q$ if and only if:

(a) p does not entail q;

(b) p does not presuppose q;

(c) p contains an embedded proposition r such that $r \gg q$ or $r \Vdash q$ or $r > q$, and r is not under the radical negation operator;

(d) the highest operator of p is not the radical negation operator;

(e) there is no member x of the P-set of p such that $x \Vdash \sim q$;

(f) there is no member x of the P-set of p such that $\sim q \Vdash x$.

The notion of P-set is defined as follows: the P-set of any, possibly complex, proposition p which is not under the radical negation operator, consists of p plus all its embedded propositions (unless radically negated) and their minimal negations. A P-set will thus never contain a proposition under the radical negation ope-

rator. We shall see a few examples in a moment.

If a (complex) proposition p implicates q, then the inference of q, given p, is justified unless the context of discourse entails the non-truth of q: implicatures are overridden by the context of discourse. Since the calculus is limited to isolated, possibly complex, propositions and does not take into account any possible or thinkable context of discourse, it has no control over discourse factors overriding implicatures. In fact, a calculus taking discourse factors into account would have to contain an independent variable 'available knowledge' for any discourse, since both explicit discourse and available knowledge can override an implicature. Yet, although the calculus will not control discourse factors, and simply 'hand over' implicatures to the context, it will enable us to stipulate coherence and acceptability conditions for texts (together with the independent variable of 'available knowledge'). For (complex) propositions in isolation we can now compute the implicatures. An the results should correspond with the speakers' intuitive judgements regarding invited or suggested inferences made on the basis of isolated sentences.

Let us write 'p_q' for 'p presupposing q'. Now, for complex propositions the general principle holds that presuppositions of embedded propositions are preserved as either entailments (when Th-4 applies), or as presuppositions (when Th-2 or Th-3 applies), or as implicatures (when conditions (a-f) are fulfilled), or they are not preserved at all. What we are dealing with here is nothing but the well-known projection problem: under what conditions do presuppositions (or entailments) of embedded propositions make it to the surface, and in what guise, if any, do they turn up? Since disjunctions and implications have turned out to be the most troublesome in this respect, we shall illustrate the calculus with a few examples of these categories.

A: Either Joan's dog has run away, or it is ill.

$\vee(p_r , q_r)$ r: Joan has a dog
$p \gg r$, $q \gg r$. Non-truth of r yields radical falsity of A:
$\sim r / \simeq r \Vdash \simeq p$ AND $\simeq q$, hence $\simeq A$. Hence: $A \gg r$.

B: Either Joan's dog hasn't come back, or it is ill.

$\vee(\sim p_r , q_r)$ r: Joan has a dog
$p \gg r$, $q \gg r$.
$\sim r / \simeq r \Vdash \simeq p$ AND $\simeq q$, hence $\simeq B$. Hence: $B \gg r$.

C: Either Joan has no dog, or her bunny has run away.

$\vee(\sim p, q_r)$ r: Joan has a bunny
$q \gg r$. Non-truth of r does not yield radical falsity of C:
$\sim r / \simeq r \Vdash \simeq q \Vdash\!\!\!\!/ \simeq C$. Hence $C \not\gg r$. Question: $C > r$?
Answer: yes, because there is no member x of the P-set of C such that either $x \Vdash \sim r$ (condition (e)) or $\sim r \Vdash r$ (condition (f)).
P-set: {C, p, ~p, q, ~q}.
Hence: $C > r$.

D: Either Joan has no dog, or her dog has run away.

$\vee(\sim p, q_p)$ $q \gg p$.
$\sim p / \simeq p \Vdash \simeq q \Vdash\!\!\!\!/ \simeq D$. Hence: $D \not\gg p$.
Question: $D > p$?
Answer: no, because one member of the P-set, ~p, entails ~p (condition (e)), and two members of the P-set, D and ~p, are entailed by ~p.

P-set: {D, p, ∼p, q, ∼q}.
Hence D⊁p.

These predictions were all correct. We run into trouble, however, with:

E: If Joan's dog has run away, she has a dog.

$\vee(\sim p_q, \wedge(p_q, q))$ $p \gg q$.

The normal calculus would give: $\sim q/\simeq q\Vdash \simeq p\Vdash \simeq E$. Hence $E \gg q$.

This, however, must be wrong: E does not presuppose q. Therefore, either the calculus is wrong, or the analysis given for E is wrong. I shall now argue that the latter is the case.

Notice first that, if E did presuppose q, it would have deviant contextual properties with respect to q. Normally, a presupposition q of p, just pronounced before p, yields a coherent text. But not so with E and q:

(4) !Joan has a dog, and if her dog has run away, she has a dog.

This confirms our intuition that E cannot be taken to presuppose q.

Notice now that E differs from other conditionals in that it does not allow for NPI's in the antecedent clause that normally do occur in such clauses:

(5)a. *If Joan's dog is *any good at all*, she has a dog.
b. *If Joan's dog is *in the least* troublesome, she has a dog.

But PPI's are all right:

(6) If Joan's dog is *still* snarling at visitors, she has a dog.

Notice, furthermore, that we can divide conditionals into two classes, one that does and one that does not allow for a paraphrase 'if it is true that p, it follows that q':

(7)a. !If you eat from this, you will be saved.
b. If it is true that you eat from this, it follows that you will be saved.

(8)a. If he said something, he was still alive.
b. If it's true that he said something, it follows that he was still alive.

The class exemplified by (8) does not allow for NPI's in the antecedent clause, but does allow for PPI's. The conditionals in the class exemplified by (7), however, do allow for NPI's:

(9)a. If he *still* moves, he is still alive. (PPI)
b. *If he *bats an eyelid*, he is still alive. (NPI)

(10)a. If he has smashed up *the lot*, he can't be dead. (PPI)
b. *If he has *as much as* touched anything, he can't be dead. (NPI)

By contrast:

(11)a. If she has said *any*thing, it will have been recorded.
b. If he *bats an eyelid*, you must tell me.
c. If he *as much as* moves his head, he will be saved.
d. If he has *the slightest* suspicion, he won't go.

which all easily allow for NPI's in the antecedent clause, but do not, or hardly, allow for a paraphrase of the type 'if it is true that p, it follows that q'.

We see that E is clearly of the class exemplified by (8): 'if it is true

that Joan's dog has run away, it follows that she has a dog'. Applying now our standard analysis of *if*-clauses to this paraphrase of E, we get 'either it isn't true that Joan's dog has run away, or it is true and it follows that she has a dog', or:

$$\vee(\sim \text{TRUE}(\text{`}p_q\text{'}),\ \wedge(\text{TRUE}(\text{`}p_q\text{'}),\ \text{FOLLOW}(\text{`q'})))$$

which, for the calculus, amounts to:

$$E:\ \vee(\vee(\sim p_q,\ \simeq p_q),\ \wedge(p_q,\ q)).$$

This gives the correct results:

$$\sim q/\simeq q \Vdash \simeq p \Vdash\!\!\!/ E.\ \text{Hence}\ E \not\Rightarrow q.$$

Neither does E implicate q, since the P-set is {E, p, ~p, q, ~q}. Now one member of the P-set, viz. ~q, entails the negation of q (condition (e)), and the negation of q entails two members of the P-set, viz. ~q and E (condition (f)). Hence $E \not\succ q$.

This shows in principle how a semantic calculus with only a minimum of pragmatics might do the job specified in the minimal semantic programme. At the moment of writing, the calculus as given here is without known counterexamples. It is, of course, possible that some will be found. In that event, the calculus must either be revised or, if it looks hopeless, be abandoned. As long, however, as it appears to do the job, it's in business. It is precisely in this sense that I favour semantics over pragmatics, and, more importantly, it is for this reason that I can see no validity for the notion 'pragmatic description of a language'.

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