

3. IMPLICATURE

3.1 TYPOLOGY AND DEFINITIONS

This chapter considers the notion of 'implicature' and outlines briefly the components of the Gricean programme, Grice (1968).¹ Attention is focused on those implicatures arising from the maxims of quality and quantity and it is argued that the former turn out to be subsumed under the felicity conditions for assertion. Various criticisms of the Gricean programme with respect to the maxim of quantity are discussed in the light of their ontological and methodological implications. Finally two functions are developed and defined which assign to each sentence the set of 'quantity' implicatures potentially implied by that sentence.

This chapter on implicature is in no sense intended as a full exegesis of Grice (1968). I am using this work for my own purposes and these purposes are not exegetical. This fact is reflected in the sloppy use of the term 'implicature' which I shall employ for the phenomenon itself and for referring to the entity implicated (where Grice would use 'implicatum'); this particular sloppy use of Grice's terminology seems to be general in the works discussed below that develop his notions and it seemed best to accord with common usage rather than stick to etymology. At the end of this chapter I shall give definitions of two functions that yield as values sets of implicatures where 'implicature' is a technical term belonging to the theory presented here. The beginning of chapter 6 presents a complex system which yields some of these "implicatures" as "implicatures" where the latter notion is also defined within the theory but accords more or less closely with Grice's 'implicati'. By the time the reader has got to the relevant parts of the dissertation, no confusion should arise.

An implicature is a proposition that is implied by the utterance of a sentence in a context even though that proposition is not a part of nor an entailment of what was actually said. Grice claimed that there were two types of implicature: 'conventional' and 'conversational'. The former arise solely because of conventional features of the words employed in an utterance; thus, on the not implausible assumption that *but* carries a conventional implicature, examples (1) and (2) would have the same truth conditions and differ only in that (2) conventionally implicates a proposition involving some sorts of contrast, unexpectedness, etc.²

- (1) *Mary got pregnant and John was pleased.*
 (2) *Mary got pregnant but John was pleased.*

If conventional then this implicature arises solely because of the particular (non-truth-conditional) properties of the word *but* and cannot be given some higher order explanation in terms of conversational rules. For a linguist this would mean that the dictionary entry for *but* would have to have some pragmatic component that would specify its implicature potential. A formal treatment of conventional implicature within a grammatical theory has been given by Karttunen & Peters (1975) who deal with example (3) by means of some additions to a Montague Grammar:

- (3) *John fails to win.*

Although their formal treatment is very impressive it seems to miss Grice's point about the implicatures arising from verbs like *fail*, *try*, etc. which is that they derive from general conversational principles and not just from the lexical entry of the verb concerned. The discussion of examples (8) - (15) below will establish this point.

Another way of looking at context-sensitive transderivational constraints is to see them arising out of conventional implicatures. This point can be elucidated by returning to the language L defined at the end of the last chapter. Imagine someone who begins listening to an L-discourse some while after it has begun. If he assumes that the speaker is only uttering well-formed expressions of L then he can deduce, on initially hearing (4) that p_{22} follows from what the speaker has previously said.

- (4) $p_{27} \wedge p_{22}$

Likewise, in English, if we overhear (5) - from Grice (1975: 44) - then we can deduce that something like (6) has either been asserted previously or is taken for granted in the context:

- (5) *He is an Englishman; he is, therefore, brave.*
 (6) *All Englishmen are brave.*

Our analysis can thus be seen to provide the beginning of a formal grip on what Grice calls 'conventional implicature' and

what Wilson (1975) calls 'non-truth-conditional implication'. Indeed, we may even give a definition of conventional implicature in L:³

- (L9) A well-formed expression ϕ CONVENTIONALLY IMPLICATES THAT $\Gamma \text{ iff } \psi$ iff $\psi R\phi$ (where Γ is the context at which ϕ occurs).

It should be noted that this definition is to be taken as quantifying over ALL contexts; this means that conventional implicature, although a pragmatic relation, is, nevertheless, invariant with respect to the particular contexts in which it is manifested. This feature of the definition concurs with the observation that conventional implicatures in natural language, unlike generalised conversational implicatures, are not liable to suspension when certain contextual conditions are met.

Grice's second class of implicatures comprises the 'conversational' ones and this class is itself divided into 'particularized' conversational implicatures and 'generalized' conversational implicatures. The former are those that arise because of some special factor inherent in the context of utterance and are not normally carried by the sentence used. Thus the second utterance in the following dialogue may well carry a particularized conversational implicature to the effect that the referent is a homosexual:

- (7) A: *What does Julian do when he's not at the hairdresser's?*
 B: *He waits for boys in the restroom of the Y.M.C.A.*

On other occasions of use, say when we already know that the referent is a school truancy officer, this sentence will not carry this particular implicature. A rather similar example is considered in greater detail in chapter 6 where it is argued that such implicatures can affect the presuppositional content of an utterance. However their general relevance to linguistic interests appears to be pretty marginal so I shall not consider them further here. The second subclass is that of 'generalized' conversational implicatures and it is with these that this section is concerned. Generalized conversational implicatures arise when 'one can say that the use of a certain form of words in an utterance would normally (in the ABSENCE of special circumstances) carry such-and-such an implicature or type of implicature.' Grice (1968). Grice goes on to warn that 'it is

all too easy to treat a generalized conversational implicature as if it were a conventional implicature" and I have already mentioned a case where this warning appears to have gone unheeded. The issue is more important than merely getting the terminology right: in syntax an analogy would lie in the difference between giving each set of lexical items a syntactic feature to prevent some transformation applying to them (the conventional case) on the one hand, and on the other specifying a general rule of grammar (like one of Ross's constraints, Ross (1967)) which makes that transformation inapplicable to them in virtue of some non-arbitrary property which they already have in common (the analogue of generalized conversational implicature). This chapter can be seen as an attempt to provide the formal specification of one type of generalized conversational implicature. It may be that this enterprise is unachievable and all implicatures will have to be regarded as conventional but, methodologically, it seems worth making the attempt. There is a middle position, that is having a general rule of predictive power but a rule which is otherwise unmotivated, i.e. it cannot be plausibly explained in terms of its conversational function. Most syntactic rules are of this type - at least they were before the advent of "functional grammar", C.L.S.11 (1975). Such a rule might be said to specify 'generalized conversational implicatures' (this is NOT one of Grice's notions): I shall return to the issue intermittently throughout the chapter.

Grice lists five features jointly necessary for an implicature to be considered conversational rather than conventional:

(i) It must not be part of the meaning of the expression to which it attaches. That is it must not be given in the lexicon or specified as the meaning-changing effect of some syntactic operation.

(ii) It must be context-sensitive and cancellable in particular cases, either by the context making it clear that it is inapplicable or by the addition of a clause denying the implicature as in the following example:

(8) *John failed to win but then he didn't even try.*

(iii) It must be "non-detachable", that is it must not be possible to substitute some other expression in the sentence which lacks the implicature in question but which otherwise means

much the same thing. Thus examples (9), (10) and (11) should carry the same implicature(s) as (3) if these implicature(s) are conversational rather than conventional:

(9) *John didn't succeed in winning.*

(10) *John wasn't able to win.*

(11) *John didn't manage to win.*

(iv) The implicature must not be a truth condition of the sentence involved: thus if (12) is false it does not follow that (3) is false or truth-valueless.

(12) *John tried to win.*

Note, for contrast, that if (13) is false then it does follow that (14) is false or truth-valueless so (13) cannot be an implicature of (14):

(13) *John won.*

(14) *John managed to win.*

(v) It must be possible for there to be two or more implicatures such that the choice of which is involved may prove indeterminate. Thus (3) may be seen as having either or both of (12) and (15) as implicatures:

(15) *John was expected to win.*

Because this last feature is less restrictive than the others (i.e. it only has to be POSSIBLE for there to be an indeterminate choice of implicatures) and because indeterminacy is difficult to handle formally I shall tend to ignore it in the discussion that follows. A fuller treatment of implicature would not be guilty of this omission which is only really defensible on operational grounds, for, as Karttunen & Peters (1975) note, "it is difficult to pin down exactly what the implicature of *fail* is."

Before we move on to consider the maxims that Grice proposes as the conversational principles from which non-conventional implicatures derive, it is worth pausing to examine the issue of definition. Grice himself, very sensibly although rather disappointingly, never gives an explicit definition of

conversational implicature although he does offer the circumspect characterization sketched above. The only⁴ general definition that I am aware of is due to Thomason (1974) and given in (16) below:

- (16) A sentence ϕ conversationally implicates ψ relative to a class C of contexts of utterance, if for all $c \in C$, such that ϕ 's assertion in c does not violate the maxims of conversation, ψ is presumed in c .

This definition is unsatisfactory for a number of reasons: (i) it is not biconditional so it does not place any restrictions on the class of conversational implicatures, (ii) as Thomason himself notes we are forced into a taxonomy of contexts in order to arrive at C for ϕ and ψ , and (iii) the definition fails to capture the notion "implicature" as the following examples show:

- (17) Some of the members showed up.

- (18) Some of the members didn't show up.

The relation between (17) and (18) is a paradigm case of implicature and yet in many contexts in which (17) would be uttered (18) would not be presumed until (17) had been uttered. Uttering (17) to implicate (18) might be precisely the point of the utterance in such contexts. So if c refers to the context immediately prior to the utterance then the formulation is incorrect. If c refers to the context immediately after utterance then it is also incorrect since (18) may not be implicated and yet the utterance of (17) can still be perfectly in accord with the maxims of conversation. For example in a proof situation, where (17) has just been derived from (19), (18) will not be implicated.⁵

- (19) All of the members showed up.

If we then restrict C so as to exclude such cases of implicature cancellation we only succeed in making the whole definition circular. Exactly the same circularity vitiates Lakoff's (1975) informal suggestion that implicature be treated as context-dependent entailment. The only example which Lakoff offers in support of his proposal, which implicitly espouses a Thomason-type definition, is handled quite straightforwardly by the theory presented in chapter 6 of this thesis (see the discussion of (84) in that chapter). Entailment is not the only definable logical relation and so a failure to

identify implicature with entailment does not have as a consequence, pace Lakoff, an embarkation onto the uncharted seas of "extralogical" (ibid: 253) and "'loose' or informal" (ibid: 270) inferences.

In answer to the question "what is an implicature?" Atlas & Levinson (1973) have offered a version of Kenny's (1966) "practical inference" logic. Although this does provide a well-defined account of DEFEASIBILITY, and hence potentially of implicature-cancellation, it appears to be of limited relevance to the question being asked since it only handles imperative or optative sentences. Thus it cannot handle, e.g., paradigm implicatures such as (18) above. Furthermore it legitimates some counterintuitive inferences whilst failing to legitimate some intuitively obvious inferences. For example, (20) is a valid inference in their logic but (21) is not:⁶

- (20) I wish John was here.
I wish John was here and I wish John was dead.

- (21) Kill all the conspirators.
Brutus is a conspirator.
Kill Brutus.

3.2 REFORMULATING THE MAXIMS

I shall now discuss Grice's four maxims of conversation, starting with those that have least bearing on the contents of this thesis.

(22) MANNER: Be Perspicuous

- i. Avoid obscurity of expression
- ii. Avoid ambiguity
- iii. Be brief (avoid unnecessary prolixity)⁷
- iv. Be orderly

It is no part of the present enterprise to formalize this maxim but, in view of the discussion in chapter 1, it may be worth briefly indicating how it might be done. (i) can be rephrased as instructing conversationalists to use, and interpret each other as using, the same language (where LANGUAGE will be defined by reference to the lexicon, set of syntactic rules, rules of semantic interpretation, etc.) or to use the intersection of their respective languages or idiolects. (ii) instructs conversationalists (a) not to use ambiguous expressions, and (b) if they hear or use an ambiguous expression then to assign to it one and only one reading and not treat it as simultaneously having several readings (where the notion 'ambiguous expression' is well-defined within some linguistic theory).⁸ In the case of speech act categorisation, (see Weiser (1974), Sadock (1974: 157-8)), this submaxim seem wholly inapplicable and Grice offers us little reason to assume it operational in other areas of language use (but cf. Hankamer (1973) and Langendoen (1975)). (iii) can be rather brutally formalized by quantifying over the length of expressions. Then it can be read as instructing speakers to choose a given two potentially synonymous expressions α and β such that β is longer than α (cf. the definition of 'brief' (L3, in chapter 2, above). And as instructing hearers on hearing β (α and β being as above) to assign it a reading distinct from α if that is possible (because if it means the same as α then α would have been used instead). Something along these lines would provide part of the explanation for R. Lakoff's (1972) observation regarding English modal verbs and their respective periphrastics: "when the speaker agrees with, or takes upon himself, the atomic meaning of the modal, he can use the simple modal form. Otherwise, he must use the periphrastic variant."⁹ (ibid: 239). (iv) might be susceptible

to something along the following lines: if a sentence ϕ contains the expressions α and β , where $\alpha \neq \beta$, in that order (i.e. ϕ is of the form $X\alpha Y\beta Z$ where X , Y , and Z are any expressions, possibly null), and where α and β are members of some set Σ such that for any two members α and β of Σ , where $\alpha \neq \beta$, the expression α before β is well-formed, then hear ϕ as implying, or use ϕ to imply, that α occurred before β . Naturally this proto-definition requires both tightening up¹⁰ and generalizing to cover more than two expressions. It would also need to allow for the possibility of cancellation, although, as will be shown in chapter 6 of this thesis, this is relatively simple to achieve. For discussion and some relevant examples see (22) - (28) in chapter 4 below, and those in Schmerling (1975). The submaxim (iv) can be seen as offering an explanation for the acceptability difference evident in examples (23) and (24) below (due to R. Lakoff (1971)):

(23) *The Lone Ranger jumped onto his horse and rode into the sunset.*

(24) *The Lone Ranger rode into the sunset and jumped onto his horse.*

Those unfamiliar with Grice's maxims may be daunted by the fact that they are all expressed as imperatives. This is the least of the problems of formalizing however, since the usual equations of "Rewrite X as Y" and "X is rewritten as Y" or "Interpret X as Y" and "X is interpreted as Y" apply.

(25) RELEVANCE: Be relevant

That relevance is relevant to linguistic descriptions is painfully apparent (e.g. in Green (1968), (1973b), Gunter (1972), Loetscher (1973), Winter (1968)) as is the complete absence of any kind of formal linguistic treatment of the notion. Grice himself admits that the issue involves difficult problems and points out that his terse formulation offers no leverage either on what an expression is required to be relevant to, or on how what is relevant can change during a conversation (but on this latter point see Adato (1971)). Thomason (1974), after briefly considering the logical literature on relevance, concludes that "no attempt to apply formal semantic theory to this notion has been successful enough to provide a model that would be usable in pragmatics." This dissertation has no contribution to make to the topic.

(26) QUALITY: Try to make your contribution one that is TRUE

i. Do not say what you BELIEVE to be false

ii. Do not say that for which you lack ADEQUATE EVIDENCE (my emphasis).

Any attempt to formalize this maxim as it stands is going to run into three sets of problems: those connected with the notion 'truth', those connected with the logic of believe and those involved in the nature of 'adequate evidence'. Note, however, that these three sets of problems are just those that crop up in the philosophical debate over the status of knowledge and the possibility of equating knowledge with justified true belief. Without engaging in this debate I propose to sidestep the problems connected with the components of (26) and, as a first step, simply replace (26) by (27) (the reader is requested to suspend judgement on these manoeuvres for several paragraphs):

(27) QUALITY: Say only that which you know.

We may then take 'know' as primitive and employ an epistemic logic to describe its operation. The most widely accepted version of epistemic logic is that of Hintikka (1962) and I shall employ it in what follows without further comment.¹¹ We are now in a position to give a simple formulation of quality implicatures:

(28) Utterance of ϕ by a speaker s implicates $K\phi$ (where for $K\phi$ read s knows that ϕ .)

This type of implicature differs from those arising from the other maxims because it cannot be intelligibly cancelled:

(29) *Pithium is radioactive {and} I don't know
{but}
that Pithium is radioactive.

this is even more clear if one attempts to cancel the components of Grice's own formulation:

(30) *Pithium is radioactive but that isn't true, nor do I believe it, nor do I have adequate evidence for claiming that it is.

Grice is aware that there is something different about his maxim

of quality because he says that "it might be felt that the importance of at least the first maxim of quality is such that it should not be included in a scheme of the kind I am constructing." Hintikka (1962) noted the anomaly of utterances like (29) in his discussion of, and solution to, Moore's paradox. The problem, which is an exact analogue of Moore's problem (for a comprehensive bibliography on the topic see Hintikka (1962 p.64)), is that the sentence $\phi \wedge K\phi$, which may be taken to represent (29), is not a contradiction in epistemic logic and so we have no reason to suppose (29) anomalous if we restrict ourselves to consideration of that formulation alone. Hintikka's solution proposes that the utterance of a sentence ϕ commits a speaker to knowledge of that sentence, i.e. to $K\phi$, and that the anomaly arises because if this principle is applied to (29) then inconsistency arises. The sentence $K(\phi \wedge K\phi)$ is necessarily false in epistemic logic. It can now be seen that my version of the quality maxim given in (28) amounts to no more and no less than Hintikka's treatment of sentences like (29). The relation between ϕ and $K\phi$ which Hintikka defines generally is called 'epistemic implication' and its definition is given in (31) below:

(31) The utterance of ϕ EPISTEMICALLY IMPLIES ψ iff $K(\phi \wedge \psi)$ is inconsistent.

Under this definition it may be readily proved that ϕ epistemically implies $K\phi$.¹²

Two possible objections become relevant at this juncture. The first is that persons often do not know that which they say, they may only believe it, they may be lying, they may have no evidence. This objection misses the point which is that implicatures only concern what people commit themselves to in uttering sentences and do not concern what is actually the case. Thus the claim that my treatment of the quality maxim makes is that speakers uttering ϕ commit themselves not only to ϕ but also to knowing that ϕ . They cannot produce intelligible utterances of (29) or (30), nor can they admit to disbelief in what they say, nor can they blithely dismiss requests for justification of what they have said. These are empirically verifiable predictions of the maxim because infringements inevitably lead to conversational consequences. As far as truth is concerned it is worth noting that at least one philosopher has advanced the view that a convention of truth is a necessary condition for a language's use. Lewis (1969), after giving a formal definition of 'convention' and applying it in a discussion of possible languages, postulates the following definition of an 'actual language':

- (32) L is an ACTUAL LANGUAGE of a population
P if and only if there prevails in P a
convention of truthfulness in L.

The word "prevail" is important: lying is an effective enterprise only in a population in which a convention of truth PREVAILS.

The second objection concerns the fact the people may, of course, say things which they do not know to be the case and not even be heard to claim that they know them to be the case. Non-assertoric speech acts regularly allow this:

- (33) *You will go to Tibet on Tuesday?*

where interrogative or imperative sentences are used no confusion can arise but a utterance like (33) can be heard as an assertion and if it is so heard then its epistemic implication is as predicted; witness the following perfectly plausible dialogue:

- (34) A: *You will go to Tibet on Tuesday?*

B: *How did you know?*

A: *I wasn't telling you, I was asking you.*

So it appears that the quality maxim may only apply to assertoric utterances and this restriction is hardly surprising. Indeed we may cease, to accord the notion any status as a maxim whatsoever and instead simply treat KNOWLEDGE THAT ϕ as one of the felicity conditions for asserting that ϕ . Let us represent this claim as follows:

- (35) For any declarative sentence ϕ

$$K\phi \in A(\phi)$$

where A is that function, which, given a declarative sentence as argument, returns a set of sentences as value, this set being the felicity conditions applicable to the assertion of ϕ .¹³

This formulation, which now stands as our definitive version of the quality maxim, makes no special allowance for utterances involving irony, jokes or metaphor. Consideration of any of

these is beyond the scope of this thesis. No problem arises, of course, if such utterances are considered to be non-assertoric.

(36) QUANTITY:

- i. Make your contribution as informative as is required (for the current purposes of the exchange)
- ii. Do not make your contribution more informative than is required.

To formalize this maxim as it stands, that is in its full generality, we would have (a) to be able to quantify over informativeness, and (b) to have some function which when applied to a conversation and a point within it would yield as value the level of informativeness required. With regard to (a) Thomason (1973) comments as follows:

Model theoretic notions can be used to construct an account of semantic informativeness, as was pointed out by Carnap & Bar Hillel (1952). But this account has failed to provide satisfactory explanations of phenomena in inductive and epistemic logic, and at the present time there is no agreement on the proper way of overcoming these difficulties. (ibid: 11)

A recent treatment of the notion, due to Hintikka (1973), is not applicable in any obvious way to expressions of natural language or to their counterparts in semantic representation. And without (a) we are in no position to begin on (b).

The tactic adopted below is to examine some of the data that would or should be covered by Grice's quantity maxim and then propose a relatively simple formal solution to the problem of describing the behavior of that data. This solution may then be seen as a special case of Grice's quantity maxim, or as an alternative to it, or as merely a conventional rule for assigning one class of conversational meanings to one class of utterance. Data similar to that found below is discussed in very great detail in Horn (1973a). However his and my treatment of it differ somewhat, especially where implicature suspension is concerned.

It is possible, in fact necessary, to give rather a lot of examples

in order to demonstrate that what is going on is a fairly general phenomenon and not one restricted to a few lexical items.

- (37) a. *Some of the boys were at the party.*
 b. *Not all of the boys were at the party.*
 c. *Some, in fact all, of the boys were at the party.*
 d. *All of the boys were at the party.*
- (38) a. *It is compatible with all that I know that he was at the party.*
 b. *It is compatible with all that I know that he was not at the party.*
 c. *It is (not only) compatible with all that I know that he was at the party, in fact I do know that he was at the party.*
 d. *I know that he was at the party.*
- (39) a. *It is possible that porosity leads to osmosis.*
 b. *It is possible that porosity does not lead to osmosis.*
 c. *It is possible, and in fact necessary, that porosity leads to osmosis.*
 d. *It is necessarily the case that porosity leads to osmosis.*
- (40) a. *Osmosis may involve porosity.*
 b. *Osmosis may not involve porosity.*
 c. *Osmosis may, and in fact must, involve porosity.*
 d. *Osmosis must involve porosity.*

- (41) a. *Mary tried to cash a cheque.*
 b. *Mary did not succeed in cashing a cheque.*
 c. *Mary tried, and in fact succeeded, in cashing a cheque.*
 d. *Mary succeeded in cashing a cheque.*
- (42) a. *I believe he's ill.*
 b. *I don't know that he's ill.*
 c. *I believe, in fact I know, that he is ill.*
 d. *I know that he is ill.*
- (43) a. *If John sees me then he will tell Margaret.*
 b. *I don't know that John will see me.*
 c. *If John sees me, and I know he will, then he will tell Margaret.*
 d. *Since John will see me, he will tell Margaret.*
- (44) a. *My sister is either in the bathroom or in the kitchen.*
 b. *I don't know that my sister is in the bathroom and I don't know that she's in the kitchen.*
 c. *My sister is either in the kitchen or in the bathroom and I know which.*
 d. *I know that my sister is in the bathroom.*
 d'. *I know that my sister is in the kitchen.*

In the examples above the b-sentence is an implicature of the a-sentence, the c-sentence contains a clause which explicitly cancels the implicature and the d-sentence is a sentence which entails the a-sentence but which is inconsistent with the implicature.

Now the relation between the a-sentence and the b-sentence cannot be that of entailment because entailments cannot be cancelled as we discover if we try to formulate the analogue of a c-sentence with one:

- (45) a. *I managed to get to the party.*
 b. *I got to the party.*
 c. **I managed to, and in fact didn't, get to the party.*

If one considers the suspension clause to be a simple conjunct, and there is no reason not to, then one would not expect to be able to conjoin the negation of an entailment of one of the other conjuncts and still maintain consistency. Another reason why the relation cannot be entailment is because in each case the d-sentence entails the a-sentence and if the a-sentence entails the b-sentence then transitivity forces us to the conclusion that the d-sentence entails the b-sentence. But in each case b and d are mutually inconsistent; this amounts to a reductio. For a formal proof and detailed discussion of why the relation cannot be entailment, together with the curious history of logicians' attempts to make it so, see Horn (1973b).

One might be inclined to treat the relation between a and b as that of presupposition, especially if one notes that the expressions that typically occur in the cancellation clauses, expressions like *in fact*, *actually* and *indeed*, also occur when presuppositions are explicitly suspended. Three considerations militate against identifying these cases with presupposition. Firstly, if presupposition is defined semantically in terms of entailment, then we are no better off than we would be treating the relation as entailment simpliciter, which, as just demonstrated, we cannot consistently do. Secondly the c-sentences show that suspension of the implicature can take place in positive sentences, but this is not possible with cases of presupposition (see chapter 5 below, for discussion):

- (46) **He regrets killing Mary and, in fact, didn't kill her.*

Thirdly, unlike presuppositions, implicatures do not usually survive if the a-sentence is embedded in a sentence which does not entail it:

- (47) *Mary managed to tell John when she thought that some of the boys were at the party. (does NOT implicate that some of the boys weren't at the party)*

An informal Gricean account of how these implicatures are derived from the maxim of quantity would go as follows: anyone uttering an a-sentence who was in a position to utter a d-sentence would be being less informative than he could be since the d-sentence makes a stronger claim about the world than the a-sentence. Thus if the speaker is being cooperative and observing the maxim of quantity it follows that in uttering a he is implicating the negation of d. The negation of d is simply b, so b is an implicature of the utterance of a (note that this argument requires slight elaboration to cope with examples (43) and (44)).

For the reader who doubts the ontological status of quantity implicatures, considering them, perhaps, merely as an analyst's construct, I provide below a couple of examples drawn from a tape transcript of a naturally occurring conversation which illustrate their operation:

- (48) A: *Is your mother well and back?*
 B: *Well she's back yes.*
 A: *She's not well then.*

B's reply to A is less informative than it could be since it only confirms one conjunct and A deduces from this that the other conjunct is disconfirmed. It is of interest to note that B's utterance-initial *well* behaves exactly as predicted in R. Lakoff (1973) which is to say that it signals an incomplete answer. The second example, drawn from the same transcript, is even more clearcut:

- (49) A: *What are you doing this evening?*
 B: *I'll either go to Fran's or not.*
 A: *You're not on call then.*

Here B produces a disjunctive tautology in response to A's question and by analogy with example (44) this should implicate that it is compatible with all that B knows that she go to Fran's. This it does since A is able to deduce from B's utterance that B

is not on call. B is a social worker and if she is on call then she has to stay in unless called out to a client. Fran is a friend and not a client so it follows that if B could go and see Fran then B cannot be on call. An analysis in terms of implicature shows how tautologies can be informative - I shall return to this point in chapter 6. Notice that in both (48) and (49) A's second utterance contains a final *then*: it would be nice to think that this is the *then* of *if... then...* and that its semantic role is to indicate the final consequent of a process of conversational reasoning.¹⁴

In the c-sentence we have observed that implicatures can be intra-sententially cancelled and one might wonder why this should be permissible since if one wanted to make the stronger claim in the first place then a d-sentence would surely do the job better than the longer and potentially confusing c-sentence. However there are cases where a c-sentence allows one to say things not readily sayable with a d-sentence. Thus (44c) could be used by one participant to another during a game of hide and seek. Somewhat less esoteric is the following example taken from a newspaper report:

- (50) *The roots of these attempts, indeed successes, by Congress to reassert itself are well known to Mr. Ford.*
(Observer 20th October 1974)

Obviously the roots of an ATTEMPT to do x may be very different from the roots of one's SUCCESS in achieving x. Thus the roots of the attempt may lie in the consequences of the Tonkin Gulf resolution, whereas the roots of the success probably lie in the immediately preceding congressional elections.

3.3 SOME RESIDUAL ISSUES

Having completed our relatively informal discussion of Grice's four maxims of conversation we are in a position to consider some of the problem and objections that have been, or can be, raised in connection with the Gricean programme, before going on to propose a formal treatment for quantify implicatures. One of the motivations of Grice's suggestions is to allow the semantic identification of certain expressions of natural language (e.g. *some, all, or, not, if...then...*, etc.) with the operators and connectives of first order predicate calculus. The discrepancies between the operation of these expressions and that of their natural language counterparts would then be accounted for pragmatically by reference to the conversational maxims.

The only detailed attack on the Gricean hypothesis with respect to the semantics and pragmatics of the logical particles of natural language has come from Cohen (1971). We address ourselves in chapter 4 below, to the question of whether Cohen's objections can be sustained.

The only other attack in the literature on the use of Gricean explanation is that of Kroch (1972).¹⁵ Kroch considers the sentence given in (51)

- (51) *John ate the apple.*

and argues that the implication that all the apple was eaten can be explained by reference to Gricean maxims. He then considers what would happen if the implication was that only part of the apple was eaten and provides an equally plausible Gricean explanation for this counterfactual case. He concludes that "a theory that accounts for what exists and for what does not exist with equal ease can provide no explanations." The point is a serious one but Kroch's choice of example is unfortunate because, as Wilson (1974) shows, there is no generalization about this implication when other verbs and nouns are considered and so the sentence is a bad candidate for a Gricean analysis in the first place. Assume for the sake of argument that we could come up with a clear case of a phenomenon to which a Gricean explanation was applicable and to whose counterfactual contrary a different Gricean explanation was equally applicable: an example might be the attempt to build a pragmatic theory of presupposition on Gricean lines, for which see Stalnaker (1974), and the discussion in chapter 5 below. What would be the moral of this hypothetical case taken together with Kroch's example?

The answer, as argued more generally in the first chapter of this thesis, is a well-defined formal model. Such a model will, on the one hand, explicitly state its domain of applicability, and thus exclude Kroch's example, and on the other hand, it will not generate any pair of predictions p and $\neg p$ since to do so would render it inconsistent and thus not well-defined. This answer has its disadvantages, not least of which is that the sheer difficulty of formalizing some of Grice's notions (e.g. "relevance") probably makes parts of his enterprise unusable for linguists at the present time. Furthermore those that are usable have to be so restrictively defined - as in this thesis - that much of the power and generality of Grice's discussion is lost. But not to stick to formalist methodology in an area like this can only lead out of linguistics and into literary criticism. Consider, by way of example, Kempson's (1975: 196) extension or elaboration of Grice's maxim of relevance:

- (52) Make the form of your utterance relevant to its content.

Now any notion of relevance that treated it as some relation between sentences, utterances, propositions, contexts or topics is going to prove inadequate to (52). (52) requires a relation between one entity that is, by definition, wholly devoid of semantics and another entity which is, by definition, exclusively semantic. Whatever such a relation might be, and it is not clear to me that it could be anything, it certainly is not the relation mentioned in (53) which I take to be the kind of relation Grice's own maxim is dealing with:

- (53) My esteemed colleague's remarks are hardly relevant to my main point.

compare (54) as one instantiation of (52):

- (54) Make the distribution of vowels in your sentence relevant to its truth conditions.

Informal explanation, not based on formal theory, particularly those that trade on words like "relevant", are always liable to the fallacy of equivocation.

The reason Grice calls his generalized conversational implicatures 'conversational' rather than 'conventional' is because he sees the maxims which generate them as more than mere matters of convention:

My avowed aim is to see talking as a special case or variety of purposive, indeed rational, behaviour... I would like to be able to think of the standard type of conversational practice not merely as something which all or most do IN FACT follow, but as something which it is REASONABLE for us to follow. Grice (1968)

If one could show that there are language communities which do not obey some or all of the maxims but are nevertheless reasonable, rational, etc. then Grice's strong claim about the nature of maxims cannot be sustained. One such community is discussed in Keenan (1974) where she shows that Malagasy speakers make their conversational contributions as uninformative as possible. For example, if asked where somebody is they may typically reply with a disjunction even though they know, and are known to know, which disjunct is true. Likewise they normally use syntactic constructions which delete the agent in order to conceal the identity of the person responsible for the action described. Also they use indefinites or common nouns (*someone*, *a girl*, etc.) even to refer to close relatives. This last mentioned practice is in direct contravention to a special case of Grice's quantity maxim discussed in Sacks & Schegloff (1974) where one of the rules given for reference is "Use a recognitional where possible." Keenan's findings imply that Grice's maxims are only "reasonable", "rational", etc. relative to a given culture, community or state of affairs. They cannot be defended as universal principles of conversation: this doesn't make them any less interesting to the linguist interested in the conversational meanings of a given language community but it must reduce their philosophical or psychological import. The implicatures that the maxims provoke may be better regarded as generalized 'conventional' ones rather than generalized 'conversational' ones.¹⁶ Since the treatment of presupposition suspension developed in chapter 6 below trades on implicatures deriving from the maxim of quantity one must predict that, if Keenan is correct, then certain kinds of presupposition suspension, e.g. that in disjunctions, will not take place in Malagasy.

3.4 THE IM-PLICATURE FUNCTIONS

The purpose of these functions is to give for any SENTENCE the set of potential quantity implicatures that that sentence could have. That is they give us all the implicatures which the sentence could possibly have prior to contextual cancellation. I shall call these potential implicatures 'im-plicatures' and in chapter 6 another function will be defined which, given a sentence context pair, will yield as value the appropriate post-cancellation subset of these im-plicatures, which subset will be referred to as the 'implicatures' of the sentence in that context. The im-plicature functions are defined as relations between SENTENCES and SETS OF SENTENCES.

The only previous attempt I know of to formalize such a function for the quantity maxim is due to Horn (1973a) and I shall incorporate something rather similar in my own since it seems basically correct. It is worth noting that the explanatory purpose of Horn's definition is somewhat different from my own; his is largely to explain the distributional facts about the lexical incorporation of negative elements whereas mine is largely to explain the facts of presupposition cancellation. We have here a case where one independently motivated generalization serves to explain two additional distinct classes of phenomena.

Horn's (1973a) definition is given below:

- (55) Given a quantitative scale of n elements p_1, p_2, \dots, p_n and a speaker uttering a statement S which contains an element p_i on this scale, then
- (i) the listener can infer $\neg S_{p_j}^{p_i}$ for all $p_j, p_i (j \neq n)$
- (ii) the listener must infer $\neg S_{p_n}^{p_i}$
- (iii) if $p_k > p_j > p_i$, then $\neg S_{p_j}^{p_i} \rightarrow \neg S_{p_k}^{p_i}$
 where S_b^a denotes the result of substituting b for all occurrences of a in S .

Some examples of the quantitative scale that Horn means his definition to apply to are given in (56):

- (56) <All, Most, Many, Some, Few,>
 <Necessarily, Probably, Possibly,>
 <.....Ten, Nine, Eight,>
 <Must, Should, May,>

Horn's definition won't do as it stands, for the trivial reason that he doesn't stipulate that $p_j > p_i$, and for the more serious reason that it makes no allowance for the scope of other logical expressions found in the sentence, nor for compound sentences. Thus, according to (55), (57) implicates (58) and (59) implicates (60):

- (57) *It is not the case that Paul ate some of the eggs.*
- (58) *Paul ate all the eggs.*
- (59) *Mary ate some of the bacon and Paul ate some of the eggs.*
- (60) *Either Mary didn't eat all of the bacon or Paul didn't eat all of the eggs.*

Before I go on to amend and expand Horn's formulation it is worth pausing to consider at what level of linguistic description such scales should be consulted. It is both in the spirit of Grice's programme and in the interests of economy to read these non-conventional inferences off the semantic representation. Presumably at such a level a set of expressions such as {perhaps, maybe, possibly} will be represented by just one item for the reading they have in common. To read off conversational implicatures from the actual 'lexical items' given in the surface structure would be tantamount to treating them as conventional implicatures, besides which the scales would require redundant listing of synonymous items. To read off implicatures from the semantic interpretation of the sentence (i.e. the proposition it expresses) would be impossible since many different sentences can express a given proposition and many of these will not contain the scalar item and thus not carry the im-plicature. An example is given in chapter 6 below where it is shown that two disjunctive sentences having the same truth-conditions (i.e. expressing the same proposition) carry different im-plicatures.¹⁷ In what follows I am to be read as deriving im-plicatures from the sentences of a semantic representation although the exemplification will be entirely by reference to surface sentences. It should be noted that the notion of semantic representation necessary (e.g. to cope with the disjunctive examples just mentioned) is a bit more "surfacey",¹⁸ or less abstract, than that hypothesized by Generative Semanticists: logically equivalent sentences are not required to have the same semantic representation but only the same semantic interpretation. The translations

of English into intensional logic achieved by Montague (1974) approximate to what would be necessary.

To assist in the discussion below I provide a number of abbreviatory definitions:¹⁹

- (I) A sentence ϕ is SIMPLE WITH RESPECT TO AN OCCURRENCE OF A COMPONENT EXPRESSION α iff ϕ contains no logical functors having wider scope than α .²⁰

The set of logical functors includes (but is, perhaps, not exhausted by) negation, quantifiers, connectives and modal operators.

- (II) Sentences ϕ_α and ϕ_β are EXPRESSION ALTERNATIVES WITH RESPECT TO α AND β iff ϕ_α is identical to ϕ_β except that in ONE place where ϕ_α has α , ϕ_β has β .

Horn does not define the notion "quantitative scale" although it is easy to gather ostensibly from (56) the kind of thing he has in mind. Definition is not easy because of the requirement that the items in the scale be qualitatively similar in addition to being quantitatively ordered. One way of capturing qualitative similarity is by reference to the notion of 'sortal correctness' for which a formal semantic treatment is available in Thomason (1972).²¹ It would take us too far afield to explore this topic here so I shall restrict myself to pointing out that to say of two expressions α and β that they have the same DOMAIN OF SORTAL APPLICABILITY is much the same as saying that they impose or are subject to exactly the same set of "selectional restrictions". The notion 'domain of sortal applicability' can be defined straightforwardly in Thomason's system.

- (III)²² An n-tuple Q of expressions is a QUANTITATIVE SCALE iff

- (i) $Q = \langle \alpha_0, \alpha_1, \dots, \alpha_{n-1} \rangle$ where $n > 1$ and each member of Q has the same domain of sortal applicability as every other member

- (ii) $[\phi\alpha_i] \subset [\phi\alpha_{i+1}]$ ²³ where $\phi\alpha_i$ and $\phi\alpha_{i+1}$ are any pair of simple expression alternatives with respect to $\alpha_i, \alpha_{i+1} \in Q$.

For detailed discussion of, and criteria for setting up, one such scale see Caton (1966).

We may now define a function of f_s which, given a sentence ψ as argument, will return a set of scalar quantity im-plicatures as its value:

- (IV) $f_s(\psi) = \{\chi : \chi = K_1\phi\alpha_i\}$
for all $\phi\alpha_i$ such that for some Q, $\alpha_i, \alpha_{i+1} \in Q$
(i) $\psi = X\widehat{\phi\alpha_{i+1}}Y$ where X and Y are any expressions, possibly null
(ii) $[\psi] \subseteq [\phi\alpha_{i+1}]$.

This definition generates epistemically qualified versions of all the im-plicatures listed as b-sentences in examples (37) to (42) as the reader may verify.

Surprisingly, perhaps, (IV) not only gives us im-plicatures from sentence components like those listed in (56) but also from logical connectives since the couple $\langle \wedge, \vee \rangle$ is a quantitative scale under (III). Thus $\phi \vee \psi$ potentially implicates $K_1(\phi \wedge \psi)$ which explains why disjunctions are commonly heard as exclusive (cf. the discussion of Hurford (1974) in chapter 4 below) given the deduction shown in (61)

- (61) 1. $\phi \vee \psi$
2. $\neg(\phi \wedge \psi)$ im-plicature of 1.
3. $\phi \vee \psi$ materially equivalent to conjunction of 1 and 2.

Scalar im-plicatures are not, however, the only quantity im-plicatures that arise in compound sentences. Thus (IV) does not generate the im-plicatures noted in (43) and (44) above. Let us, therefore, define a function f_c which, given a compound sentence ϕ as argument, will return a set of CLAUSAL QUANTITY IM-PLICATURES as its value:

- (V) $f_c(\phi) = \{\chi : \chi \in \{P\psi, P_1\psi\}\}$
for all sentences ψ such that
(i) $\phi = X\widehat{\psi}Y$ where X and Y are any expressions, possibly null

- (ii) $[\phi] \notin [\psi]$
 (iii) $[\phi] \notin [\neg\psi]$
 (iv) ϕ has some expression alternative ϕ_α with respect to ψ and α where α is an arbitrary sentence such that
- $\alpha \neq \psi$
 - $K\alpha \notin f_p(\phi_\alpha)^{\text{st}} \text{st}$
 - $K\neg\alpha \notin f_p(\phi_\alpha)$.

Any such set $f_c(\phi)$ is consistent if every constituent sentence ψ in ϕ is itself consistent. This definition gives us, among others, those im-plicatures first found in examples (43) and (44) above and repeated below for convenience:

- (62) *If John sees me he will tell Margaret.*
 (63) *I don't know that John will see me.*
 (64) *My sister is in the bathroom or she is in the kitchen.*
 (65) *I don't know that my sister is in the bathroom.*

More formally it follows that the set of this class of im-plicatures for otherwise simple disjunctions and conditionals (of whatever type) whose constituents meet (V)'s conditions is as given below:

$$(66) f_c(\phi \vee \psi) = f_c(\phi \rightarrow \psi) = \{P\phi, P\neg\phi, P\psi, P\neg\psi\}$$

Condition (iv) of (V) deserves some explanation: what this does is ensure that the im-plicatures are not read off from clauses which are already pre-supposed (under the definition of f_p given in chapter 5); if this condition were not present then every pre-supposition which was not also an entailment would automatically get cancelled by the system defined in chapter 6. When a sentence has the same clause in TWO places, one in a pre-suppositional environment and the other not in such an environment, then, assuming the other three conditions apply, this condition generates the relevant im-plicatures despite the presence of the pre-suppositional context. Thus (67) im-plicates (63) but (68) does not im-plicate (63):

- (67) *If John sees me he will regret seeing me.*
 (68) *If John tells Margaret he will regret seeing me.*

The Gricean argument for the im-plicatures generated by this definition goes as follows: if one utters a compound or complex sentence having a constituent which is not itself entailed or pre-supposed by the matrix sentence and whose negation is likewise neither entailed nor pre-supposed, then one would be in breach of the maxim of quantity if one knew that sentence to be true or false, but was not known to so know, since one could have been more informative by producing a complex sentence having the constituent concerned, or its negation, as an entailment or a pre-supposition. It follows that, ceteris paribus, the utterance of such a complex sentence implicates that both the constituent sentence and its negation are compatible with what the speaker knows.

This Gricean argument relies on the fact that natural languages provide their users with pairs of sentences of ROUGHLY EQUIVALENT BREVITY which differ only in that in one, one or more constituent clauses are not entailed. This means that strict adherence to the maxim of quantity does not involve violation of the maxim of manner ("Be brief!"). If one is in a position to, then one can always utter the stronger and more informative sentence without increasing the length of one's utterance. Here are some examples:

- (69) *Since John was there we can assume that Mary was too.*
 (70) *If John was there we can assume that Mary was too.*
 (71) *We know that John was there.*
 (72) *We think that John was there.*
 (73) *John was there and Mary was absent.*
 (74) *John was there or Mary was absent.*

f_c and f_s typically give us several im-plicatures, even from quite simple sentences. Thus (75) im-plicates (76) in virtue of (IV) and im-plicates (77) and (78) in virtue of (V):

(75) *John believes Margaret to be unfaithful.*

(76) K_1 (*John knows Margaret to be unfaithful*).

(77) P (*Margaret is unfaithful*).

(78) P_1 (*Margaret is unfaithful*).

The class of verbs that give rise to implicatures like (77) and (78) approximates to those called "plugs" in Karttunen (1973a) and it includes many verbs of propositional attitude (*believe, think, hope, dream, etc.*) and verbs of saying (*ask, say, tell, etc.*) which have in common that they neither entail nor pre-suppose their complements. This "coincidence" will be shown to have some explanatory consequences for Karttunen's own examples in chapter 6, below. This type of implicature was first noted by Sacks (1968) who gives the following example (which I have abbreviated) from a newspaper report:

(79) *David Searles returned to the street with his girl and found the car was missing. At first he thought it had been stolen. Then he realized it had been towed away by the police. (New York Times 11.2.67)*

Sacks comments that "*he realized* stands in opposition to *he thought*, by reference to the fact that *thought* would be used were it the case that it turned out he was wrong."²⁵