PRAGMATICS

IMPLICATURE, PRESUPPOSITION, AND LOGICAL FORM

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ACADEMIC PRESS
New York  San Francisco  London
A Subsidiary of Harcourt Brace Jovanovich, Publishers
Typology and Definitions

This chapter considers the notion of IMPLICATURE and outlines briefly the components of the Gricean program, as presented in Grice (1967). Attention is focused on those implicatures arising from the maxims of quality and quantity. It is argued that the former turn out to be subsumed under the felicity conditions for assertion. Various criticisms of the Gricean program 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 is in no sense intended as a full exegesis of Grice (1967). I am using his 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 both 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 I thought it best to follow common usage rather than stick to etymology. At the end of this

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1 The chapter of Grice (1967) that is most relevant to the present discussion has been published as Grice (1975). Good introductions to his program can be found in Harnish (1976), Kempson (1975), and Sadock (1978).
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.” The latter notion is also defined within the theory, but accords more or less closely with Grice’s “implicata.” By the time the reader has got to the relevant parts of the book, 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 sort of contrast, unexpectedness, or the like.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 and Peters (1975), who deal with example (3) by means of some additions to a Montague Grammar:

(3) John failed to win.

Although their formal treatment is very impressive, their particular choice of examples seems to miss Grice’s point about the implicatures arising from verbs like fail, try, and the like. That point is that the implicatures derive from general conversational principles, and not just from the lexical entry of the verb concerned. The discussion of examples (5)–(12) that follows will establish this point.

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.

(4) 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 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 chapter is largely 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 1975:56].” Grice goes on to warn that “it is all too easy to treat a generalized conversational implicature as if it were a conventional implicature [ibid.: 56].” 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 of a 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), which makes that transformation inapplicable to them in virtue of some nonarbitrary 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, that is, 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” (Grossman et al. 1975). Such a rule might be said to specify GENERALIZED CONVENTIONAL IMPLICATURES (this is not one of Grice’s notions). I shall return to the issue intermittently throughout this chapter.

² For a discussion of *but* in the context of Grice’s work, see Kempson (1975). For a formally flawed approach to conventional implicature, see Gazdar and Klein (1977).
Grice (1975: 57–58) 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:

(5) John failed to win, but then he didn’t even try.

(iii) It must be “nondetachable,” that is, it must not be possible to substitute some other expression in the sentence that lacks the implicature in question but which otherwise means much the same thing. Thus examples (6), (7), and (8) should carry the same implicature(s) as (3) if these implicature(s) are conversational rather than conventional.

(6) John didn’t succeed in winning.
(7) John wasn’t able to win.
(8) John didn’t manage to win.

(iv) The implicature must not be a truth condition of the sentence involved. If (9) is false, it does not follow that (3) is false or truth-valueless.

(9) John tried to win.

Note, for contrast, that if (10) is false, then it does follow that (11) is false or truth-valueless, so (10) cannot be an implicature of (11).

(10) John won.
(11) 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 (9) and (12) as implicatures.

(12) John was expected to win.

Because this last feature is less restrictive than the others (that is, it only has to be possible for there to be an indeterminate choice of implicatures) and because indeterminacy is hard to handle formally, I shall mostly 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. As Karttunen and Peters (1975:278) 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 nonconventional 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 just sketched. The first general definition that I am aware of is due to Thomason (1973:9) and given in (13).

(13) A sentence \( \psi \) conversationally implicates \( \phi \) relative to a class \( C \) of contexts of utterance, if for all \( \psi \in C \), such that \( \phi \) is an assertion in \( C \) does not violate the maxims of conversation, \( \psi \) is presumed in \( C \).

This definition is unsatisfactory for a number of reasons. First, it is not biconditional, so it does not place any restrictions on the class of conversational implicatures. Second, as Thomason himself notes we are forced into a taxonomy of contexts in order to arrive at \( C \) for \( \phi \) and \( \psi \). Third, the definition fails to capture the notion "implicature," as the following examples show.

(14) Some of the members showed up.
(15) Some of the members didn’t show up.

The relation between (14) and (15) is a paradigm case of implicature and yet, in many contexts in which (14) would be uttered, (15) would not be presumed until (14) had been uttered. Uttering (14) to implicate (15) 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 (15) may not be implicated and yet the utterance of (14) can still be perfectly in accord with the maxims of conversation. For example in a proof situation, where (14) has just been derived from (16), (15) will not be implicated.\(^3\)

\(^3\) I am assuming that (16) entails (14). This assumption may appear to clash with a familiar property of predicate calculus, namely that if \( \exists x \) [member (x) \( \rightarrow \) turn up (x)] does not entail \( \exists x \) [member (x) \( \land \) turn up (x)]. The clash is only superficial however. I shall argue in Chapter 5 that Russell was correct in supposing that (i) entails (ii).

(i) The members showed up.
(ii) There are members.
A Russellian translation of (16) — which contains a definite description — will entail (14). Note that there does seem to be a meaning difference between (iii) and (iv).
(iii) All damaged books must be handed to the librarian.
(iv) All of the damaged books must be handed to the librarian.
Sentence (iii) could be displayed in any library, but (iv) would be more likely to appear in one which had, say, recently suffered a fire. See also Karttunen (1975:51ff).
3. IMPLICATURE

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 definition like Thomason’s, is handled quite straightforwardly by the theory presented in Chapter 6 of this book [see the discussion of example (77) on p. 145 in that chapter]. Since entailment is not the only definable logical relation, 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.

A second definition of implicature is due to Walker (1975:157).

S conversationally implicates φ by U iff in uttering U S M-intends to convey φ to his audience, and intends this intention to be recognised partly because of the audience’s recognition of the sense of U (together with its expectation that S also knows the sense of U); but partly also because the audience expects S to be conforming to the Cooperative Principle, and expects S to anticipate this expectation and to act accordingly.

This definition appears to require auxiliary theories of INTENTION, EXPECTATION, and RECOGNITION in order to be useful. In the absence of such theories, obscursum per obscurius.

Katz and Langendoen (1976:13) claim that a hypothetical function, from utterances into sentences, called PRAG, allows Grice’s “special notion of conversational implicature” to be eliminated. They support this claim by offering the following “definition”: “Someone conversationally implicates P in saying S in the context C just in case (a) PRAG assigns the reading R as its output for a structural description of S and appropriate information about C, and (b) the proposition represented by R semantically entails P.” They also tell us that “it is not important or possible to specify the nature of the rules comprising PRAG (ibid.: 11).” Since PRAG remains wholly undefined, and since no indication is given as to how PRAG would acquire “appropriate information about C,” I can see no good reason for taking this proposal seriously. It clearly fails to capture the notion that Grice discusses. If someone says Mr. X is hopeless at philosophy in a context in which it is clear that he means exactly that, no more and no less, then, according to Katz and Langendoen’s definition, he will have conversationally implicated that Mr. X is hopeless at philosophy. And, of course, he has done no such thing. Grice’s fundamental distinction between what was SAID and what was IMPLICATED is obliterated by this definition.

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 book.

1. MANNER: Be Perspicuous.
   i. Avoid obscurity of expression.
   ii. Avoid ambiguity.
   iii. Be brief (avoid unnecessary prolixity).
   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 indicating briefly how it might be done. Part (i) can be rephrased as instructing speakers and

4 I am grateful to Stephen Levinson for bringing these examples to my attention.

5 Compare this maxim with the following comment of Suppes (1973:393).

It is an obvious point that the apparatus of model-theoretic semantics is not sufficient to predict the choice of a particular description of an object from among many semantically suitable ones. Suppose John and Mary are walking and John notices a spider close to Mary’s shoulder. He says “Watch out for that spider.” He does not say, “Watch out for the black, half-inch long spider that has a green dot in its centre and is about six inches from your left shoulder at a vertical angle of about sixty degrees.”

6 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.
addresses 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, and so forth) or to use the intersection of their respective languages or idiolects. Part (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). In the case of speech act categorization (see Weiser 1974; Sadock 1974: 157–158), this submaxim seems 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)]. Submaxim (iii) can be rather brutally formalized by quantifying over the length of expressions at some level of representation. Then it can be read as instructing speakers to choose α, given two potentially synonymous expressions α and β such that β is longer than α. It also instructs 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 (1972:239) 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.” Sub-maxim (iv) might be susceptible to something along the following lines: If a sentence ϕ contains the expressions α and β in that order (i.e., ϕ is of the form X¬α¬ϕ¬Y¬β¬ϕ¬Z, where X, Y, and Z are any expressions, possibly null), and where α and β have distinct extensions and are members of some set Σ such that for any two members α and β of Σ the expression α¬ϕ¬β is well-formed, then hear ϕ as implying, or use ϕ to imply, that the event denoted by α occurred before the event denoted by β. This formulation requires tightening up, generalizing to cover more than two expressions and generalizing to cover temporal precedence as well as temporal precedence. It would also need to allow for the possibility of cancellation, although, as will be shown in Chapter 6 of this book, this is relatively simple to achieve. For discussion and some relevant examples see (19)–(25) in Chapter 4 of this book, Schmerling (1975), and Linde (1976). Other work by Linde (e.g., Linde and Labov 1975) indicates the considerable role played by the “Be orderly” submaxim in the description of the temporal domain. In the temporal domain, it offers a very straightforward account of the meaning difference exhibited by the following pair of sentences.

(20) John stole the money and went to the bank

(21) John went to the bank and stole the money

(22) RELEVANCE: Be relevant

That relevance is relevant to linguistic descriptions is painfully apparent (see, for example, the following condition on the acceptability of headless relative clauses in Japanese): “THE RELEVANCY CONDITION: For a headless relative clause to be acceptable, it is necessary that it be interpreted pragmatically in such a way as to be directly relevant to the pragmatic content of its matrix clause [Kuroda 1976:27].” See also Green (1968, 1973b), Gunter (1972), and Loetscher (1973). Equally apparent is the almost complete absence of any kind of formal linguistic treatment of the notion (but see Sperber and Wilson 1977). Grice himself admits that the issue involves difficult problems and points out that his terse formulation offers no guide either to what an expression is required to be relevant to, or to how what is relevant can change during a conversation [but on this latter point see Adato (1971)]. Thomason (1973:12), 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.” The present work has no contribution to make to the topic.

(23) QUALITY: Try to make your contribution one that is true.

(i) Do not say what you believe to be false.10
(ii) Do not say that for which you lack adequate evidence [emphasis added]

Any attempt to formalise this maxim as it stands runs into three sets of problems: Those connected with the notion “truth,” those connected

10 Cf. “Thou shalt not make a straightforward assertion that you do not believe [Fogelin 1967:20].”
with the logic of belief, 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 (23) and, as a first step, simply replace (23) by (24) (the
reader is requested to suspend judgment on these maneuvers for several
paragraphs).

(24) 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. We are now in a position to give a simple
formulation of quality implicatures:

(25) Utterance of \( \phi \) by a speaker \( s \) implicates \( K\phi \) (where for \( K\phi \norcharacters
read \( s \) “knows that” \( \phi \)).

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

(26) *Pithium is radioactive [and I don’t know that Pithium is
but] radioactive.

This is even more clear if one attempts to cancel the components of
Grice’s own formulation.

(27) *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 (1975:46) 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

11 For brief details of this logic see the list of symbols and typographical conventions on
formalism. That KNOWING and not, say, believing, assuming, or something else is what
is involved is evidenced in the following:

We have in the data, “Oh she knows you’re crazy b**ch!” where that might be different
from “She thinks you’re crazy”, where the problem, I suppose, is that whatever is
correct to say about what she figures, then if I say “She knows you’re crazy”, it’s hard for
you to be in a position to say “No, she THINKS I’m crazy. She happens to be right.” That is
to say, if some facts are assertibly so, then, that somebody thinks that they’re so can
apparently be used in such a fashion as to say that they KNOW that it’s so; whether or not
their thoughts turn out to have a correct basis for that result [Sacks 1988:3].

anomaly of utterances like (26) in his discussion of, and solution to,
problem, which is an exact analogue of Moore’s problem (for a com-
prehensive bibliography on the topic see Hintikka 1962:64), is that the
sentence \( p \land \neg Kp \), which may be taken to represent (26), is not a
contradiction in epistemic logic and so we have no reason to suppose (26)
amoanlous if we restrict ourselves to consideration of that formulation
alone. Hintikka’s solution proposes that the utterance of a sentence \( \phi \norcharacters
commits a speaker to knowledge of that sentence, that is, to \( K\phi \), and that
the anomaly arises because, if this principle is applied to (26), then
inconsistency arises. The sentence \( K(\phi \land \neg \neg K\phi) \) is necessarily false in
epistemic logic. It can now be seen that my version of the quality maxim
given in (25) amounts to no more and no less than Hintikka’s treatment of
sentences like (26). The relation between \( \phi \) and \( K\phi \) which Hintikka
(1962:79) defines generally is called EPISTEMIC IMPLICATION and its defini-
tion is given in (28).

(28) The utterance of \( \phi \) epistemically implies \( \psi \) iff \( K(\phi \land \neg \neg \psi) \) is
inconsistent.

Under this definition, it may be readily proved that \( \phi \) epistemically
implies \( K\phi \).12

Two possible objections are relevant at this juncture. The first objection
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 \( \phi \) commit themselves not only to \( \phi \), but
also to knowing that \( \phi \). They cannot produce intelligible utterances such
as (26) or (27), 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 (1969:174) after giving a formal definition of CONVENTION and applying it in a discussion of possible languages, postulates the following definition of an ACTUAL LANGUAGE.

\[(29) \quad L \text{ is an actual language of [a population] } P \text{ iff there prevails in } P \text{ a convention of truthfulness in } L.\]

The word \textit{prevail} is important: Lying is an effective enterprise only in a population in which a convention of truth \textit{prevails}.

The second objection is that 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. Nonassertoric speech acts regularly allow this.

\[(30) \quad \text{You will go to Tibet on Tuesday?}\]

Where interrogative or imperative sentences are used, no confusion can arise but the utterance of a sentence like (30) \textit{can} be heard as an assertion. If it is so heard, then its epistemic implication is as predicted by (28). Notice the following perfectly plausible dialogue.

\[(31) \quad \begin{align*}
A: & \quad \text{You will go to Tibet on Tuesday.} \\
B: & \quad \text{How did you know?} \\
A: & \quad \text{I wasn't telling you, I was asking you.}
\end{align*}\]

So it appears that the quality maxim may only apply to assertoric utterances. This restriction is hardly surprising (see Harman 1974:10). Indeed, we may cease to accord the notion any status as a maxim whatsoever and instead simply treat \textsc{knowledge} as a maxim for asserting that \phi. Let us represent this claim as follows:

\[(32) \quad \text{For any declarative sentence } \phi, \text{ assertion of } \phi \text{ commits the speaker to } K\phi. \text{ [See definition XV in Chapter 6 of this volume for a precise expression of this.]}\]

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 book. No problem arises, of course, if such utterances are considered to be nonassertoric.

\[(33) \quad \text{QUANTITY:}\]

\[(33a) \quad \text{(i) Make your contribution as informative as is required (for the current purposes of the exchange).}^{13}\]

\[^{13}\text{Cf. "Make the strongest possible claim that you can legitimately defend [Fogelin 1967:20]."}\]

\[\text{REFORMULATING THE MAXIMS}\]

\[(ii) \quad \text{Do not make your contribution more informative than is required.}\]

To formalize this maxim as it stands, that is in its full generality, we would have to (a) be able to quantify over informativeness, and (b) have some function which when applied to a conversation and a point within it would yield as its value the level of informativeness required. With regard to (a), Thomason (1973:11) comments as follows:

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

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 here 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 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 (1972). 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.

\[(34) \quad \begin{align*}
a: & \quad \text{Some of the boys were at the party.} \\
b: & \quad \text{Not all of the boys were at the party.} \\
c: & \quad \text{Some, in fact all, of the boys were at the party.} \\
d: & \quad \text{All of the boys were at the party.}
\end{align*}\]

\[(35) \quad \begin{align*}
a: & \quad \text{It is compatible with all that I know that he was at the party.} \\
b: & \quad \text{It is compatible with all that I know that he was not at the party.} \\
c: & \quad \text{It is (not only) compatible with all that I know that he was at the party, in fact I do know that he was at the party.} \\
d: & \quad \text{I know that he was at the party.}
\end{align*}\]
3. IMPLICATURE

(36) 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.

(37) 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.

(38) a. Mary tried to cash a check.
b. Mary did not succeed in cashing a check.
c. Mary tried, and in fact succeeded, in cashing a check.
d. Mary succeeded in cashing a check.

(39) 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.

(40) 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.

(41) 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 just given, 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.

(42) 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 conjoint the negation of an entailment of one of the other conjuncts and still maintain consistency. Another reason why the relation cannot be entailment is that in each case the d-sentence entails the a-sentence. 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, which amounts to a reductio [see Fogelin (1967:18), Horn (1972:76–77), and Horn (1973) for further discussion].

One might be inclined to treat the relation between the a-sentence and the b-sentence as that of presupposition, especially if one notes that the expressions that typically occur in the cancellation clauses, expressions such as in fact, actually and indeed, also occur when presuppositions are explicitly suspended (cf. Allwood 1972:27). However, unlike presuppositions, implicatures do not usually survive if the a-sentence is embedded in a sentence that does not entail it.

(43) Mary managed to tell John when she thought that some of the boys were at the party. (which does NOT implicate that some of the boys were not 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 (40) and (41)].

For the reader who doubts the ontological status of quantity implicatures, I provide below a couple of examples drawn from a tape transcript of a naturally occurring conversation which illustrate their operation.

(44) 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 (1973:458), which is to say that it signals an incomplete answer. The second example, drawn from the same transcript, is even more clear-cut.

(45) A: What are you doing this evening?
3. IMPLICATURE

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 (40), 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 to 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 (44) and (45) 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. 44

In the c-sentences, we have observed that implicatures can be intra-sententially cancelled. 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, (41c) 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 (Observer, 20 October 1974).

(46) The roots of these attempts, indeed successes, by Congress to reassert itself . . . are well known to Mr. Ford.

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 have lain in the consequences of the Tonkin Gulf resolution, whereas the roots of the success probably lay in the immediately preceding congressional elections.

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 problems and objections that have been, or can be, raised in connection with the Gricean program, before going on to propose a formal treatment for quantity implicatures. One of the motivations of Grice’s suggestions is to allow the semantic identification of certain expressions of natural language (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 functors of natural language has come from Cohen (1971). In Chapter 4 of this volume, I address myself 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). 45 Kroch considers the sentence given in (47).

(47) John ate the apple.

He 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. As Wilson (1975:104–106) 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. One example might be the attempt to build a pragmatic theory of presupposition on Gricean lines, for which see Stalnaker (1974a), and the discussion in Chapter 5 of this volume. What would be the result of this hypothetical case taken together with Kroch’s example? The answer, as argued more generally in the first chapter of this book, is a well-defined formal theory. Such a theory will explicitly state its domain of applicability, and thus exclude Kroch’s example. Furthermore, 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 (for example, “relevance”) probably makes parts of his enterprise unusable for linguists at the present time. Furthermore, those parts that are usable have to be so restrictively defined—as in this book—

44 I owe this suggestion to Hans Kamp.

45 I have not been able to get hold of Kroch (1972) and so it is reported here, secondhand, from my reading of Wilson (1975) and Kempson (1975).
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) elaboration of Grice’s maxim of relevance.

(48) 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 (48), which 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 (49), which I take to be the kind of relation Grice’s own maxim is dealing with.

(49) My esteemed colleague’s remarks are hardly relevant to my main point.

Compare this to (50), which is an instantiation of (48).

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

Informal explanations, 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 [1975:47-48].

If one could show that there are language communities which do not obey some or all of the maxims, but are nevertheless reasonable and rational, then Grice’s strong claim about the nature of the maxims could not be sustained. One such community is discussed in Keenan (1976), 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 contradiction of a special case of Grice’s quantity maxim discussed in Sacks and Schegloff (1977), where one of the rules given for reference is: “Use a recognizably where possible.” Keenan’s findings imply that Grice’s maxims are only “reasonable,” and “rational” relative to a given culture, community, or state of affairs. They cannot be defended as universal principles of conversation. This does not make them any less interesting to the linguist studying the conversational meanings of a given language community, but it must reduce their philosophical or psychological import (but cf. Harnish 1976:340, fn. 29). The implicatures that the maxims provoke may be better regarded as generalized CONVENTIONAL ones rather than generalized CONVERSATIONAL ones. Since the treatment of presupposition suspension developed in Chapter 6 of this volume trades on implicatures deriving from the maxim of quantity, one must predict that, if Keenan is correct, then certain kinds of presupposition suspension, for example that in disjunctions, will not take place in Malagasy.

Potential Quantity Implicatures

In this section two functions are defined which, taken together, yield for any sentence the set of potential quantity implicatures that the sentence could have. That is, they give all the implicatures which the sentence could possibly have prior to contextual cancellation, I shall call these potential implicatures “im-plicatures.” In Chapter 6 another function will be defined which, given a sentence context pair, will yield as value the appropriate postcancellation subset of these im-plicatures, which subset will be referred to as the “implicatures” of the sentence in the 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 (1972). I shall incorporate something rather similar, since Horn seems basically correct. It is worth noting that the explanatory purpose of Horn’s definition is somewhat different from my own: His aim 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. One independently motivated generalization (Grice’s maxim of quantity) serves to explain two additional distinct classes of phenomena.

16 See also Cole (1975:286–288).
3. IMPLICATURE

Horn's (1972:112) definition is given below:

(51) Given a quantitative scale of n elements \( p_1, p_2, \ldots, p_n \) and a speaker uttering a statement \( S \) which contains an element \( p_i \) on this scale, then

(i) the listener can infer \( \neg S_{p_j} \) for all \( p_j, p_i \) (\( j \neq n \))
(ii) the listener must infer \( \neg S_{p_k} \)
(iii) if \( p_k > p_j > p_i \), then \( \neg S_{p_j} \rightarrow \neg S_{p_k} \), where \( S_\alpha \) denotes the result of substituting \( \alpha \) for all occurrences of \( a \) in \( S \).

Some examples of the quantitative scales that Horn means his definition to apply to are given in (52):

(52) \( \{ \text{all, most, many, some, few, \ldots} \} \)
\( \{ \text{necessarily, probably, possibly, \ldots} \} \)
\( \{ \ldots \text{ten, nine, eight, \ldots} \} \)
\( \{ \text{must, should, may, \ldots} \} \)

Horn’s definition will not do as it stands, for the trivial reason that he does not stipulate that \( p_1 > p_n \), 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 (51), (52) implicates (54) and (55) implicates (56).

(53) It is not the case that Paul ate some of the eggs.
(54) Paul ate all the eggs.
(55) Mary ate some of the bacon and Paul ate some of the eggs.
(56) 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 as Horn’s should be consulted. It is both in the spirit of Grice’s program and in the interests of economy to read these nonconventional inferences from the semantic representation. Presumably, at such a level a set of expressions such as \( \{ \text{perhaps, maybe, possibly} \} \) will be represented by just one item for the reading they have in common. To read off conversational im-plicatures 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 im-plicatures 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 of this volume, where it is shown that two disjunctive sentences having the same truth-conditions (i.e., expressing the same proposition) carry different im-plicatures. In what follows I shall assume that im-plicatures derive from the sentences of a semantic representation, although the exemplification will be entirely by reference to sentences of English. 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 “surfacy,” \( ^{19} \) 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.

To assist in the discussion which follows, I provide two abbreviatory definitions. \( ^{19} \)

(I) A sentence \( \phi \) is simple with respect to an occurrence of a component expression \( \alpha \) iff \( \phi \) contains no logical functors having wider scope than \( \alpha \). \( ^{20} \)

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

(II) Sentences \( \phi_a \) and \( \phi_b \) are expression alternatives with respect to \( \alpha \) and \( \beta \) iff \( \phi_a \) is identical to \( \phi_b \) except that in one place where \( \phi_a \) has \( \alpha \), \( \phi_b \) has \( \beta \).

Horn does not define the notion “quantitative scale,” although it is easy to gather ostensively from (52) the kind of thing he has in mind. Definition is difficult for two reasons. The items in the scale must be

\( ^{19} \) See examples (18)–(20) in Chapter 6 of this book.
\( ^{20} \) But not too “surfacy”. Consider the following examples.
(i) Sam went or Mary went.
(ii) Sam or Mary went.
(iii) Mary believes Sam to have gone.
(iv) Mary believes Sam to have gone.

Clearly we do not want the pragmatics to have to run the syntax in reverse which is what it would have to do if it applied to surface structure in these examples (which generate CLAUSAL IM-Plicatures, see (V)).

A SENTENCE is to be understood here as any member of the set of proposition-denoting WFFS defined by the formation rules of the language employed for semantic representation. An EXPRESSION is any subpart of such a WFF. One cannot really be more precise than this without specifying the grammar of semantic representation, a task which is outside our present brief. I am assuming that a precise formulation would avoid problems of the sort discussed by Geach (1965). Compound and complex will be used interchangeably of any sentences having as a constituent at least one occurrence of any logical functor other than a quantifier or at least two occurrences of members of the set of verbs and sentence adverbs.

\( ^{20} \) I am grateful to Lauri Karttunen for providing me with an example that showed an earlier formulation of this definition to be defective.
qualitatively similar: for example, we want (. . . , know, believe, . . . ) to be a scale, but not (. . . , regret, know, . . . ), and no obvious or available similarity criterion exists. Attempts to use “identity of selection restrictions” or “identity of item-induced presuppositions” as the similarity criterion, as suggested in Gazdar (1977:2, 181), do not work for reasons which can be deduced from the examples given in the preceding sentence. The other difficulty arises because of the nature of the ordering relation imposed on such scales. It is easy enough to provide a semantic informativeness ordering, but the work of Fauconnier (e.g., 1975a, 1975b) has shown that the ordering relation is pragmatic.21 The definition of quantitative scale given in Gazdar (1977:72) runs foul of both these types of difficulty. I shall consequently content myself with a (semantically stated) necessary condition on the class of scales that figure in the examples discussed. For the purposes of definition (IV) I shall simply assume, like Horn, that the scales are, in some sense, “given to us.” Caton (1966) provides detailed discussion of, and criteria for setting up, one such quantitative scale.

(III) Let \( Q \) be an n-tuple22 of expressions such that \( Q = \langle \alpha_0, \alpha_1, \ldots, \alpha_{n-1} \rangle \) where \( n > 1 \). Then if \( Q \) is a quantitative scale: 

\[
[\phi_{\alpha_0}] \sqsubseteq [\phi_{\alpha_{n-1}}]
\]

where \( \phi_{\alpha_0} \) and \( \phi_{\alpha_{n-1}} \) are any pair of simple expression alternatives with respect to \( \alpha_0, \alpha_{n-1} \in Q \).

This says that any quantitative scale is such that, if one expression precedes another on that scale, then some sentence containing the first expression will always entail but not be entailed by an otherwise identical sentence containing the second expression, subject to the constraint that the expressions are not within the scope of any logical functors in the sentences. If \( \beta \) follows \( \alpha \) in a scale, then \( \beta \) is “weaker” than \( \alpha \).

We may define a function \( f_\phi \) which, given a sentence \( \phi \) as argument, will return a set of scalar quantity im-plicatures (an “im-plicature” is a potential implicature) as its value:

(IV) \( f_\phi (\psi) = \{ x : x = K \neg \phi_{\alpha_0} \} \) 

for all \( \phi_{\alpha_0} \) such that for some quantitative scale \( Q, \alpha_0, \alpha_{n-1} \in Q \)

(i) \( \psi = X \neg \phi_{\alpha_{n-1}} Y \) where \( X \) and \( Y \) are any expressions, possibly null

21 See also, in this connection, Harnish (1976:362–363, fn. 46) and the works cited therein.

22 Note that treating scales as n-tuple obscures the fact that, in general, we are dealing with partial rather than total orderings.

23 For details of the notational conventions see the list of symbols and typographical conventions on formalism.

(V) \( f_\phi (\psi) = \{ x : x \in \{ P\psi, P\neg \psi \} \} \)

for all sentences \( \psi \) such that 

(i) \( \psi = X \neg \psi Y \) where \( X \) and \( Y \) are any expressions, possibly null 

(ii) \( [\psi] \sqsubseteq [\psi] \) 

(iii) \( [\psi] \sqsubseteq [\neg \psi] \) 

(iv) \( \phi \) has some expression alternative \( \phi_0 \) with respect to \( \psi \) and \( \alpha \) where \( \alpha \) is an arbitrary sentence such that 

(a) \( \alpha \neq \psi \) 

(b) \( K\alpha \notin f_\phi (\phi_0) \) 

(c) \( K\neg \alpha \notin f_\phi (\phi_0) \)

This says that \( \phi \) scalar–quantity–implicates that the speaker knows that it is not the case that \( \psi \) if and only if there is some sentence \( \psi' \), just like \( \psi \) except that it contains a “weaker” scalar expression, and which is entailed by \( \phi \) and is either identical to \( \phi \) or forms a part of it (e.g., it is one conjunct), subject to the constraint that the scalar expressions are not within the scope of any logical functors in \( \psi \) or \( \psi' \).

This definition generates epistemically qualified versions of all the im-plicatures listed as b-sentences in examples (34) to (39) as the reader may verify.

Surprisingly, perhaps, (IV) not only gives us im-plicatures from sentence components like those listed in (52), but also from logical connectives, since the couple \( \langle \land, \lor \rangle \) will be a quantitative scale. Thus \( \phi \lor \omega \) potentially implicates \( K \neg (\phi \land \psi) \), which explains why disjunctions are commonly heard as exclusive (cf. the discussion in Chapters 4 and 6 of this volume). The deduction for this point is shown in (57).

\[(\neg \psi) \lor \neg \psi \]

1. \( \neg \psi \lor \psi \)

2. \( K \neg (\phi \land \psi) \) im-plicature of 1.

3. \( \neg (\phi \land \psi) \) entailed by 2.

4. \( \phi \lor \psi \) entailed by 1. and 3.

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 (40) and (41). Let us, therefore, define a function \( f_\phi \) which, given a compound sentence \( \phi \) as argument, will return a set of clausal quantity im-plicatures as its value.

(V) \( f_\phi (\phi) = \{ x : x \in \{ P\phi, P\neg \phi \} \} \)

for all sentences \( \phi \) such that 

(i) \( \phi = X \neg \phi Y \) where \( X \) and \( Y \) are any expressions, possibly null 

(ii) \( [\phi] \sqsubseteq [\phi] \) 

(iii) \( [\phi] \sqsubseteq [\neg \phi] \) 

(iv) \( \phi \) has some expression alternative \( \phi_0 \) with respect to \( \psi \) and \( \alpha \) where \( \alpha \) is an arbitrary sentence such that 

(a) \( \alpha \neq \psi \) 

(b) \( K\alpha \notin f_\phi (\phi_0) \) 

(c) \( K\neg \alpha \notin f_\phi (\phi_0) \)

For the definition of \( f_\phi \) see (VI) in Chapter 5 of this book.
Ignoring condition (iv) for the moment, this says that φ clausal quantity implicates that, for all the speaker knows, ψ, and, for all the speaker knows, not ψ, if and only if ψ is a part of φ, but neither ψ nor its negation is entailed by φ.

Any set \( f_c(\phi) \) is consistent if every constituent sentence ψ in φ is itself consistent. This definition gives us, among others, those im-plications first found in examples (40) and (41) and repeated here for convenience.

(58) If John sees me then he will tell Margaret.
(59) I don’t know that John will see me.
(60) My sister is either in the bathroom or in the kitchen.
(61) I don’t know that my sister is in the bathroom.

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

(62) \( f_c(\phi \lor \neg \psi) = f_c(\text{if} \neg \phi \text{then} \neg \psi) = \{P\phi, P\psi, P\neg \psi, P\neg \phi\} \)

Condition (iv) of (V) deserves some explanation. What this does is ensure that the im-plications are not read from clauses which are already pre-supposed (a “pre-supposition” is a potential presupposition) under the definition of \( f_c \) given in Chapter 5, page 126. 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-plications despite the presence of the pre-suppositional context. Thus, (63) im-plicates (59), but (64) does not im-plicate (59).

(63) If John sees me he will regret seeing me.
(64) If John tells Margaret he will regret seeing me.

The Gricean argument for the im-plications 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 entail-

ment or a presupposition. 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:

(65) Since John was there, we can assume that Mary was too.
(66) If John was there, we can assume that Mary was too.
(67) We know that John was there.
(68) We think that John was there.
(69) John was there and Mary was absent.
(70) John was there or Mary was absent.

Functions \( f_c \) and \( f_s \) typically give us several im-plications, even from quite simple sentences. Thus (71) im-plicates (72) in virtue of (IV) and implicates (73) and (74) by virtue of (V).

(71) John believes Margaret to be unfaithful.
(72) K\neg(John knows Margaret to be unfaithful).
(73) P(Margaret is unfaithful).
(74) P\neg(Margaret is unfaithful).

The class of verbs that give rise to im-plications like (73) and (74) approximates to those called “plugs” in Karttunen (1973a). 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 in Chapter 6 to have some explanatory consequences for Karttunen’s own examples. This type of im-plication was first noted by Sacks (1968), who gives the following example (which I have abbreviated) from a newspaper report (New York Times 11 February 1967).

(75) 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.

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.'

Biggs (1976:51) makes the mistake of treating this kind of clausal quantity im-plicature as an entailment. Thus, on his analysis, (i) entails (ii) on both "readings" of (i).

(i) Fred still thinks he's married to Oldham's answer to Sophia Loren.
(ii) The speaker of (i) believes that Fred is not married to Oldham's answer to Sophia Loren.

But this is clearly incorrect in the light of the acceptability of sentences like (iii) and (iv).

(iii) Fred and me still think he's married to Oldham's answer to Sophia Loren.
(iv) Fred still thinks he's married to Oldham's answer to Sophia Loren and I think so too.

Under (V) we have that (i) merely im-plicates that it is compatible with all the speaker knows that Fred is not married to Oldham's answer to Sophia Loren. This im-plicature gets cancelled in (iii) and (iv)—see Chapter 6 for an explanation.

What is the logical form of English sentences containing words like not, and, or, and if? Are such words truth-functionally definable? How? Which truth-functions are found in natural language? Why? What are the pragmatic properties of the words that correspond to such functions? The purpose of this chapter is to provide answers, albeit partial ones, to these questions. The focus will be on those functionals that have most bearing on the theories of implicature and presupposition espoused in this book. Accordingly we discuss in turn below NEGATION, TRUTH-FUNCTIONAL CONNECTIVES, and CONDITIONALS.

Negation

Is Natural Language Negation a Logical Operator?

Cohen (1971) argues, against Grice (1967), that natural language negation cannot be identified with the truth-functional ~. He notes dialects of English where double negation occurs merely as an emphatic variant of single negation, thus in such a dialect (1) would have the same truth conditions as (2).

1 Polish notation is used extensively throughout this chapter because it is the only logical notation which provides names for all the truth-functional operators and two-place connectives.