Abstract and Keywords

The logical constants are technical terms, invented and precisely defined by logicians for the purpose of producing rigorous formal proofs. Mathematics virtually exhausts the domain of deductive reasoning of any complexity, and it is there that the benefits of this refined form of language are felt. Pragmatic issues may arise — issues concerning the point of making a certain statement — for there will be more or less perspicuous and illuminating ways of presenting proofs in this language, and we may be puzzled or misled when we wonder why the mathematician is taking some particular step. But this is hardly a compulsory topic in the philosophy of language.

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FROM one point of view, this seems something of a non-subject: the logical constants are technical terms, invented and precisely defined by logicians for the purpose of producing rigorous formal proofs. Mathematics virtually exhausts the domain of deductive reasoning of any complexity, and it is there that the benefits of this refined form of language are felt. Pragmatic issues may arise—issues concerning the point of making a certain statement—for there will be more or less perspicuous and illuminating ways of presenting proofs in this language, and we may be puzzled or misled when we wonder why the mathematician is taking some particular step. But this is hardly a compulsory topic in the philosophy of language. From this perspective, it looks as if I am about to fill a welcome gap in the literature.

From another point of view, the 'logical forms' identified in formal logic have much to teach us about the semantic structure of natural languages, and hence about the language-user's ability readily to produce and to understand new sentences. The logical constants are crucial elements in logical form. The question arises whether or how well, on the logician's account of their meanings, they match their nearest ordinary-language equivalents—words such as 'and', 'or', 'not', 'if', 'all', and 'some'. Paul Grice famously argued that they do match: apparent discrepancies are not indicative of differences in meaning, but are to be explained, pragmatically, in (p. 769) terms of rational principles

governing conversation. They would arise, and would be explicable, even for speakers of 'logician's English', who, by stipulation, use the words with the logician's meanings.

Although he did not use the term 'pragmatics', Grice breathed new life into this subject, and changed the way we think of it. Traditionally, semantics concerns the meanings of words and sentences, pragmatics concerns people's use of words and sentences. But this is hardly a perspicuous distinction, if it is a distinction at all: words mean what people use them to mean; and, it would seem, if I want to communicate that p, I shall do so by using a string of words which means that p. What Grice showed is that when one says something, one inevitably communicates more than is attributable to the meanings of the words one uses, for the hearer properly makes inferences not just from the content of what you said, but from the fact that you said it. For instance, there are a great many people of whom it could be truly said that they haven't been to prison yet, but if I make that remark about someone, you are likely to infer that he is a shady character, and there was some likelihood that he would have been to prison by now, otherwise it is inexplicable why I should make the remark. Thus, the heart of pragmatics is what gets communicated *beyond* what one's words literally mean; and there is a subject here, however explicit our words.

Controversy remains surrounding the semantics-pragmatics distinction. Consider words whose reference depends on the context in which they are used, like 'I', 'she', 'that man' and 'yesterday'. Is the business of establishing their reference on a particular occasion a matter of semantics or pragmatics? On the older conception, it is pragmatics. If this is so, semantics alone does not yield a truth-evaluable content, in the presence of such words. On the Grice-inspired conception, it is semantics: the meanings of these words determine, in a context, or at least serve as a guide to their reference, on which the truth or falsity of the sentence in which they occur turns. Their meanings can be represented as a function from contexts to denotations. Pragmatics comes in after a truth-evaluable thought has been expressed. This issue might be dismissed as terminological, but it hinges on views about where the theoretically important line is to be drawn. On the Grice-inspired view, reference-fixing is part of semantics because semantics delivers the proposition expressed by one's words, a proposition which concerns the objects the singular terms refer to. On opposing views, semantics rarely delivers propositions: the meanings of the words uttered, together with syntax, even together with assignments of references to pronouns and the like, underdetermine the proposition expressed, and pragmatics is involved; so nothing is gained by insisting that reference-fixing is semantics. At its most general, the issue here is how much of our ability to communicate rests on specifically linguistic knowledge, and how large a role is played by background knowledge, common sense and inference to the best explanation, all of which play a role in the pragmatics of communication.

(p. 770) 30.1 Logical Form and the Logical Constants

Here is a relatively modest conception of logical form. Formal logic is the study of patterns of valid argument. It discerns a common structure or form in arguments with different subject matter, and pronounces on whether any argument of that form is valid. For example, from 'Either John or Mary will chair the meeting' and 'John will not chair the meeting' we may deduce that Mary will chair the meeting; and from 'Sue caught either the four o'clock train or the five o'clock train' and 'Sue did not catch the four o'clock train' we may deduce that she caught the five o'clock train. Despite the different subject matter, each exemplifies a common pattern of argument: either A or B; not A; from which we may deduce that B. (Note that we play around a little with the structure of the original sentences to discern their 'logical form', so that 'or' comes between whole sentences and 'not' precedes a whole sentence: we construe the first sentence as equivalent to 'Either John will chair the meeting or Mary will chair the meeting', the second as 'It is not the case that John will chair the meeting', etc.)

Of course we do not abstract entirely from the content of the sentences in the original arguments: the form still contains the words, common to both arguments, 'either … or' and 'not'. These are examples of logical constants: constants because we keep their meaning fixed, when abstracting away from the rest of the content to exhibit the form of an argument; logical because these words are the crucial words on which the validity of many arguments hinge.

Logical constants are therefore correlative to the notion of logical form. From this modest perspective, there is no need to think that there is a unique, absolute logical form of a sentence. We may wish to isolate different patterns of valid argument for different purposes. (Not all valid arguments are formally valid: 'It's round; so it isn't square' is a valid argument.) Hence there is no definitive list of logical constants. But there is a standard list, due to the fact that we have a standard logic, largely due to Gottlob Frege (1879), and vastly more powerful than any previous system of logic.

First there are the sentence connectives, or sentential operators: expressions which, when applied to a declarative sentence or to two such sentences, yield another, more complex sentence. Given two sentences A and B (e.g. 'Ann is in Paris' and 'Bob is in Paris), we can form the sentences 'A and B', 'A or B' and 'If A, B'. And given the sentence A we can form the sentence 'It is not the case that A.' We shall abbreviate these '$A\&B$', '$A \vee B$' '$A \supset B$' and '$\neg A$'. The meanings of the sentence-connectives, as they are used in standard logic, are usually displayed in truth tables, which show how these words generate a sentence with certain truth conditions, given the truth conditions of the sentences to which they apply: (p. 771) There are four possible combinations of truth-values for the two sentences, displayed on the left. The columns on the right tell us that $\neg A$ is true if A is false, false if A is true; '$A\&B$' is true if A and B are both true, otherwise it is false; '$A \vee B$' is false if A and B are both false, otherwise it is true; '$A \supset B$' is false if A is true and B is false; oth-

erwise (so standard logic tells us) it is true. If understanding a sentence is knowing the conditions under which it is true, the above table shows how an understanding of the complex sentence is derived from an understanding of the component sentences, and the particular logical constant with which it is constructed.

A	B	¬A	A&B	A∨B	A⊃B
T	T	F	T	T	T
T	F	F	F	T	F
F	T	T	F	T	T
F	F	T	F	F	T

Then there are the quantifiers, 'all' and 'some' (and equivalent expressions). Here, for good reason, Frege departed further from the syntax of natural languages. Take a sentence which contains one or more occurrences of a particular singular term, say 'Tom': 'Tom is tired'; 'Tom is tired and hungry (i.e. Tom is tired and Tom is hungry)', 'If Tom has been travelling all day, he (Tom) is tired and hungry.' Remove the singular term, 'Tom', marking the places from which it has been removed by 'x', and you have a one-place predicate: 'x is tired', 'x is tired and x is hungry', 'If x has been travelling all day then x is tired and x is hungry.' We can now express the thought that somebody satisfies the predicate, or everybody satisfies the predicate: $(\exists x)(x$ is tired$)$, $(\exists x)(x$ is tired $\& x$ is hungry$)$; $(\forall x)(x$ has been travelling all day $\supset x$ is tired and x is hungry$)$. (I assume for simplicity that the quantifiers range over people.) This syntactic machinery pays dividends when we consider sentences containing more than one quantifier. 'Everybody loves somebody', on its most natural reading, is formed by applying the universal quantifier to the one-place predicate $(\exists y)(x$ loves $y)$, (x being the space from which a singular term has been removed), to form $(\forall x)(\exists y)(x$ loves $y)$. 'Somebody is loved by everybody', on its most natural reading, is formed by applying the existential quantifier to the one-place predicate $(\forall y)(y$ loves $x)$, to form $(\exists x)(\forall y)(y$ loves $x)$. The syntax makes clear how the sentence is built from its parts, and enables us to employ simple rules governing the role of quantifiers in inferences.

Of course, there are very many other words or phrases which, when applied to a sentence, or two sentences, yield a sentence: it is possible that, probable that, surprising that, relevant that, known that A; A because B, A before B, A despite B, ... There are many other quantifiers, including 'most', 'many' 'few'. Some of these occur in interesting patterns of argument. For examples, from 'Most Fs are G' and 'All Gs are H' it follows that most Fs are H; but from 'All Fs are G' and 'Most Gs are H' it does not follow that most Fs are H. Counterexample: all kiwis are birds; most birds fly; therefore most kiwis fly. From 'It is possible that $A\&B$' it follows that it is possible that A, and it is possible that B; but from 'It is possible that A' and 'It is possible that B' it does not follow that it is possible that $A\&B$. Counterexample: exercise.

(p. 772)

The focus of standard logic is partly explained by the overriding purpose of its founders: that of providing a system of logic adequate for mathematical reasoning. The treatment of the quantifiers, making multiple generality perspicuous, was the great advance. Mathematics does not need to make modal, temporal or causal distinctions, nor does it have much use for quantifiers such as 'most', 'many' and 'few'. Thus, for more general purposes, we may wish to extend standard logic in a number of directions. In modal logic we add the logical constants 'It is possible that' and 'It is necessary that', symbolized ◇ and □. Their meanings cannot be given on the model of the truth table, for the truth-value of 'A' does not always determine the truth-value of '◇A' or '□A'. Saul Kripke (1963) showed how to provide a semantics for modal logic, by invoking a set of possible worlds, and interpreting sentences as true (or false) at a world w. Cutting a long story short, '□A' is true at w

iff *A* is true at all worlds, and '◇*A*' is true at w iff *A* is true at some world. Thus we have the beginnings of intensional logic, as opposed to Frege's extensional logic.[1]

As mentioned above, there is a more ambitious project based on the idea of logical form: it is taken as the model for the semantic structure of natural language. The 'deep structure' does not match perfectly the superficial grammatical structure of our sentences, but it is nevertheless the key to our ability to produce and to understand sentences we have never heard before. There are two variants of this project. One, associated with Donald Davidson (1967, 1973), departs as little as possible from the resources of standard logic, and in any case is committed to keeping the modes of combination extensional. The other takes modal logic as its model: the proposition expressed by a sentence may be thought of as a function from possible worlds to truth-values, determined by possible-world-relative interpretations of the parts of the sentence. This approach is associated with Richard Montague (1974); David Lewis (1970); Robert Stalnaker (1999); David Kaplan (1989); and Saul Kripke (1980), among others. One of the best-known applications of the latter approach is to the semantics of conditionals.

A symptom of the difference between the logician's and the semanticist's interest in logical form is one's attitude to the fact that some logical constants are definable in terms of others. In setting up a system of deductive reasoning, a premium is attached to reducing the number of primitive logical constants. Frege had ⊃, ¬ and ∀ as primitive, with '*A&B*' and '*A* ∨ *B*' defined as short for '¬(*A* ⊃ ¬*B*) and '¬*A* ⊃ *B*' respectively, and '(∃*x*)φ*x*' as short for '¬(∀*x*)¬φ*x*'. Alternatively, '*A* ∨ *B*' and '*A* ⊃ *B*' can be defined as '¬(¬*A&*¬*B*)' and '¬(*A&*¬*B*)' respectively; or '*A&B*' and '*A* ⊃ *B*' can be defined as '¬(¬*A* ∨ ¬*B*)' and '¬*A* ∨ *B*' respectively. Indeed one can go further and reduce all four sentence-connectives to a single connective, 'neither *A* nor *B*', or alternatively to 'not both *A* and *B*'. Write the former '*A* |*B*'. '¬*A*' becomes '*A*|*A*'. '*A* or *B*' becomes 'Not: neither *A* nor *B*', i.e. (*A*|*B*)|(*A*|*B*). The discovery of this reduction excited Russell, who, in the preface to the second edition of *Principia Mathematica*, calls it 'the most definite improvement resulting (p. 773) from work in mathematical logic in the past fourteen years' (1927, p. xiii); and also inspired Wittgenstein in the *Tractatus* (§5.5ff). But (Wittgenstein notwithstanding) the reductions are of no interest from the point of view of semantic structure, for they make sentences in the primitive vocabulary barely decipherable by ordinary mortals. There is no case for saying that the thought '*A* or *B*' really has the form 'Not: not *A* & not *B*', or the thought '*A* and *B*' really has the form 'It's not the case that if *A*, not *B*', etc.; and there is plenty of case for not saying that the 'Stroke' gives the real structure of our thoughts and utterances of conjunctions, disjunctions, negations and conditionals.

30.2 Discrepancies

The founders of modern logic were ready to admit that they were departing from ordinary language, in the kinds of linguistic structure they proposed for employment in deductive reasoning, often appealing, by way of analogy, to the need for specialized, technical terms in science. Thus Frege:

> In determining the sense of scientific expressions we cannot undertake to concur exactly with the usage of ordinary life; this, indeed, is unsuited to scientific purposes, where we feel the need for more precise definition. (1923, in Frege, 1977: 64)

and

> Just here I see the greatest difficulty for philosophy: the instrument it finds available for its work, namely ordinary language, is little suited to the purpose, for its formation was governed by requirements wholly different from those of philosophy. So also logic is first of all obliged to fashion a usable instrument from those already to hand. And for this purpose it initially finds but little in the way of usable instruments available. (*Ibid.*: 69)

And Russell:

> Any attempt to be precise and accurate requires modification of common speech both as regards vocabulary and as regards syntax. … In philosophy it is syntax, even more than vocabulary, that needs to be corrected. (1959: 242)

And Tarski (1944: 122) speaks of 'the hope that languages with specified structure could finally replace everyday language in scientific discourse'.

And yet, it is impossible to read 'On Denoting' or 'On Sense and Reference' without taking Russell and Frege to be providing insights into the workings of natural language. Very well, they were idealizing, but in such a way that was meant to throw light on how natural language, at its best, at least approximately, functions. Frege's essay cited above begins

> It is astonishing what language can do. With a few syllables it can express an incalculable number of thoughts, so that even a thought grasped by a terrestrial being for the very first time can be put into words which will be understood by someone to whom the thought is entirely new. This would be impossible were we not able to distinguish parts in the thought (p. 774) corresponding to parts in the sentence, so that the structure of the sentence serves as an image of the structure of the thought. (*Ibid.*: 56)

Value judgements aside, P. F. Strawson, in *Introduction to Logical Theory* (1952), agrees about the discrepancies:

> The fact is that in ordinary speech and writing, clauses and sentences do not contribute to the truth conditions of things said … in any such simple way as that pictured by the truth tables, … but in far more subtle, various and complex ways. But it is precisely the simplicity of the way in which, by the definition of a truth-function, clauses joined by these connectives contribute to the truth-conditions of sentences resulting from the junctions, which makes possible the stylized, mechanical neatness of the logical system. It will not do to reproach the logician for his divorce from linguistic realities, any more than it will do to reproach the abstract

painter for not being a representational artist; but one may justly reproach him if he *claims* to be a representational artist. (*Ibid.*: 81)

About conjunctions, Strawson claimed that

'They got married and had a child' or 'He set to work and found a job' are by no means logically equivalent to 'They had a child and got married' or 'He found a job and set to work' (80)

and comments

We do not string together at random any assertions we consider true; we bring them together, in spoken or written sentences or paragraphs, only when there is some further reason for the *rapprochement*, e.g. when they record successive episodes in a single narrative. And that for the sake of which we conjoin may confer upon the sentences embodying the conjunction logical features at variance with the rules for '&'. Thus we have seen that a statement of the form 'p and q' may carry the implication of temporal order incompatible with that carried by the corresponding statement 'q and p'. (81)

On disjunctions, he considers 'Either we catch this bus or we shall have to walk all the way home' and says

Obviously, we should not regard our catching the bus as a sufficient condition for the truth of [this] statement; if it turns out that the bus we caught was not the last one, we should say that the man who had made the statement had been wrong. The truth of one of the alternates is no more a sufficient condition of the truth of the alternative statement than the falsity of the antecedent is a sufficient condition for the truth of the hypothetical statement. (90)

And on conditionals he says

The standard or primary use of an 'if … then …' statement [is] where, not knowing whether some statement which could be made by the use of a sentence corresponding in a certain way to the first clause of the hypothetical is true or not, or believing it to be false, we nevertheless consider that a step in reasoning from that statement to a statement related in a similar manner to the second clause would be a sound or reasonable step. (83)

(p. 775) 30.3 Conversational Implicature

In his William James Lectures, delivered at Harvard in 1967, entitled 'Logic and Conversation', Grice argued that phenomena such as those adduced by Strawson do not demonstrate a difference in meaning between the natural-language words and the logical symbols. They can be pragmatically explained, in terms of something's being a reasonable thing to say: 'I wish … to maintain that the common assumption of the contestants [the

'formalists' and 'informalists'] … is a … mistake, and that the mistake arises from inadequate attention to the nature and importance of the conditions governing conversation' (1989: 24).

Grice had two targets in his lectures. One was the prevalent habit, in the ordinary-language philosophy of the recent past, of asking 'Would one *say* such-and-such, in such-and-such circumstances?', and drawing consequences about the nature of the concepts involved. He cites a catalogue of examples. The fact that one wouldn't *say* 'It looks red to me', when looking under normal conditions at a clearly red object, does not show that the 'looks' statement isn't true in these circumstances. The use of this non-committal form of words, rather than simply saying 'It's red', is to be expected only if there is some reason to doubt the stronger statement. But that is to be explained in terms of the propriety of a conversational remark, not in terms of a peculiarly limited applicability of the 'looks' vocabulary. A similar point is made about Ryle's claim that 'in their ordinary employment "voluntary" and "involuntary" are used … as adjectives applying to actions which ought not to be done'. Outside this context, we must beware of 'an unwitting extension of the ordinary use of "voluntary" and "involuntary" on the part of philosophers' (1949: 69).

Speaking is a rational activity, and one needs reasons for saying something, beyond taking it to be true. Hearers make inferences not just from the content of what is said, but from the fact that you said it. And if you violate the principles governing conversation, you can mislead your audience without saying anything false. Grice invented the term 'implicature'[2] for what is 'implicated' by the fact that you say something, beyond the content of what is said. The kind of implicature with which he is primarily concerned he calls 'conversational implicature' (which he distinguishes from 'conventional implicature' carried by certain words like 'but', 'moreover', 'nevertheless'). He lists a number of maxims of conversational practice, classified under the categories, Quantity, Quality, Relation and Manner:

Quantity: (1) Make your contribution as informative as is required (for the current purposes of the exchange). (2) Do not make your contribution more informative than is required.

Quality: Try to make your contribution one that is true, i.e. (1) do not say what you believe to be false; (2) do not say that for which you lack adequate evidence.

(p. 776)

Relation: Be relevant.

Manner: Be perspicuous. (1) Avoid obscurity of expression. (2) Avoid ambiguity. (3) Be brief (avoid unnecessary prolixity). (4) Be orderly.

It is presumably 'Be orderly' which is meant to explain the perceived difference between 'She got married and had a baby' and 'She had a baby and got married' which, if Grice is right, must share a truth-value, though they carry different implicatures. But the maxim that does most explanatory work, in both the philosophical examples and the case of the

logical constants, is the first Maxim of Quantity: make your contribution as informative as is required. Violation of this maxim is misleading. I am asked how many people attended my lecture. I say 'Less than a hundred'. Three people attended. I (knowingly) spoke truly, but left you with the wrong impression, as you assume I gave as good an estimate as I could. The same applies if I say 'I just saw part of the butler's body in the cellar' when I saw the butler going about his everyday business there. Closer to our topic, I am asked where John is. I know he is in the pub, and I know that he never goes near libraries. I say 'He is either in the pub or the library.' I speak truly but mislead you into thinking that this is all the information I have. And an example of a negated conjunction (Lewis, 1976: 143): 'You won't eat those and live', I say of some wholesome and delicious mushrooms, knowing that you will now leave them alone, deferring to my expertise. You don't eat them, so what I said was true (as I had good reason to believe it would be), but I misled you.

How is one to decide whether something is a conversational implicature rather than part of the content of what is said? A feature of conversational implicature is that it is cancellable, either explicitly: 'They went to France and Spain; I don't mean to imply that they went in that order', or contextually: 'I did my BA in London and my A-levels in Manchester.'[3] If the temporal order were part of the meaning of the conjunction, it would not be cancellable: to say 'They went to France and then to Spain; I don't mean to imply that they did so in that order' is as incoherent as 'My car is red; I don't mean to imply that it is coloured.' With disjunctions, it is normally a violation of the Maxim of Quantity to assert a disjunction when you are in a position to assert one of the disjuncts, but in special circumstances one may say 'The prize is in either the garden or the attic. I'm not going to tell you which.'

Against the claim that the constants sometimes have their truth-functional sense, and sometimes a stronger sense, Grice states his Modified Occam's Razor: senses are not to be multiplied beyond necessity. This also implies that senses are to be kept weak rather than strong, thin rather than thick, for thick senses would not apply to all cases. The fact that we typically assert a disjunction on grounds which do not license the assertion of either disjunct is adequately accounted for by its truth-functional sense together with general principles governing conversation, and this explanation is to be preferred to postulation of further senses of 'or'.

(p. 777)

What are we to make of Strawson's claim, concerning 'Either we catch this bus or we shall have to walk all the way home', that 'obviously', we should not regard our catching the bus as sufficient condition for its truth, and 'if it turns out that the bus we caught was not the last one, we should say that the man who had made the statement had been wrong'? This last remark is rather rash: he has identified the most obvious reason for making this statement, but by no means the only one. Perhaps we are likely to meet someone we wish to avoid if we take a later bus. Perhaps we are on a strict exercise regime: if we catch this bus, we'll make it to the gym, but if we don't, walking home is the only way of fulfilling the requirements. Perhaps we were given money for the bus in order to be

home in time for dinner, and if we miss this bus, we shall be too late for dinner, and shall be obliged to return the money. Naturally, one is expected to have some reason for what one says, but people can have different reasons for the same thing, and the question arises: what are all these reasons *for*? The truth table gives the answer: they are reasons for the claim that one or the other of the disjuncts is true.

Also, one can be right by luck, or wrong by bad luck. My reasons may be quite spurious for saying that John is either in Oxford or in London, but if it turns out by some fluke that he is in Oxford, I was right.

Grice cites further evidence of the truth-functional meaning of 'or': 'It is not the case that either *A* or *B*' seems just to say that neither *A* nor *B*; and 'to say "Suppose that *A* or *B*" seems to be to invite someone to suppose merely that one of the two disjuncts is true' (1989: 45–6).[4] Thus he commits himself to the view that when a compound sentence is embedded in a longer sentence—for instance, when it is negated, or occurs as one disjunct of a disjunction or as the antecedent of a conditional—it is only its truth-functional meaning which contributes to the meaning of the longer sentence. This commitment is central to the defence of the truth-functional account: the point of the truth table for '&' (say) is not only to give the truth conditions of conjunctions standing alone, but also to show how conjunctions contribute to the meaning of longer sentences. This commitment has been the source of much criticism, as we shall see in Section 30.5

Grice devotes most attention to the case of the indicative conditional. According to the logic books, 'If *A*, *B*' is equivalent to 'Either not *A*, or *B*', so defence of the truth-functional conditional follows the same lines as the defence of truth-functional disjunction: it would be a violation of principles governing conversation, and hence misleading, to assert 'If *A*, *B*' knowing just that ¬*A*, or just that *B*; for in these circumstances one could make the briefer, more informative statement: ¬*A*; or alternatively *B*. Just as it would be misleading but true to say 'He's either in the pub or the library' knowing that he is in the pub and never goes near libraries, so for 'If he's not in the pub he's in the library', in the same circumstances. Similarly if I say 'You won't eat those and live', knowing that you won't eat them, and knowing that they are wholesome, I mislead but do not lie, and the same goes for 'If you eat those you will die', or (p. 778) better, 'If you eat those, they will kill you.' Provided you don't eat them—and I have reason to think you won't—what I said was true, but misleading.

Grice argues for the cancellability of the implicature as follows. I say 'I know just where Smith is and what he is doing, but all I will tell you is that if he is in the library he is working.' No one would be surprised, he says, if it turned out that my basis for saying this was that I had just looked in the library and found him working. But that is the relatively easy case: many non-truth-functionalists will agree with the top two lines of the truth table, i.e. agree that a conditional is true if its antecedent and consequent are true. If it turned out that I had just seen Smith on the football pitch, and moreover I know that he visits libraries only to read newspapers, not many would agree that my conditional remark was true.

Grice is aware of this difficulty, and points to a disanalogy between disjunctions and conditionals. *Pace* Strawson, it is natural to see a disjunction as confirmed—verified, established—by the discovery that one of its disjuncts is true. Yet no one takes the discovery that the antecedent is false as establishing that a conditional is true (1989: 63). No one would take the fact that you don't eat the mushrooms as establishing the truth of my remark 'If you eat them they will kill you.' This is more than a difficulty: it looks like a direct refutation of the claim that our use of conditionals conforms to the truth function.

He points out another 'serious difficulty' (1989: 80): 'It is not the case that if *A*, *B*' does not seem to mean the same as the negation of the truth-functional conditional, which is equivalent to '$A \& \neg B$'. Of an unseen geometrical figure, I may say 'It's not the case that if it's a pentagon it has six sides.' But I am not willing to say that it is a pentagon and does not have six sides: for all I know, it is not a pentagon (in which case the truth-functional 'Pentagon $\supset$ six sides' is true). Grice goes on to examine various ways the assertion of the negation of a conditional might be interpreted: the assertion of a contrary conditional; the denial that the conditional is assertible. This is all very well, but it is hard to square with the thesis being advanced: that the truth functions are correct accounts of the meanings of 'if' and 'it is not the case that'.

30.4 Pragmatics and the Conditional

30.4.1

Missing from Grice's discussion is any very powerful reason why we should think that the truth function gives the meaning of 'if', as opposed to a simplified, near-relative of 'if' the advantage of whose clarity outweighs the oddities it engenders, at least in mathematical reasoning. (He merely offers a highly artificial example of a conventional Bridge bid which is supposed to mean 'If I have a red king, I also have a black king.') There *are* powerful reasons for thinking that 'if' is truth-functional. There are facts about our acceptance of conditionals which (it seems) only the truth-functional account (henceforth TF) can explain. Any rival account of the truth conditions of conditionals gives them stronger truth conditions: it is not enough that (p. 779) the truth function is satisfied; something more is required. Yet, when all I know of relevance is either *A* or *B*, I will readily infer that if not *A*, *B*. Return to the case where I am told 'The prize is either in the garden or the attic; I'm not going to tell you which.' Assuming my informant to be reliable and honest, I head for the garden thinking 'If it's not in the garden, it's in the attic.' Nothing more than the (truth-functional) disjunction is required. It is very hard to see how this can be explained on the hypothesis that conditionals have stronger truth conditions, for then the disjunction does not entail the conditional, so how could knowing just the disjunction be enough to license the conditional?

On the other hand, as we have seen, there are equally compelling reasons for stronger, non-truth-functional truth conditions (henceforth NTF). We may both believe that the Tories won't win, yet disagree about what will happen if they do. Believing that $\neg A$ leaves

one free to reject 'If A, B'. This seems to imply that the conditional may be either true or false when its antecedent is false: something further is required for its truth. Whichever horn of this dilemma one opts for, pragmatics must be appealed to to dispel the attraction of the other.

There is a third alternative, due originally to F. P. Ramsey (1929), and developed by Ernest Adams (1975). Conditionals do not express propositions. A conditional statement does not make a claim about how things are, true or false as the case may be. They are essentially hypothetical judgements. When we make a conditional judgement, we suppose that A, and make a hypothetical judgement about B, under that supposition. Two propositions are involved, but they play different roles—one as the content of a supposition, one as the content of a hypothetical belief or assertion, under the supposition—and they do not combine into a single proposition which is believed or asserted. I have defended this 'suppositional theory' (henceforth Supp) elsewhere (e.g. Edgington 2001, 2003), and will not give a detailed defence here, but it needs some exposition because it plays a role in some of the pragmatic strategies that have been adopted for conditionals.

Uncertain conditional judgements are at the heart of Ramsey's and Adams's work. Our uncertain judgements are assumed, idealizing somewhat, to conform to the rules of probability, and there we find a valuable conditional concept, that of a conditional probability —the probability of B on the supposition that A, written p($B|A$). Supposing that A amounts to setting aside the possibility that $\neg A$, and focusing on the possibilities $A\&B$ and $A\&\neg B$. If you think that $A\&B$ is about ten times more likely than $A\&\neg B$, you think it is about 10 to 1 that B if A.

Uncertain judgements present further problems for TF. Suppose you think it unlikely that A, i.e. likely that $\neg A$. Then, for any B, you must, if consistent, think it likely that at least one of the propositions $\{\neg A, B\}$ is true, i.e. likely that $\neg A \vee B$, i.e. likely that $A \supset B$: TF implies that all conditionals with unlikely antecedents are likely to be true. This is intolerable. We need to be able to distinguish between believable and unbelievable conditionals whose antecedents we judge to be unlikely: 'I don't think I'll need to get in touch, but if I do, I'll need a phone number'; not: 'I don't think I'll need to get in touch, but if I do, I'll manage by telepathy.'

(p. 780)

Supp solves the dilemma with which this section begins. If I know *just* that $A \vee B$ (I don't know which), then, on the supposition that $\neg A$, I must conclude that B. Here Supp agrees with the TF. On the other hand, the fact that I think it likely that $\neg A$, leaves me free to judge $A\&B$ less likely than $A\&\neg B$, and so to reject 'If A, B'. For example, suppose I think it is about 90 per cent likely that Sue won't be offered the job, 9 per cent likely that she will be offered and accept, one per cent likely that she will be offered and decline. The conditional probability that she will decline, on the supposition that she is offered the job, is 10 per cent. Here Supp agrees with NTF, that one may consistently disbelieve A, and disbelieve 'If A, B'. For TF, this is not possible. It is 91 per cent likely that (Either she won't be

offered the job, or she will be offered it and decline). Hence, the probability of (Offered ⊃ Decline) is 91 per cent.

30.4.2

David Lewis (1976) proved that there is no proposition *A*B* the probability of whose truth can be systematically equated with p(*B*|*A*), thus underlining the fact that Supp does not treat conditionals as propositions. While finding Supp attractive, he was not prepared to give up truth conditions for conditionals. He argued that indicative conditionals have truth-functional truth conditions but, for Grice's reasons, are assertible only if the conditional probability of consequent given antecedent is high. He appealed to the Gricean maxim 'assert the stronger rather than the weaker (when you have sufficient grounds for the stronger, and when the stronger is relevant)'. We then get some algebra—not totally impenetrable qua algebra, but somewhat obscure why it is the right bit of algebra for the purpose—to show that we must subtract a factor which involves p(¬*A*) from p(*A* ⊃ *B*) to get a measure of the assertibility of 'If *A*, *B*'—lo and behold, p(*B* | *A*) (*Ibid.* 142–3).

However, there is no way of using Gricean considerations to show that conditionals are assertible when one has a high probability for *B* given *A*. Indeed, Gricean considerations show that thesis to be false. Supp is primarily a theory of conditional belief, not of assertibility; and Gricean principles show that not everything you are in a position to believe is a reasonable thing to say. Consider this case: you believe *A* and *B*. Then it will usually be misleading for you to say 'If *A*, *B*', for this is weaker than what you are in a position to say. For instance, you are asked who is coming to the party. You know that Ann is coming, and you know that Bob is coming, and you also know that there is no relevant connection between these two facts. It is misleading to say 'Bob is coming if Ann is.' But a high p(*A*&*B*) guarantees a high p(*B*|*A*). Here the suppositional part is, as it were, idle: suppose that Ann is coming (I already know she is); under that supposition, is Bob coming? Yes. This is an acceptable but boring conditional belief, on a par with the belief that Ann or Bob is coming when I know that they are both coming, but not a reasonable thing to say.

Another case: I believe that the match will be cancelled, because all the players are ill. I believe that whether or not it rains, the match will be cancelled: if it rains, the (p. 781) match will be cancelled, and if it doesn't rain, the match will be cancelled. But I would mislead, for Gricean reasons, by saying, if asked whether the match will be played, 'If it rains, the match will be cancelled.'[5]

Grice identified a real phenomenon. I don't think he succeeds in his defence of TF, but everyone's theory of conditionals or of anything else must allow that there are cases where one has grounds for believing something which, in a normal conversational context, would not be a reasonable remark to make.

30.4.3

Frank Jackson (1979, 1980–1, 1987) argues in a different way that the truth-functional truth conditions are correct, but 'If A, B' is assertible when p($B|A$) is high.[6] But have we not, a couple of paragraphs back, refuted that thesis? No, because Jackson means something different by 'assertible'. He uses a different spelling: 'assertable' for the notion which is sensitive to Gricean considerations about what is a reasonable thing to say in conversation, 'assertible' for his notion, which abstracts from these considerations. Something is assertible, for Jackson, if (a) the speaker gives it a high probability of truth and (b) the speaker is not violating any rules concerning terms carrying conventional implicatures. 'If', he claims, carries a conventional implicature, as do words like 'but', 'even', 'nevertheless'. These words do not contribute to the truth-conditional content of what is said. Their role is to aid the transfer of information from speaker to hearer. They do not change the content of what is being transferred.

What then is the conventional implicature associated with 'if'? In saying 'If A, B', the speaker not only communicates her belief that $A \supset B$, i.e. $\neg A \vee B$, but also signals that this belief is 'robust' with respect to the antecedent A. In his earliest writings, this means that the speaker signals that she would not give up her belief in ($A \supset B$) were she to learn that A (call this robustness$_1$). Therefore, she doesn't believe ($A \supset B$) just because she believes that $\neg A$; for if that were the case, and she learned that A, she would change her mind about the conditional. Robustness makes asserted conditionals fit to be used in inferring by modus ponens, for they survive the learning of A, hence enabling the inference to B.

He claimed that this is equivalent to having a high degree of belief in $A \supset B$ given A, i.e. that it obtains when p(($A \supset B)|A$) is high, i.e. p(($\neg A \vee B)|A$) is high, i.e. p($B|A$) is high (call this robustness$_2$).

Unfortunately, as Jackson soon learned, these two characterizations of robustness are not equivalent. The most famous kind of counterexample to the alleged equivalence is due to Richmond Thomason, reported by Bas van Fraassen (1980: 503). There are many things we are likely never to know; consequently, there are many things I'm prepared to assert of the form 'If A, I'll never find out (or, no one will ever (p. 782) know).' For example, if there was a chaffinch on this lawn a hundred years ago today, I'll never find out (or no one will ever know). I have a high probability for the consequent on the assumption of the antecedent. But were I, surprisingly, to learn that the antecedent is true (say, by coming across a bird-watcher's diary that inspires total confidence), I would not come to believe that I will never find out that it is true! On the contrary, I will reject my previous conditional belief.[7]

So Jackson's official account of conditionals uses robustness$_2$: a conditional is true iff ($A \supset B$) and assertible iff, in addition, p(($A \supset B|A$), i.e. p($B|A$) is high.

My main complaint against Grice's defence of TF is this: Grice laudably showed that reasons for believing something are insufficient reasons for saying it. But in the case of conditionals, in a large class of cases, people don't believe them, indeed, disbelieve them, al-

though the truth-functional truth condition is satisfied. On the face of it, the same objection applies to Jackson: he is committed to the view that 'If *A*, *B*' is probably true whenever *A* is probably false. So someone who thinks it unlikely that the Tories will win, must think it likely to be true that if they win they will nationalize the car industry. But that is not the way we think. If you and I agree that the Tories won't win, that leaves us free to disagree about what will happen if they do win. And this is a non-optional, important part of our mental life.

Jackson is well aware of this objection (1980–1: 132–3; 1987: 39–40). Here another strand in his thinking emerges. It is an error theory (or once he has freed us from error, a 'convenient fiction' theory). We speak and think as if there were a proposition $A * B$ such that $p(A * B) = p(B|A)$. But Lewis and others have proved that there is not.

I find this hard to square with the official theory. Return to the example of Sue, of whom we think that it is 90 per cent likely that she will not be offered the job, 9 per cent likely that she will be offered and accept, one per cent likely that she will be offered and decline. According to Jackson's official theory we think it's 91 per cent likely to be true that if she is offered the job she will decline; but this is not assertible, in the sense in which 'Even Gödel understood first-order logic' is not assertible. According to the error theory, we think it is 10 per cent likely to be true that if she is offered she will decline, but this is an illusion (or a pretence). The theories seem to say incompatible things about how likely we think it is that a conditional is true.

The charge of incompatibility could be avoided if it is maintained that what we are really up to when we assert conditionals is deeply hidden from consciousness. Admittedly, controversy amongst philosophers shows that the correct account of these matters is not manifestly obvious. Still, a theory which maintains that competent, intelligent folk systematically and incorrigibly make wrong judgements in a large class of cases, is hard to swallow. It also makes the official theory wonderfully immune to counterexamples. It's no good objecting that no one who thinks that the Republicans won't win thinks 'If the Republicans win, they will double income tax' (p. 783) is probably true, albeit unassertible: of course not, says Jackson, they are under the illusion that it is probably false.

The error theory comes into its own in Jackson's discussion of the validity of inferences: 'I am committed to gross misperceptions of validity in the case of inferences involving indicative conditionals' (1987: 48). Conventional implicatures, he claims, get in the way of our perception of validity. We confuse truth-preservation with assertibility preservation. Once more, the theory is immune to counterexamples in the form of arguments we take to be invalid which are valid on the truth-functional reading of 'if'.

Jackson must hold that we *should* judge 'If the Republicans win, they will double income tax' to be probably true, albeit unassertible, when it is improbable that they will win. But it is quite unclear why we should—would we better off if we judged all conditionals with improbable antecedents to be probably true? The error theory involves less error than the official theory: it gives the right answer to how likely we think it is that Sue will decline if she is offered the job, rather than describing this as a proposition which is 91 per cent

probable but 10 per cent assertible. If there is an error, it is a harmless one of too liberal a use of the words 'true' and 'false', to which it would be pedantic to object. And a little rephrasing or re-punctuation eliminates the error: 'you mean that it's likely to be false that she will decline, on the assumption that she is offered the job?'

30.4.4

Let us now turn to Stalnaker's influential NTF theory. Stalnaker (1968) was the first to offer a possible-worlds semantics for conditionals, and it was motivated by Ramsey's thought that we assess conditionals by supposing the antecedent—adding it hypothetically to our stock of knowledge—and assessing the consequent under that supposition:

> Now that we have found an answer to the question 'How do we decide whether or not to believe a conditional statement?' [Ramsey's answer] the problem is to make the transition from belief conditions to truth conditions. … The concept of a *possible world* is just what we need to make the transition, since a possible world is the analogue of a stock of hypothetical beliefs. The following is a first approximation to the account I shall propose: Consider a possible world in which A is true and otherwise differs minimally from the actual world. 'If A, then B' is true (false) just in case B is true (false) in that possible world. (1968: 33–4)

Stalnaker treats both indicative and subjunctive conditionals along these lines:

> 'If A, B' is true at w iff B is true at F(A, w)

where F is a 'selection function' which selects, for any proposition A and any world w, a world w′ which is the 'closest' world to w at which A is true. But there are pragmatic constraints on the selection function—i.e. on which A-worlds count as closest to the actual world or to any other world—which differ for the two kinds of conditionals.

(p. 784)

The pragmatic constraint for indicative conditionals is set in the framework of conversational dynamics. At any stage in a conversation, many things are taken for granted between speaker and hearer, i.e. many possibilities are taken as already ruled out. The remaining possibilities are live. Call the set of worlds which have not been ruled out—the live possibilities—the context set. For indicative conditionals, antecedents are typically live possibilities, and we focus on that case. The pragmatic constraint for indicative conditionals is that when A is compatible with the context set, the closest A-world is a member of the context set; that is, the closest A-world is a member of the set of live possibilities, not already ruled out.

The proposition expressed by 'If A, B' is the set of worlds w such that the closest A-world to w is a B-world. The ordering of worlds depends on the conversational setting. As different possibilities are live in different conversational settings, it is almost inevitable that a different proposition is expressed by 'If A, B' in different conversational settings.

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Let us transpose this to the one-person case: I am talking to myself, i.e. thinking. I suppose that A (which is a live possibility for me). The pragmatic constraint requires that the closest A-world is one compatible with what I take for granted—take myself to know. It is epistemically possible for me. Provided you and I have different bodies of information, the proposition I think when I think 'If A, B' will differ from the one you think when you think something you would express be the same words: the constraints on closeness differ; what counts as 'closest' for me may not be 'closest' for you.

Stalnaker uses this machinery to explain why, although $A \lor B$ does not entail 'If $\neg A$, B', in a context in which we take for granted that $A \lor B$, but don't take for granted that A, 'If $\neg A$, B' is true. There are no $\neg A \& \neg B$-worlds compatible with what we take for granted, but there are some $\neg A$-worlds compatible with what we take for granted. Worlds compatible with what we take for granted, in this context, count as closer than worlds incompatible with what we take for granted. So, in this context, the closest $\neg A$-world must be a B-world.

Start with a context in which we don't take for granted that $A \lor B$, and we are wondering whether, if $\neg A$, B. Here is a list of the possibilities. I write the Stalnaker conditional '$A >
B$'. Lines 3–6 manifest the non-truth-functionality of '$>$': when the antecedent is false, that leaves open whether or not the closest antecedent-world is a B-world.

	$\neg A$	B	$\neg A > B$
1.	T	T	T
2.	T	F	F
3.	F	T	T
4.	F	T	F
5.	F	F	T
6.	F	F	F

Now we learn that $A \lor B$, nothing stronger. That rules out line 2, and nothing else. For TF and for Supp, that is enough to conclude that if $\neg A$, B. But for NTF, it would (p. 785) seem, it is not enough, for there remain the possibilities 4 and 6 in which $\neg A > B$ is false.

Stalnaker avoids this consequence: once line 2 has been eliminated, we are in a new context, our selection function is based on a new closeness-relation between worlds. We have to select a $\neg A$-world which is compatible with what we take for granted, so it is bound to be a B-world, because there are now no $\neg A \& \neg B$-worlds compatible with what we take for granted. We have not discovered to be true the proposition, if $\neg A$, B, that we were previ-

ously uncertain about. There is now a new proposition expressed by the same words, which we know to be true.

This amount of sensitivity to what we take for granted seems to me implausible. One usually distinguishes quite sharply the content of what is said from the epistemic attitude one takes to that content. Someone conjectures that if Ann isn't home, Bob is. We are entirely agnostic about this. Then we discover that at least one them is home (nothing stronger). It seems more natural to say that we have now discovered to be true what we were previously uncertain of (or from Supp's perspective, that we now have a different attitude to the same conditional thought, that B on the supposition that $\neg A$). It does not seem as though the content of our conditional thought has changed.

Also, Stalnaker's argument is restricted to the special case where we take the $\neg A \&\neg B$-possibilities to be ruled out. Consider a case when, starting out agnostic, we become close to certain, but not certain, that $A \vee B$: say we become about 95 per cent certain that $A \vee B$ but are about 50 per cent certain that A. According to Supp, we are entitled to be quite close to certain that if $\neg A$, B: 90 per cent certain, in fact.[8] In this case, no possibilities have been ruled out. There are $\neg A \& \neg B$-worlds as well as $\neg A \& B$-worlds which are permissible candidates for being nearest. The pragmatic constraint is inoperative. Stalnaker has not told us why we should think it likely, in this case, that the nearest $\neg A$-world is a B-world.

Uncertain conditional judgements create difficulties for all propositional theories. It is easy to construct probabilistic counterexamples to TF; and it is easy for the Lewisian variant of Stalnaker's theory that says '$A > B$' is true iff B is true in *all* closest A-worlds. But it is rather harder for Stalnaker's own theory. Here is a putative counterexample.[9] We have no idea how much fuel, if any, there is in the car. Ann is going to drive it along a straight road which is 100 miles long. She will go at constant speed and her car will use fuel at a uniform rate. If the tank is full, she will go exactly 100 miles then stop. If it's empty, she won't start. Otherwise, if her tank is x per cent full she will travel x miles then stop. Bob gives equal credence to the propositions 'She'll stop in the first mile', 'She'll stop in the second mile' and so on.

Now consider the conditionals:

(1) If she stops before half way, she will stop in the 1st mile.
(50) If she stops before half way, she will stop in the 50th mile.

(p. 786) According to Supp, these all get the same probability: each gets 2 per cent. This seems reasonable.
Write Stalnaker's truth condition thus:

'$A > B$' is true iff either $A\&B$, or $\neg A$ & the closest A-world is a B-world.

The following assumption is very plausible: consider a world w in which Ann goes more than half way. A world in which she stops in the 50th mile is more similar to w than a world in which she doesn't stop in the 50th mile is similar to w. After all, it is spatially and temporally more similar,

more similar in terms of the amount of fuel in the tank, more similar in its likely causes and consequences, etc.

There are two ways in which (1) can be true: (a) she stops in the first mile. (1 per cent likely); (b) she doesn't stop before half way, and in the closest world in which she does stop before half-way, she stops in the first mile. By our assumption, (b) is certainly false. So (1) gets one per cent probability.

There are two ways in which (50) can be true: (a) she stops in the 50th mile (1 percent likely); (b) she doesn't stop before half way, and the closest world in which she does stop before half way is one in which she stops in the 50th mile. By our assumption, (b) is true iff she doesn't stop before half way, and so is 50 per cent likely. So (50) gets a probability of 51 per cent.

Thus, Stalnaker's theory appears to give wrong results for uncertain conditional judgements.

30.4.5

Finally a remark about disjunctions in the antecedents of conditionals: 'If either A or B, then C' seems to have two readings. On the first reading, it is equivalent to 'If A, C, and if B, C.' For example, 'If I get Mary or John as a tutor, I'll pass' seems to be equivalent to 'If I get Mary as a tutor, I'll pass; and if I get John as a tutor, I'll pass.' In Supp's terms, this reading goes: suppose that A, or alternatively suppose that B; either way, C. In Stalnaker's terms it is something like 'Select the nearest A-world, or alternatively select the nearest B-world; either way, the world you select is a C-world.

The second reading: make one single supposition, that '$A \lor B$' is true. For instance, there are two candidates in the election, X and Y. I probably won't vote, but if I vote for either of them, X or Y, I'll vote for X. We don't want this remark to entail 'If I vote for Y, I'll vote for X.' Or, someone says she thinks that John is in France or Italy' and I say, 'Well, if he's in France or Italy, he's in Rome: that's the only place in France or Italy he ever goes.' Supposing it's true that he's in France or Italy, he's in Rome. The nearest world in which it's true that he's in France or Italy is one in which he is in Rome. This reading doesn't entail 'If he's in France he's in Rome.'

The first reading seems the commoner, and leads to an apparent problem about the substitution of logically equivalent propositions in antecedents. I'm pretty sure the match is not wet and other conditions conducive to lighting obtain. 'If you strike the match it will light', I say. The antecedent is equivalent to 'You strike it and it's wet, or you strike it and it's not wet.' But 'If you strike and it's wet, or if you strike (p. 787) it and it's not wet, it will light' sounds wrong! On the first reading, we don't really have a disjunctive antecedent at all; you're given the choice of two antecedents from each of which the consequent follows.

On TF, we do have $(A \lor B) \supset C$ equivalent to $(A \supset C)\&(B \supset C)$. So, on TF, 'If you strike it, it will light' is equivalent to 'If you strike it and it's wet, it will light, and if you strike it and it's not wet, it will light.' This is not an advantage: since Adams's and Stalnaker's work, we have appreciated the fact that strengthening of the antecedent is not valid for conditionals: 'If you strike it, it will light' does not commit me to 'If you strike it and it's wet, it will light.' The conditional probability of consequent given antecedent can be high for the first and low for the second. The nearest possible world in which the antecedent is true is one in which the consequent is true for the first, and not the second.

30.5 Radical Pragmatics: Conjunction and Negation

A number of philosophers and linguists now give pragmatics a larger role in communication than that emphasized by Grice: they argue that the meaning of a sentence uttered (even given assignments of references to pronouns and demonstratives) typically underdetermines the proposition expressed.[10] Linguistic knowledge needs to be supplemented by pragmatic inference for any communication to take place. One school of thought of this kind is the Relevance Theory of Dan Sperber and Deirdre Wilson (1986/95). See Relevance Theory—New Directions and Developments. As well as Grice's implicatures, their theory employs the notion of an 'explicature': the proposition actually expressed, which is derived from the linguistic meaning of the sentence uttered, supplemented by pragmatics. A work in this framework which pays attention to some logical constants is Robyn Carston's *Thoughts and Utterances* (2002). Chapters 3 and 4 are on the pragmatics of 'and'-conjunction, and the pragmatics of negation, respectively.

On 'and', Carston agrees with Grice that pairs of sentences such as 'He took off his boots and got into bed' and 'He got into bed and took off his boots' do not differ in linguistic meaning. But that is not to say that utterances of these sentences express the same proposition. The proposition expressed depends on pragmatics as well as linguistic meaning, and typically involves a temporal ordering of the events.

She points out the variety of relations that may be conveyed by conjunctions, other than mere temporal sequence:

> He handed her the scalpel and she made an incision.
> We spent the day in town and I went to Harrods.
> (p. 788)
> She shot him in the head and he died instantly.
> He left her and she took to the bottle.
> He was short-sighted and mistook her for a hatstand.
> She went to the yoga class and found it very calming.
> I forgot to hide the cake and the children ate it.

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Although all these are asymmetric[11], they cannot all be paraphrased with 'and then'. It is extremely implausible that 'and' is multiply ambiguous. Firstly, there is no expectation that lexical ambiguity will carry over to other languages. Secondly, if, in each of these examples, we eliminate 'and' in favour of a full stop between two sentences, the same message will be conveyed; and it can hardly be claimed that the full stop is multiply ambiguous![12] Thirdly, the natural reading is cancellable, if highly artificially: 'She shot him in the head and he died instantly, but not as a result of her shot' is not a contradiction in terms; nor is 'I forgot to hide the cake and the children ate it; but they would have found it and eaten it even if I had hidden it.' And as we have already seen, reversal of the temporal order is permissible when the order of events is presumed to be already known: 'I did my BA in London and my A-levels in Manchester'; 'The plant died and it was Mary who forgot to water it'; and

> A: Did John break the vase?
>
> B: Well, it broke and he dropped it

Like Grice, Carston favours 'minimal univocal semantics with pragmatic enrich- ment', but unlike Grice, she claims that the pragmatic enrichment is needed to generate the explicit content of what is communicated. The main reason for this claim is that the pragmatic enrichment is preserved when the conjunction is embedded in longer sentences. She cites a principle formulated by Recanati (1989: 91)

> A pragmatically determined aspect of meaning is part of [the content of] what is said (and, therefore, not a conversational implicature) if—and perhaps only if—it falls within the scope of logical operators such as negation and conditionals.

Consider

(1) If he took to drink and she left him, it serves him right.
(2) If she left him and he took to drink, he deserves some sympathy.
(3) Either she got married and had a baby, or she had a baby and got married, I don't know which.
(4) It is better to drive home and drink three beers than to drink three beers and drive home. (Wilson, 1975: 151)
(5) She didn't make a lot of money and go to live in Bermuda; she went to live in Bermuda and made a lot of money.

If Grice is right, and '$A\&B$' expresses the same proposition as '$B\&A$' none of the above examples make much sense. I could accept both (1) and (2) despite the fact that their consequents conflict (the consequent of (1) could just as well be 'he deserves no sympathy'). (3) is of the form 'A or A, I don't know which'; (4) says that A is better than A; (5) says 'Not A; A'.[13] Assume for the time being that the thesis of pragmatic enrichment of content is correct. What then is the 'minimal univocal semantics' for 'and'? Is it given by the truth table? Carston does not think so, for this would involve a mixture of levels: at the minimal semantic level, one does not usually have any truth-evaluable propositions to feed into the truth function. She comes to no definite conclusion about the lexical meaning of 'and'—if

any: she considers and does not reject the possibility that it has no lexical meaning at all (256; 257). I don't see how this can be right: it may be eliminable in favour of a full stop when it is the main connective, but it plays an essential role in the embedded clauses found in (1)–(5) above. She also considers the possibility that it functions as an instruction to treat the sentences it connects as a single unit for semantic processing (*Ibid.*). Maybe so, but this must be true of sentence-connectives in general, and not peculiar to 'and'.

I see no compelling reason to deny that semantically, 'and' is truth-functional. Granting pragmatic enrichment, it is the sentences 'and' connects which get enriched: 'He took off his boots and got into bed (a little later).' 'He handed her the scalpel and she (then) made an incision (with the scalpel).' 'We spent the day in town and I went to Harrods (during that day).' 'She shot him in the head and (as a result of the former) he died instantly.' Recall that the same effects are generated by a full stop between two sentences. It is not specially the 'and' which does the enriching, but general pragmatic principles governing the assignment of times to the events described, with causal and other implications added on as appropriate. And even if it were specially the 'and' that does the enriching, its semantic meaning could still be that it operates truth-functionally on the pragmatically enriched content of the sentences it connects.

When Carston turns to negation, this is the kind of conclusion she reaches concerning so-called 'metalinguistic negation', exemplified by

> We didn't see hippopotamuses. We saw hippopotami.

> She's not pleased at the outcome; she's thrilled to bits.

Here she argues, against numerous opponents, that we need not postulate a non-standard use of negation. Rather, we pragmatically enrich the sentences negated: they express something like 'It's not the case that what we saw are properly called "hippotamuses" '; and ' "Pleased" would not be an appropriate way of describing her.' Thus she saves the thesis that negation is semantically univocal, and indeed, truth-functional. I suggest that if this move is permissible for negation, it is permissible for conjunction also: enrich the sentences conjoined without tampering with the meaning of the conjoining device, 'and'.

(p. 790)

Before returning to conjunction, I shall make a brief comment on the other main problem discussed in Carston's chapter on negation: the 'scope ambiguity' in sentences such as 'All the children haven't passed the exam', 'Fred didn't scrub the potatoes with sand-paper in the bath-tub at midnight' and the notorious 'The present King of France is not bald.' Here she agrees with Grice (1970/1989): semantically, negation has wide scope, and narrow-scope readings are pragmatic enrichments, appropriate when some part of the remark is taken for granted, as common ground, not up for question. In many remarks of the form 'The F is not G' it will be taken as uncontroversial that there is a unique salient F, and so what is being denied is that it is G. But this is pragmatic rather than semantic: 'The King of France is not bald: there is no King of France' is quite in order.

Now it is convenient for Grice and Carston that the wide-scope reading is the weak reading, in the cases they discuss, and hence ripe for pragmatic enrichment. But not all scope ambiguities involving negation have this structure. Consider this example:

> The Head of Department will never be an octogenarian.

This could be a comment on the limited life expectancy of Ann, the present Head of Department; or it could be a comment on the fact that rules require that whoever is Head retire before the age of eighty. The two readings are logically independent. Neither reading (out of context) is to be preferred to the other. They have roughly the forms:

> Concerning the present Head of Department, there is not a future time t at which she will be an octogenarian.

> It is not the case that there is a future time t at which the Head of Department at t is an octogenarian.

Hence I am inclined to the more traditional view that these sentences are semantically ambiguous because they are syntactically ambiguous, represented by different logical forms.
Return to conjunctions. It is not uncontroversial that we must treat the temporal implications of conjunctions purely as a matter of pragmatics. In examples like 'John came in and sat down', Jeffrey King and Jason Stanley (2005) claim that 'according to most twenty-first-century syntactic theories' (144) each verb has a time indication in its logical form: John came in at t and sat down at t′. Certainly, context is required to determine what the time references are. But this is a standard case of reference-fixing, a proper part of semantics. They quote a general maxim, formulated by Barbara Partee (1984: 254) 'there is a past reference time r-p specified at the start of the discourse, and … the introduction of new event sentences moves the reference time forward'. On the basis of this, t′ is later than t. Admittedly, this is described as a pragmatic maxim, for it establishes a norm, from which there may be exceptions; but this is pragmatics only to the extent that pragmatic procedures are engaged in establishing the reference of pronouns like 'she' or demonstratives like 'that man'. This is an instance of a bold, general thesis defended by Stanley (2000: 391): all context-dependence which affects truth conditions results from fixing the (p. 791) values of contextually sensitive elements in the real structure of natural language sentences. King and Stanley offer an analysis of the more complex example (4), along the same lines (146).

If temporal factors can be treated along familiar semantic lines, what about the conjunctions which seem to impute causal connections? These seem less entrenched, riding on the back of the temporal factors. One could not deny that causation was involved by saying 'It's not the case that he pushed her and she fell.' Often, it would seem, they could be treated as conversational implicatures. The difficulty is that the causal implication seems to survive embedding in the antecedents of conditionals, as in (1) and (2) above. Here Stanley adopts Stalnaker's theory of indicative conditionals: we are speaking of a 'close possible world' in which the antecedent is true. Closeness is a contextually sensitive matter. The temporal relations are built into the semantics. And it may well be that the rele-

vant 'close' possible worlds to consider are those in which not only temporal but also causal relations hold. Similarly on the suppositional theory: consider 'Suppose that he pushed her and she fell'; I could go on to say that it doesn't necessarily follow that the push caused the fall. Nevertheless, that would typically be thought to be much the most likely way the supposition would be true, and affect what one took the likely consequences of the supposition to be.

Despite her defence of univocal, truth-functional negation, Carston hints at a conception of semantics very different from the classical conception. She voices the suspicion that the origin of classical semantics in logic has distorted our theories of linguistic processing. She quotes with approval Pieter Seuren (2000: 289) who says 'The logical properties of the sentences of natural languages are best seen as epiphenomenal on the semantic and cognitive processing of the sentences in question. They emerge when semantic processes and properties are looked at from the point of view of preservation of truth through sequences of sentences, which is the defining question of logic, not of semantics.' And she says 'The truth relation holds between thoughts and states of affairs, so between propositions expressed by utterances (semantic/pragmatic hybrids) and states of affairs. Then, it is systems of thought, rather than linguistic systems, for which a truth calculus, that is, a logic, should be devised. If this is right, there is no obvious reason to suppose … that what natural-language connectives … encode is identical to the context-free, truth-based properties of the logical operators' (257).

In his inaugural lecture, 'Meaning and Truth' (1969), Strawson speaks of the 'Homeric struggle' between the formal semanticists and the theorists of communication intention (5). On the question of how much of linguistic communication can be explained by semantics as opposed to pragmatics, the battles continue. As far as the sentential logical constants are concerned, no great damage has been done to the logician's treatment of 'and', 'or' and 'not'. But the logician's 'if' is a technical concept. The advantages of its simplicity and clarity arguably outweigh its defects in mathematical reasoning. Outside mathematics, especially because uncertain conditional judgements matter, its use would be intolerable. Pragmatics is a valuable discipline, but one must beware of its overuse to prop up indefensible semantic theories.

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Notes:

(1) Extensional logic is truth-functional: the truth-value of a complex sentence is determined by the truth-values of its components.

(2) The term has since made its way into the English language: it is given in *The Chambers Dictionary*, 2003 edition, in Grice's sense, with an example of his kind (with no mention of philosophy or linguistics, or of Grice).

(3) This example comes from Robyn Carston (2002: 233). General knowledge (at least in Britain) of the order in which one does A-levels and BAs dissipates any oddity in the reversal of the temporal order.

(4) We shall see later (Section 30.5.5) that there is a problem about disjunctive suppositions and disjunctive antecedents.

(5) Note that I don't believe *every* conditional whose consequent is 'the match will be cancelled': I don't believe 'If all the players make a very speedy recovery, the match will be cancelled'.

(6) Lewis (1986: 152–6) came to accept Jackson's account as preferable to his own.

(7) This is not the only kind of counterexample to the equation of robustness$_1$ and robustness$_2$. I discuss others in Edgington (1995) and Edgington (forthcoming).

(8) If p($A \vee B$) = 95% and p(A) = 50%, p($\neg A \& B$) = 45%. p($\neg A \& \neg B$) = 5%. So, on the assumption that $\neg A$, it's 45:5, or 9:1, that B.

(9) I owe this example to my student, James Studd, who used it for a different purpose.

(10) Among philosophers who take this line are Kent Bach (2005); Stephen Neale (2005); François Recanati (1989); Charles Travis (1997). Needless to say, there are significant disagreements between them.

(11) After a list like this it is worth reminding ourselves that there are plenty of conjunctions which do not concern sequences of events or episodes, and are symmetric: 'John is a teacher and Mary is an artist.'

(12) Interestingly, as Carston points out, the full stop and the 'and' are not always interchangeable: the former allows for some relations between sentences not permitted by the latter. For instance, 'He broke his leg. He fell off a step ladder' is fine, the latter sentence being an explanation of the first. But the two sentences conjoined in that order by 'and' yields a sentence which is bizarre, would demand a very special context, and would not convey that the second was an explanation of the first.

(13) This difficulty for Grice was first pointed out by Cohen (1971).

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