RELEVANT FACTS AND SUPPOSITIONS: A NEW
ANALYSIS OF CONDITIONALS

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1. *Introduction*.

In this paper, I shall distinguish between firstly, what I shall call '*the relevant facts*', C, of a dialogue, namely the truths concerning those things the dialogue is about, and, secondly, '*the suppositions*', D, of the dialogue, namely, what is (truly or falsely) being *supposed* or assumed to be the case at any stage of the dialogue and use these notions in the development of a '*ceteris paribus*' analysis of conditional locutions in the style of Angelica Kratzer's analysis [10]. However, unlike that analysis and other analyses which David Lewis [14] has shown to be similar to Kratzer's, namely those of Lewis [13], and Stalnaker [21], the analysis to be offered allows that the conditional may be false when both antecedent and consequent are true.

In the Kratzer, Lewis and Stalnaker analyses, the truth of a conditional in a possible world is a function of the antecedent, the consequent and the possible world. In the present analysis, the truth of the conditional is a function also of the set, C, of relevant facts which are, in turn, determined by the context in which the conditional locution is embedded. The set C will usually be a proper subset of the totality of facts. In the Kratzer, Lewis and Stalnaker analyses, the relevant facts are, in effect, all the facts there are, which is why they must be invariant with dialectical context.

Initially, Frank Ramsey's analysis of conditionals and a modified version of this (MR) will be considered. Allow that for any set, Q, of propositions, Q (bold face) represents the conjunction of its members. The modified Ramsey analysis to be considered is:

(MR)   'if p, q' expresses a truth if and only if $(C\&D\&p) \rightarrow q$ (where '$\rightarrow$' $=_{df}$ 'entails')

The *ceteris paribus* analysis (CP) is a development of MR to cater for certain objections to that analysis. It is:

(CP) 'if p, q' expresses a truth if and only if every consistent set of propositions containing p, the suppositions, D, and a maximal subset of the relevant facts, C, entails q.

It is shown that, if the relevant facts are closed under entailment, CP reduces to:

(CPC) 'If p, q' expresses a truth
$$\text{iff } ((D\&p) \rightarrow q) \lor (\diamond (C\&D\&p)\&((C\&D\&p) \rightarrow q))$$

It is shown also that (CP) and (CPC) are not equivalent when the proviso is dropped. Furthermore, there seem to be locutions to which (CP) applies but (CPC) certainly does not. If this is so, it follows that the relevant facts are not always closed under entailment. Consequences for the validity of arguments using conditionals are discussed in the light of pragmatic considerations.

Throughout the paper it is assumed that entailment is 'classical', that is that $p \rightarrow q$ iff $\sim \diamond (p\& \sim q)$.

Neither MR nor CP recognise a distinction between so-called indicative conditionals and subjunctive conditionals. If there is a distinction to be made here, it is not one which is pertinent to my present purposes, which is to capture the logic of a certain sort of message commonly conveyed by many sentences containing 'if' or one of its cognates using a variety of verb forms.

2. *Frank Ramsey's Analysis of Conditionals.*

Frank Ramsey, in an essay entitled 'General Propositions and Causality' [17] (p 144) wrote:

> In general we can say with Mill that 'If p then q' means that q is inferrible from p, that is, of course, from p together with certain facts and laws not stated but in some way indicated by the context.

and again (p145):

> Of course that $p \supset q$ follows from the facts is not a proposition of logic, but a description of the facts: 'They are such as to involve $p \supset q$.'

Let us, for the moment, call Ramsey's 'certain facts and laws' 'relevant facts'. Then Ramsey's analysis is that an if-conditional locution, (If p, q), expresses a truth if and only if the conjunction, C, of the relevant facts entails (p ⊃ q); or equivalently, if and only if (C&p) entails q.

Referring as he did to 'certain facts and laws', it is doubtful whether Ramsey would have allowed the relevant facts to be false. However, there are, in ordinary discourse, tacit assertion-governing assumptions which can be false. I shall call these 'suppositions'. The pragmatics of suppositions is markedly different from the pragmatics of relevant facts. Let us now begin to examine that difference.

3. *Relevant Facts and Suppositions.*

Discourse may, and often does, concern possibilities other than that which obtains. However, any rational discourse is concerned with *some* aspect of reality, if only a subset of the analytic truths.

I shall keep the words 'relevant facts' to describe the propositions that are true of those aspects of reality that a discussion is *about*. That is rather vague. I shall attempt to be a little more explicit.

Francois Recanati [18] has given us the idea of what he calls '*domains of discourse*', primarily to explain our divergent intuitions about definite descriptions. The idea is that we usually speak as if there were only a limited number of things in the universe — namely the things we are talking about. Thus, if there is one and only one person that we are talking about then Russell's theory of definite descriptions correctly applies when we are talking of 'the person'.

As an initial suggestion, allow that the relevant facts are those facts which are about (which make reference to) members of the domain of discourse and about nothing else. Let us allow also that (p ∨ Gb) is at least about b. Then, in general, not all entailments of relevant facts are relevant facts. For if all entailments of relevant facts were relevant facts, and p were a relevant fact, then since p entails (p ∨ Gb) for any item, b, (p ∨ Gb) would also be a relevant fact whence b would be a member of the domain of discourse. Hence everything would be a member of the domain of discourse. So, unless everything is in the domain of discourse, not all entailments of relevant facts can be relevant facts. In allowing, therefore, that not everything need be in the domain of discourse, we also allow that not all entailments of relevant facts are relevant facts.

So, if both Mary and Bill are members of the domain of discourse, but Alice is not, then 'Mary is a woman', and 'Mary loves Bill', if true, will be among the relevant facts, but neither 'Mary is a friend of Alice' nor 'Either Mary is a woman or Alice is a woman' will be among the relevant facts, even though 'Mary is a woman or Alice is a woman' is an entailment of the relevant fact 'Mary is a woman'.

Domains of discourse with their corresponding relevant facts can be introduced into a dialogue in a variety of ways. For example, magazines and academic journals usally carry a statement of their areas of interest. One does not expect the editors of a geographical magazine to agree to publish mathematical proofs in their journal.

Nevertheless, one might also reasonably suppose that if some assertion refers to some item, then that item becomes a member of the domain of discourse.

Dialectical mores will presumably allow also for the removal of items from the domain of discourse, for example, via locutions such as 'Let's change the subject. How's your mother?'.

The dialectical rules for membership of the relevant facts are not, however, the primary concern of this paper. The point I do wish to make now is that although it is conceivable that we should demand of our interlocuters that they keep in mind the set of relevant facts, it would be absurd, in general, to expect them to know the complete contents of that set at any stage of the dialogue. Insofar as one can think of them at all, it will, in general, be only via what Tichy [22] calls 'propositional offices' — in effect, definite descriptions of propositions or sets of propositions, for example, 'the truths about your mother'.

Unlike relevant facts, what I am calling 'suppositions' can come as either truths or falsehoods. Suppositions are introduced into the dialogue by locutions like 'Suppose it's fine this afternoon' and 'Let ABC be a triangle.' If we suppose that it will be fine this afternoon, or that ABC is a triangle, we may be supposing something that is false.

The meanings given to 'relevant facts' here is different from the sense given to the term 'presupposition' by Chisholm [3]. Chisholm's presuppositions are like relevant facts in being the 'system of statements' that the if-conditional is about. But unlike relevant facts, each of Chisholm's presuppositions are accepted or believed by the speaker. We make no such assumption about relevant facts. We allow that it may not be known by the speaker which propositions are members of the set of relevant facts. We insist only that the set of relevant facts is identifiable by the speaker; that

speakers know what they are talking about in the sense of knowing the subject under discussion. They do not have to be able to identify every true proposition which falls under that subject.

To illustrate that what is asserted by any assertive locution (not just 'if'-locutions) is a function not only of the semantics of the locution including any denotations involved, but also of the relevant facts and suppositions which are operative for that locution. Consider:

Case 1

> Mary: Suppose it's fine this afternoon. What will you do?
> Alice: I shall go for a walk.

Now Alice intends to stay at home if it rains — and it does rain and she stays at home. But she told the truth. In all likelihood, if her locution had not been governed by the supposition generated by Mary, it would have expressed a falsehood.

Similarly, consider:

Case 2

> Mary: Suppose it's fine this afternoon. What shall we do?
> Alice: If you go for a walk, I'll go with you.

Again, Alice intends to stay home if it rains — and it does rain, and she stays home, though Mary decides to go for a walk just the same. But Alice's if-locution would have expressed a truth, let us allow, despite the fact that its antecedent was true and its consequent was false, given that she intended to walk with Mary were it fine.

Let D be the conjunction of all the suppositions operating on some if-conditional, (If p, q), and let C be the conjunction of all the relevant facts. What I call the modified Ramsey (MR) analysis of if-conditionals is:

MR. (If p, q) expresses a truth iff $(C \& D \& p) \rightarrow q$.

The logical form of a proposition being asserted by a locution governed by relevant facts C and suppositions D will be:

$(C \& D) \rightarrow p$

That is, any assertion governed by a supposition will be, in effect, the consequent of an if-conditional of which the supposition, D, is the antecedent. This way of regarding governed assertions, at least as they occur in ordinary English, is supported by correspondence of verb forms used in antecedent and consequent on the one hand, and supposition and governed assertion on the other. Compare for example:

Alice: If it's fine this afternoon, I'll go for a walk.

with

Mary: Suppose it's fine this afternoon. What will you do?
Alice: I'll go for a walk.

Again compare

Alice: If it *had been* fine this afternoon, I *would have gone* for a walk.

with

Mary: Suppose it *had been* fine this afternoon. What would you have done?
Alice: I *would have gone* for a walk.

Conversely, it would seem to be a plausible conjecture that the antecedents of if-conditionals should be regarded as suppositions governing their consequents.

This would be a feature of if-conditionals which would distinguish them from material conditionals. If the antecedents of if-conditionals are suppositions for their consequents, and if suppositions can affect the domain of discourse, and if that effect, together with its associated effect on the relevant facts, takes place immediately, then, in what would otherwise be identical stages of a dialectical context, an if-conditional may not express the same proposition as the corresponding material conditional. The reason for that is not just that the if-conditional will alter the relevant facts. Any assertion may do that. Rather it is that the antecedent could alter the relevant facts for the consequent. The material conditional, on the other hand, is an artifice so defined as to disallow any such relationship between antecedant and consequent.

4. When the suppositions are inconsistent with the relevant facts.

If the supposition is inconsistent with the relevant facts, then, given MR and a classical account of entailment, the if-conditional is true regardless of the consequent. Does this matter?

Let us return to Case 2, namely:

> Mary: Suppose it's fine this afternoon. What shall we do?
> Alice: If you go for a walk, I'll go with you.

Now suppose that Mary's suppositional locution and the question which follows affect the domain of discourse to include at least this afternoon, Mary and Alice, and possibly such items as this afternoon's possible fineness, and the behavioural dispositions of both Mary and Alice — and that this inclusion is operative on Alice's locution.

Suppose also that Alice was less than honest. Suppose that she fully intends to go motoring with Cedric if it is fine in the afternoon. She is also fairly sure (and she is right) that if it is fine and she goes motoring with Cedric, then Mary will go for a walk by herself. Nevertheless it rains and neither Mary nor Alice go for a walk.

Here Alice's response that she would go for a walk with Mary if Mary went for a walk seems to express a falsehood. Alice had no such intention.

However, if all the true propositions that refer to Mary and which do not refer to anything outside the domain of discourse are included among the relevant facts, then one would think that this would include the proposition that Mary will not go for a walk this afternoon. Hence the relevant facts alone and therefore the conjunction of the suppositions with the relevant facts would entail:

> Mary will go for a walk this afternoon
> $\supset$ Alice will go for a walk with Mary this afternoon.

and this entailment, given MR, would yield truth for Alice's assertion — not falsehood as previously surmised. Worse, Alice's assertion would have been true even if the supposition that it was going to be fine in the afternoon were replaced with any supposition whatever.

The problem is a version of that which Goodman [6] and Chisholm [2] brought to our attention many years ago, which for them was the problem of counterfactual conditionals and which here arises as the problem of the

antecedent or supposition or their conjunction being inconsistent with the relevant facts. What is to be done? There are a number of avenues to explore.

Firstly, we could give up and conclude that if-conditionals are a basically illogical aspect of our language that should be replaced, at least in any discourse aiming at exactitude, with better behaved substitutes.

Secondly, we could conclude that any relevant fact analysis of if-conditionals is incorrect and that we should investigate some other approach, for example, that of Routley and Meyer [19] which treats the semantics of if-conditionals as irreducibly basic.

Thirdly, we could accept the above results and attempt to explain away our contrary intuitions on the matter by appeal, say, to the pragmatic features of the dialectical situation.

Fourthly, we could examine further proposals for restricting membership of the relevant facts, for example, by adopting constraints dictated by verb forms within the if-locution. Thus Dudman ([5], p153) says '... when we say *If she had attended we are* GRANTING THE COURSE OF HISTORY ONLY UP TO SOME PAST PAST POINT ...'. For us, the business of granting the course of history up to some point could amount to the exclusion from the relevant facts of any proposition concerning any time past that point.

Fifthly, we could adopt some mixed version of the third and fourth approaches. Let us briefly consider these proposals in turn.

5. *Giving up on 'if'*.

The widespread use of 'if', not only in ordinary discourse but also in the literature of mathematics and other exact sciences, with little corresponding confusion and inexactitude, is evidence that if-conditionals, properly used, may be no less logical than any other common types of locution. It is true that philosophical discourse often leads to problems and uncertainties with if-conditionals. But this may be due, at least in part, to the habit among many philosophers and logicians of treating the proposition expressed by an if-conditional as being independent of any context.

For example, some philosophers are wont to cogitate, following the injunctions of Saul Kripke ([11] p313), on whether some person X would have been X if X's father had been Z rather than Y. Such questions, posed outside any context which would determine the relevant facts and supposi-

tions, would be pseudo-questions if a suppositional-relevant fact analysis of if-conditionals was correct. One might as well raise the 'question' of whether it is a cat independently of any context which would pin down the referent of 'it'. But with a Ramsey-style analysis, provided that the relevant facts and suppositions were well defined, there would be no need to think of if-conditionals as being any less explicit, exact or logical than any other form of locution.

Some, for example J.J.C. Smart [20] (pp387-8), have thought that if-conditionals are unsuited to mathematics or physics because of their intensionality. If-conditionals (strong conditionals as he calls them) are *about* theories not *of* theories. It would be odd, he claims, if a physical theory could not be stated without the help of an apparently *metalinguistic* concept.

It would indeed be odd if a physical theory could not be stated without talking about English or some other language. One can, of course, talk about theories and other propositions and their entailments without talking about any languages in which such theories may be couched. In that sense, if-conditionals are not necessarily metalinguistic. They *are meta*-theoretical in the sense that they are about their suppositions and relevant facts. But I can see no reason why that should preclude them from being about other things as well — including the things that the theory is about or those items of the domain of discourse which have generated the relevant facts. Ramsey's claim that it is not a proposition of logic that 'p ⊃ q follows from the facts' may seem implausible to those who focus on the paradigmatically logical words 'follows from'. But he is right in the sense that, in general, little or no logic could be learnt from such an assertion. He is right also in his claim that the statement is a description of the facts - and description of physical facts is, after all, the purpose of discourse about physics.

To know that a set of propositions, S, entails some specifiable proposition, p, is to know something very different from, and often something much weaker than, the contents of S. It is because we sometimes know the weaker statement, but not the stronger statement, that we have need of if-conditionals within physics as well as every other subject area. To deprive ourselves of the use of if-conditionals would be to deprive ourselves of the means of expressing some of the knowledge in our possession

6. *Are if-conditionals irreducibly basic?*

Routley [19] has argued that if-conditionals in ordinary discourse cannot be

semantically analysed using other simple and well understood logical terms, and, in particular, cannot be analysed in the Ramsey style with necessity and the material conditional. Even if he is right, a Ramsey if-conditional could still be a good explication of a natural language if-conditional which could find a use within the exact sciences in the manner suggested in the previous section. But it can find such a use only if the set of relevant facts (but not necessarily the contents of that set) is precisely determinable; and it would be more useful the more likely it was to match the ordinary language if-conditional in truth value. It is worthwhile, therefore, to continue the search for a close explication, if not an exact analysis, of if-conditionals along Ramsey lines.

7. Dealing pragmatically with the inconsistency of supposition and relevant facts.

Roderic Chisholm [2] called Ramsey's 'certain facts and laws' *presuppositions*. But he said that the statements speakers presuppose when they assert a counterfactual (an if-conditional with a false antecedent) will, presumably, be statements they accept or believe. Daniels and Freeman [4] also claim that our 'tacit assumptions' as they call them, 'are drawn from our stock of beliefs about the world.' But this is a mistake. As we have seen, the relevant facts need not ever be to mind; they may be merely 'indicated by the context'. One can indicate a proposition without knowing what proposition is being indicated. For example, the context may indicate that the laws of nature are relevant facts without any participant of the dialogue knowing what any of the laws are. There is no clause in a Ramsey-style analysis of if-conditionals, nor need there be any, to the effect that the conjunction of the relevant facts, C, is believed or known.

As Tichy [22] correctly points out, propositional offices (such as 'the laws of nature') can act as 'objects of contemplation' with which one can be perfectly familiar 'without knowing which proposition occupies it'.

Chisholm's mistake is of some consequence. If a speaker does not know what propositions are to be identified with the relevant facts, she may not know, even when it would otherwise be obvious, that the antecedent of her if-conditional is inconsistent with the relevant facts.

However, it may be argued that, on this analysis, if the speaker *was* able to identify the relevant facts and, moreover, believed them to be true, it would be at least misleading for her to utter (If p, q) when p is obviously

inconsistent with the relevant facts. For she would realise that this inconsistency obtained and hence, since an inconsistency strictly entails any proposition whatever, she should realise that she might just as well have uttered (If p, ~ q), or for that matter (If p, r) for any r at all. Her utterance would therefore breach dialectical etiquette in appearing to yield more information than it does. She might just as well have uttered ~ p.

As an insurance against such pragmatic fallacies, both Chisholm [3] and Goodman [6] insist that the antecedent must be consistent with what Chisholm calls the presuppositions (our relevant facts). However, one may be tempted to argue that to endeavour to cater for pragmatic errors by fiddling with the semantics is itself an error. David Lewis says as much (Harper *et al* [8], p73) when considering an objection that on his analysis, ~ ◇ p entails (If p, q).

In many cases, there seems to be no error, pragmatic or semantic, when the antecedent of one's if-conditional locution is inconsistent with the relevant facts. Consider such a case.

Case 3

Let us suppose that the discussion is about next Saturday's dance, and suppose that the relevant facts include not only the truths concerning the dance, but also the truths concerning the participants of the discussion as well as the truths about absent friends, one of whom is Mary. Suppose also that one of the truths about Mary, unbeknown to Bill, is that Mary never goes to dances. Bill does know, however, how fond of Mary he is, and how much he would want to spend next Saturday night with Mary. Asked whether he plans to go to the dance, he responds, 'If Mary goes, I'll go.'

Bill seems to have stated a truth — a truth, furthermore, that he intended to state, namely that the facts about the dance, Mary and himself, together with the proposition that Mary will go, entail his going. He does not seem to be in error semantically or factually. He certainly is not guilty of the pragmatic error mentioned above. He had no idea that Mary never went to dances. It is not true that he might just as well have uttered, 'Mary isn't going.' He did not have that information. He was being optimally cooperative and not at all misleading. He was giving all the information at his disposal.

Information which seems significant at one time can often be seen to be a trivial consequence of information later received. But lack of knowledge in itself is no dialectical error. There would seem to be nothing wrong with

Bill's speech act.

What is the difference, then, between Bill of Case 3 and dishonest Alice of Case 2? On parity of reasoning, if Bill's assertion expressed a truth, we should allow Alice's 'If you go for a walk, I'll go with you' to express a truth also; not a falsehood as first supposed. It might be argued that Alice's assertion was less than honest because she did not *know* that it expressed a truth. For all she *knew*, it might have been fine in the afternoon with Mary going for a walk; in which case, Alice would *not* have gone walking with Mary, and Alice would have asserted a falsehood. It is, of course, a breach of dialectical etiquette to assert something that, for all you know, is false.

In summary, it seems on a first examination that response number three might be appropriate for the case of honest Bill's plan for the dance and the case of deceitful Alice and her secret plans about motoring with Cedric. So far, it might seem that we can stick to MR, assert that Alice's assertion, unbeknown to Alice, expressed a truth but that Alice's deceit consisted in her assertion of something she knew had a good chance of being false. In Bill's case, the truth of his assertion received no challenge from our intuitions. Here, then, are two cases of inconsistency of supposition with relevant facts which seem so far to yield no trouble for MR. They are both cases when the speaker is ignorant of the inconsistency. But what if the speaker and his or her audience are *not* ignorant of the inconsistency?

8. *Suppositions that are known by the speaker to be inconsistent with the relevant facts.*

Case 4: Mary and Alice are discussing the second world war.

> Mary: It's a good thing that Hitler didn't invade England.
> Alice: Why is that?
> Mary: Because had Hitler invaded England, the Nazis would have won the war.

Here there is no question of ignorance about whether or not Hitler invaded England. Both Mary and Alice are committed to the fact that he did not. Further, that fact, one might suppose, would be about a member of the domain of discourse, namely Hitler, and is not about anything outside the domain of discourse. So on our present account of relevant facts, it would

have to be included among the relevant facts. Hence Mary's assertion would be otiose - and certainly no explanation of why it was a good thing that Hitler did not invade England. For given MR, it would have been equally true that if Hitler had invaded England, the Nazis would not have won the war. Mary's locution would have been pragmatically fallacious. But Mary's locution does not seem to be pragmatically fallacious. It would appear, on the surface of it, at least, to provide quite a reasonable response to Alice's demand for an explanation. If one thought that it wasn't a good explanation, it would probably be because one rather believes that Hitler's invasion would not have had that consequence — that Mary's explanation was false. So it would appear that if we are to cleave both to MR *and* the intuitions corresponding to ordinary discourse, the fact that Hitler did not invade England must be removed from the relevant facts in this case.

As previously suggested, following Dudman, we could constrain the relevant facts to those that describe the facts of the world up to some point in history, imagining that the supposed invasion takes place after that time.

If such a historical constraint were the *only* constraint on relevant facts, MR would be an unsatisfactory analysis. For either all the laws of nature that are applicable at the supposed point in history will be included in the relevant facts or only some of them will be included or none of them will be included. If all of them were, then, together with the initial and boundary conditions applying at that time, they would entail every true proposition after that time — including the fact that Hitler did not invade England. The antecedent would be inconsistent with the relevant facts as before.

If none of the laws were included, then nothing concerning any event later than that time would follow from the relevant facts together with the proposition that Hitler invaded. Any such conditional would have to be deemed false.

Neither would there seem to be a clear basis for selecting some of the laws for retention in the relevant facts whilst rejecting others — if the historical constraints were the only constraints.

With the relevant facts further constrained to the facts about all and only the members of the domain of discourse, there would be a selection, on our analysis, of those laws, initial conditions and boundary conditions that apply to members of our domain of discourse. But as for laws, it is hard to see how that such a selection could accomplish much. Are not laws the sort of thing that are applicable and hence relevant to everything? Perhaps not. Perhaps "All A's are B's" is applicable and hence relevant only to A's.

Be that as it may, there may still be enough laws, boundary conditions

and initial conditions left over after this selection process to ensure that the conjunction of the relevant facts about Britain, the war, Hitler and the Nazis, together with the relevant facts about all the other things that are likely to be members of the domain of discourse in a conversation about the war, is contrary to the supposition that Hitler invaded. It is to deal with this sort of case that we now turn to the ceteris paribus (CP) analysis.

9. *The ceteris paribus (CP) analysis of if-conditionals.*

An alternative, or rather, a supplementary approach to the Ramsey style of analysis is the *ceteris paribus* (CP) approach to inconsistency between the relevant facts, C, and the suppositions and antecedent, (D&p). The idea is to consider not what (C&D&p) entails, but rather, what would be entailed by all consistent conjunctions of D, p and a maximal subset of the relevant facts.

Let us make this idea a little more explicit.
Let Q (bold face) be the conjunction of all the members

of any set, Q, of propositions (as before).
Say of any set of propositions, M, that M is *maximally consistent within* some set of propositions, S, iff

(i) $M \subseteq S$

and

(ii)   any proposition is a member of M if it is both consistent with M and is a member of S;

that is,

$(r)((\Diamond (M \& r) \& r \in S) \supset r \in M)$

Say that M is *maximally p-consistent within* a set S of propositions iff, in addition to clauses (i) and (ii) above,

(iii) $p \in M$.

Then the suggested analysis is that, with relevant facts C and suppositions D, locution (If p, q) expresses a truth iff:

(M)   (M is maximally (D&p)-consistent within $CU\{(D\&p)\} \supset (M \twoheadrightarrow q)$).

Angelika Kratzer [10] considers a similar analysis([1]) in which the truth of if-conditionals 'depends on everything which is the case in the world under consideration'. She says that 'in assessing them, we have to consider all the possibilities of adding as many facts to the antecedent as consistency permits. If the consequent follows from every such possibility, then (and only then), the whole counterfactual is true.'

In terms of the analysis we have just been considering, this amounts to the case where there are no suppositions beside the antecedent itself, and where one is literally talking about everything, making the relevant facts, C, the set T of *all* the truths. Under these circumstances, as Kratzer shows, the proposition expressed by 'If p, q' is true iff:

$$(p\&q) \vee (\sim p \& (p \twoheadrightarrow q))$$

and, perhaps, under those circumstances, that reduction is not implausible.

Kratzer then refines her analysis by constraining the possibilities under consideration to those in which certain facts are 'lumped together'. They 'stand or fall together'. That is, the possibilities are confined to those in which certain true material equivalences continue to hold. With this refinement, allow that the suppositions, D, are the material equivalences which do the lumping, and the set of relevant facts, C, is set of all truths, T, as before. Under these circumstances, a locution (If p, q) expresses a truth iff:

$$(p\&q) \vee (\sim p \& ((D\&p) \twoheadrightarrow q))$$

David Lewis's analysis [12], like Stalnaker's [21], assumes that possibilities can be ordered by a·'nearer' relation. On Lewis's account, (If p, q) expresses a truth in possibility n iff:

([1]) In this analysis, the terms 'maximally consistent within' and 'maximally p-consistent within' have been borrowed from Kratzer's [10], but the definition of those terms differs from Kratzer's. The condition of being a member of S in clause (ii), is altered from Kratzer's corresponding condition of being an entailment of a member of S.

either ~ ◇p *or* some (accessible) (p,q)-world is nearer to n than any (p, ~q) world.

As Lewis shows [14], both his analysis and Stalnaker's [21] can be recast in what he calls 'premise semantics' and what I have called a *ceteris paribus* form in which C=T as in Kratzer's analysis. Thus, in all these analyses, (p&q) entails (If p, q). That is regarded by many as a defect in these analyses.

Neither MR nor CP suffer from such a defect. Recanati [18] (p63) says that domains of discourse are similar to possible worlds, but that there is an important difference: unlike possible worlds, they do not have to be 'complete' — they can be 'mini-worlds'. In our terms, the corresponding set of relevant facts does not have to be maximally consistent within the set of all propositions. That is, it does not have to include every proposition or its negation.

If Recanati is correct and if C need not entail T (even if *vice-versa*), then one does not obtain the result that any locution of (If p, q) expresses a truth if both p and q happen to be true. If C is the set of all those truths that are about Mary and no-one and nothing else, then C will not include the facts that either Mary is not tall or Joanna is tall, let alone that either Alice is not tall or Joanna is tall, even if Mary, Alice and Joanna are all tall.

It will be shown that CP reduces to MR when the conjunction of relevant facts, C, is consistent with the suppositions (D&p); and that, since C is true, will include the case when (D&p) is true. It will also include some cases when (D&p) is false. However, the MR analysis, namely (C&D&p)→q, can be false even when both p and q are true.

What happens to CP when C is inconsistent with (D&p)? That depends. Suppose that any entailment of the relevant facts is a relevant fact, in other words, that C is closed under entailment. It will be shown that, in that case, the CP analysis reduces to ((D&p)→q) when (D&p) is inconsistent with C. On the usual assumption that

$$((D\&p) \rightarrow q) \rightarrow ((C\&D\&p) \rightarrow q),$$

the analysis therefore reduces, *under those circumstances*, to:

$$((D\&p) \rightarrow q) \vee (\lozenge(C\&D\&p)\&((C\&D\&p) \rightarrow q))$$

However, it will also be shown that if C is not closed under entailment, there is no such reduction. Proofs of the promised results now follow.

Theorem. If $\Diamond$ (C&D&p), then (M)(M is maximally (D&p)-consistent within CU{(D&p)} $\supset$ (M $\rightarrow$ q)) iff (C&D&p) $\rightarrow$ q

Proof. If $\Diamond$ (C&D&p), then there is only one maximally (D&p)-consistent set, M, within CU{(D&p)}, namely, CU{(D&p)} itself.

Hence M, that is, (C&D&p), will entail q iff (C&D&p) entails q.

Theorem:
If 1. $\sim \Diamond$ (C&D&p)
and C is closed under entailment, that is,
  2. (r)((C $\rightarrow$ r) $\supset$ r $\in$ C),
then (M)(M is maximally (D&p)-consistent within CU{(D&p)} $\supset$ (M$\rightarrow$q))
    iff ((D&p) $\rightarrow$ q).

Proof. If (D&p) is itself inconsistent, then there can be no maximally (D&p)-consistent set, M. For M would be required both to have (D&p) as a member by clause (iii) of the definition of maximal p-consistency, and would be required not to have it as a member by virtue of clause (ii) which requires that all members of M are consistent with M and hence are self-consistent. Since there is no such M, both sides of the biconditional are vacuously true. The theorem therefore holds for inconsistent (D&p).

Assume $\Diamond$ (D&p) & $\sim \Diamond$ (C&D&p).

If $\Diamond$ (D&p), there will be at least one maximally (D&p)-consistent set, M, within CU{(D&p)} and the conjunction, M, of any such maximally (D&p)-consistent set will entail (D&p). Hence if (D&p) entails q, so will any such M.
Now assume that

3. (D&p) $\nrightarrow$ q

We need to show that there is at least one maximally (D&p)-consistent set of propositions within CU{(D&p)} whose conjunction does not entail q.

Consider the proposition (C ∨ ((D&p)& ~ q)).
By assumption 2, since C ⇥ (C ∨ ((D&p)& ~ q)),
(C ∨ ((D&p)& ~ q)) ∈ C

Whence

4. (C ∨ ((D&p)& ~ q)) ∈ CU{(D&p)}

By assumption 1, ~ ◇(C&D&p), whence

5. □(((C ∨ ((D&p)& ~ q))&(D&p)) ≡ ((D&p)& ~ q))

By assumption 3, (D&p) ⇥̸ q, whence

6. ◇((D&p)& ~ q)

From 5 and 6, it follows that

7. ◇((C ∨ ((D&p)& ~ q))&(D&p))

Whence, given 4,

8. {(C ∨ ((D&p)& ~ q)),(D&p)} is a consistent subset of CU{(D&p)}.

Since (D&p) ∈ {(C ∨ ((D&p)& ~ q)),(D&p)}, there will be a maximally (D&p)-consistent set within CU{(D&p)} (call it M) of which {(C ∨ ((D&p)& ~ q)),(D&p)} is a subset.
Further, 5 plus the fact that ((D&p)& ~ q) ⇥ ~ q, ensures that ((C ∨ ((D&p)& ~ q))&(D&p)), and hence the conjunction, M, of all the members of M entail ~ q. That is,

9. M ⇥ ~ q

whence, since M is consistent,

10. M ⇥̸ q.

Let it be stressed that this proof assumes that the relevant facts are closed under entailment. If the relevant facts are not closed under entailment, the

collapse of the analysis to ((D&p) $\rightarrow$ q) does not obtain. This is demonstrated by the case where both $\Diamond$((D&p)&q) and $\Diamond$((D&p)&~q) are the case, and where C={~p,(~pvq)}; whence $\Box$(C$\equiv$~p). In this case, ~$\Diamond$(C&D&p), ((D&p) $\not\rightarrow$ q) and the conjunction of the only maximally (D&p)-consistent subset of CU{(D&p)}, namely {(D&p),(~pvq)}, does entail q.

Note that, in this example, the proposition (~p $\vee$ ((D&p)&~q)) is entailed by C, but it is not a member of C. Were it a member of C it would allow the formation of a maximally (D&p)-consistent subset of CU{(D&p)} which did not entail q.

10. *Commentary on CP.*

The CP analysis just given is an improvement on Kratzer analyses insofar as it yields a more plausible result (namely a modified Ramsey analysis) when the relevant facts and suppositions (including the antecedent) are consistent. Further, when the relevant facts are inconsistent with the suppositions, the relevant facts may be discarded as in the Kratzer analyses, but *only* if the relevant facts are closed under entailment.

The fact that the truth value of propositions expressed with conditional locutions can sometimes be independent of any relevant facts does not necessarily render them useless. Within mathematical treatises on geometry, in the analysis and interpretation of scientific experiments, and in calculations concerned with engineering designs, suppositions usually are sufficiently informative to carry the entailment on their own.

With CP, counterfactual historical conditionals, for example, conditionals with antecedents like 'If Hitler had invaded England', do not have to be counted as true simply because the antecedent is inconsistent with the relevant facts as in both modified and unmodified Ramsey analyses. Nor do they have to be counted as false simply because the antecedent together with any extra suppositions, D, do not entail the consequent, as would be the case if C were required to be closed under entailment.

Indeed, with many historical counterfactuals, it turns out to be very hard to work out whether such a conditional would be true, given our limited ability to come to know the relevant facts, let alone perform the requisite CP analysis on such a large body of data. But that is good news for CP. After all, who knows what would have happened had Hitler invaded England?

So much for history, but what of Bill and Alice? Recall that we first conjectured that deceitful Alice was asserting a falsehood when she told Mary that if Mary went for a walk, she would go with her. Then, with MR we changed our minds and suggested that, although Alice asserted a truth, she did not know that she was doing so. The CP analysis allows that the truth value of the conditional is not so easily determined. The same comments apply to the case of honest Bill. The outcome of a CP analysis of Alice's and Bill's assertions could well be consistent with our initial common sense evaluations of their truth values.

11. *Logical Consequences of CP.*

Given that what is being asserted with a conditional locution (or any assertion for that matter) is a function of the operative suppositions and relevant facts, we must accomodate such suppositions and relevant facts in any logical analysis of argument. Given all possible variation of suppositions and relevant facts from premise to premise and from premises to conclusion any argument form will have its counter-instances. For example, an argument of the form 'p so p' will be invalid if the premise is governed by suppositions D_1 and relevant facts C_1, whilst the conclusion is governed by D_2 and C_2 — for the premise would be stating that $(C_1 \& D_1) \rightarrow p$, which would not, in general, imply the conclusion, $(C_2 \& D_2) \rightarrow p$.

How does the analysis fare if we assume (what is, on occasion, untrue) that suppositions and relevant facts are kept constant throughout the argument?

If the conjunctions of the antecedents of any conditional premises or conclusion with the suppositions is invariably consistent with the relevant facts, then the argument will be valid if and only if the corresponding argument with material conditionals is valid. Every premise and the conclusion will be saying something to the effect: in every possibility under consideration throughout this argument, so and so. Such an argument will be valid just in case the same argument without the prefixing clauses is valid.

However, consistency of the suppositions and the antecedents with the relevant facts in the premises does not guarantee such consistency in the conclusion. The notorious case of strengthening of the antecedent (which many call weakening) is a case in point. Assume it is possible that $(C \& D \& p)$. Given that assumption, it may not be possible that $(C \& D \& p \& q)$. Assume it is not. Then a premise 'if p, r' will express a truth iff

(C&D&p)→³r, and, provided, as may or may not be the case, that the relevant facts are closed under entailment, a conclusion 'if (p&q), r' will be true iff (D&p&q)→³r. But the conclusion does not follow. So, in general, strengthening of the antecedent will be invalid.

For example, if, in some context, the relevant facts were closed under entailment (a highly unlikely prospect), and if these relevant facts included the fact that Beverley was unmarried, then the following argument (allowing that 'spinster' means 'unmarried woman') would, in that context, have true premises and a false conclusion:

> If Beverley is a woman, Beverley is a spinster. So if Beverley is a married woman, Beverley is a spinster.

A similar story applies to contraposition. Assume that $\diamond$ (C&D&p) and $\sim \diamond$ (C&D& $\sim$ q). Then, if the relevant facts, C, were closed under entailment, which they may or may not be, the argument

> If p,q. So if $\sim$ q, $\sim$ p

would be valid if and only if the argument

> (C&D&p)→³q So (D& $\sim$ q)→³ $\sim$ p

were valid; and clearly this latter argument form is invalid.

For example: again, if, in some context, the relevant facts were closed under entailment, and if these relevant facts included the fact that Beverley was unmarried, then, in that context, the following argument would have true premises and a false conclusion:

> If Beverley is a woman, Beverley is a spinster. (True) So, if Beverley is not a spinster, Beverley is not a woman. (False)

Again transitivity can fail, even if we hold suppositions and relevant facts constant throughout. For again, if C were closed under entailment, and given also that $\diamond$ (C&D&q) but $\sim \diamond$ (C&D&p), the argument

> 'If p, q; if q, r; so if p, r'

becomes:

$(D\&p) \rightarrow q; (C\&D\&q) \rightarrow r; \text{ So } (D\&p) \rightarrow r$

which is invalid.

For example, again allow that, in some context, the relevant facts are closed under entailment and that one of the relevant facts is that Beverley is unmarried. Then the following argument would have true premises and a false conclusion in that context.

If Beverley is a married woman, Beverley is a woman.
If Beverley is a woman, Beverley is a spinster.
So if Beverley is a married woman, Beverley is a spinster.

Let it be stressed that the above arguments concerning Beverley's gender and marital status, considered simply as structures of English sentences are neither valid nor invalid in themselves. Since what is expressed by the conditional sentences is a function of the relevant facts and suppositions, which are in turn determined by the dialectical context in which the argument is found, one can talk sensibly only of the validity of such a structure within a context. Indeed, given the possibility of suppositions governing our assertions, the same comment applies to any argument whatever.

The argument form 'q so if p, q' fails for the same reason as contraposition —even when relevant facts and suppositions are kept constant and are thought to govern the premise as well as the conclusion. The relevant facts may be inconsistent with p and p may not entail q on its own. For this reason some deny that if-introduction is valid because of the possibility of using it to generate an argument from q to if p, q as follows:

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—  1. q        Assumption
┌  2. p        Assumption
│  3. q        1, repeat
└
    4. If p, q.   2-3, Conditional Proof.
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However, if the undischarged assumptions of an argument are taken as suppositions governing subsequent conditionals, line 4 of the deduction above will express a truth just in case $(q\&p) \rightarrow q$ is true —which is what, after all, the argument has shown to be so. Conditional proof for 'if'-assertions are allowable after all.

12. *Modalities Within 'If'- locutions.*

John Austin [1] (p 210) claimed that 'I can if I choose' cannot be contraposed. 'If I can't, I don't choose to' does not follow. That seems to be correct.

There can be confusion concerning what counts as a contraposition. Thus the contraposition of 'If it rains, I shan't go.' is *not* 'If I *go*, it won't rain.' The contraposition should retain the temporal ordering of the supposed events. In the original, the tenses of the verbs place my failure to go *after* the rain. The would-be contraposition has the temporal sequence the wrong way round. The true contraposition would be: 'If I go, it will not have rained.'

But neither bad tensing nor altered relevant facts, nor inconsistency of relevant facts with the antecedent of the conclusion are the trouble with Austin's example. As David Lewis pointed out ([13], p423), if-sentences with a statement of possibility in the consequent act logically as the *negations* of conditionals. To understand why this is so, one must understand how assertions of possibility behave when governed by suppositons and relevant facts. I offer the following analyses of 'can' locutions and similar analyses would apply to other modalities.

Let E be (C&D) when (C&D) is possible, and the disjunction of the maximally D-consistent sets of propositions within CU{D} otherwise. E can be thought of as the proposition that is true in all and only those possibilities under consideration. Then when governed by E, an assertion of the form:

It can be the case that q. (Can q)

expresses a truth iff

$\Diamond (E\&q),$

An assertion of the form:

It must to be the case that q

expresses a truth iff

$E \rightarrow q$

'It must be the case that q', it is conjectured, should receive the same analysis as 'It ought to be the case that q' with the added condition that E and hence q be true. The proposition E will be true, of course, if and only if all the suppositions are true.

When such locutions follow an 'if' clause, the proposition, p, expressed by that clause, will generate an extra supposition governing what follows, in which case, D is replaced by (D&p) in the above analyses of 'Can q' and 'Must q'. So:

(If p, Can q) expresses a truth iff $\Diamond$ (E&p&q).

The 'contraposition' of such a locution, if it can be correctly so described, will yield the following analysis:

(If $\sim$ Can q, $\sim$p) expresses a truth iff (E& $\sim \Diamond$ (E&q))$\rightarrow \sim$p.

Clearly the 'contrapositions' of if-locutions with possibilised consequents are not of equivalent logical form to those of the if-locutions from which they are syntactically derived.

As mentioned above, a similar analysis for 'Can p' as that given has been in the literature for some time now (Lewis, [13]) without any adverse reaction, to my knowledge. The point of mentioning it here is to point out that not all if-locutions are conditionals in the sense in which I have used 'conditional' in this paper. 'If' introduces a supposition, and hence helps to delimit a set of possibilities for consideration. The purpose of the locution may be to say that some proposition q is true throughout those possibilities or to say it is true in one of them, or to give a command or advice or information dependent on whether the world turns out to be one of those possibilities.

13. Conclusions

In this paper, a new analysis of conditionals has been offerred. The analysis is a development of Kratzer's analysis [10]. The new analysis is based on a distinction between the truths concerning what a dialogue is about (the relevant facts, C), and suppositions, D, which are determined by suppositional locutions or sublocutions and which can be either true or false. The analysis is that a locution 'If p, q' (provided that q is free of modal terms)

expresses a truth iff the conjunction of the suppositions, D, together with p and the disjunction of all the maximal subsets of C consistent with (D&p) entail q.

Unlike Kratzer's account, the new theory allows:

(a) that the relevant facts, C, may be a proper subset of the totality of truths;
(b) that the relevant facts may fail to be closed under entailment,
(c) that the relevant facts may be supplemented by suppositions, D.

Consequent to (a) and (b) above, and unlike the analyses of Kratzer, Lewis and Stalnaker, the mere fact that p and q are both true does not guarantee the truth of what is expressed with 'If p, q'.

Relevant facts and suppositions may govern any type of assertion and other types of locution as well — not just if-conditionals. The prime difference between an if-conditional and a material conditional is that the antecedent of the if-conditional acts as a supposition for the consequent, whereas the antecedent of the material conditional is, by stipulation, passive.

The analysis explains why the truth value of what is expressed by some conditional locutions is quite easily assessed, whereas with others, for example, 'If Hitler had invaded, the Nazis would have won' are almost impossible to assess. Further, it explains why weakening, contraposition and hypothetical syllogism seem perfectly valid in some contexts and perfectly invalid in others. Further, it does all this without recourse to mysterious metaphysical notions of nearness of possible worlds.

In short, both pragmatically and semantically, the results fit well both with scientific discourse and ordinary discourse as well.

A theory of 'Can' and 'Must' locutions locutions was appended to cater for the appearance of such modal expressions within if-locutions.

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