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AN INCOMPATIBLE PAIR OF SUBJUNCTIVE CONDITIONAL MODAL AXIOMS*

(Received 23 June, 1982)

1. BACKGROUND

Most of the axiomatic controversy which has arisen within the field of subjunctive conditional modal logic has arisen over the following two formulas:

(CC) Conjunction Conditionalization

$$(p \wedge q) \rightarrow (p \mathbin{\Box\!\!\rightarrow} q),$$

and

(DD) Disjunction Distribution

$$((p \vee q) \mathbin{\Box\!\!\rightarrow} r) \rightarrow ((p \mathbin{\Box\!\!\rightarrow} r) \wedge (q \mathbin{\Box\!\!\rightarrow} r)),$$

where $\Box\!\!\rightarrow$ is the modal connective for subjunctive implication (read 'if it were the case that ..., then it would be the case that ______'), and $\wedge$, $\vee$, and $\rightarrow$ represent truth functional conjunction, disjunction, and material implication, respectively.[1]

Most critics of (CC), including Bennett (1974, pp. 386–388), Fine (1975a, p. 453), and Bigelow (1976, p. 218), have tacitly argued on informal semantic grounds from what might be called the *Connection Hypothesis*: a necessary condition for the truth of a subjunctive conditional of the form $A \mathbin{\Box\!\!\rightarrow} C$ is the existence of some sort of 'connection' (presumably, of either a logical or a causal nature) between the propositions expressed by A and C. Mere concurrent or coincident truth, so the argument runs, is either not a connection at all or at least not one of the requisite sort. Hence, since (CC) would secure the truth of subjunctive conditionals with true but unconnected antecedents and consequents, it should be reckoned invalid, the critics maintain, for exactly this reason.[2]

(CC) has also been implicitly challenged on proof theoretic grounds. A *(subjunctive conditional modal) logic* is any set of formulas in the language

Philosophical Studies **44** (1983) 71–110. 0031–8116/83/0441–0071$04.00

of $\Box\!\!\rightarrow$-enriched nonmodal propositional logic which contains the truth functional tautologies and is closed under the inference rules of *Modus Ponens (MP)* and *Uniform Substition (US)*. Let L be any logic containing (CC) and the detachment formula

(CMP) Conditional Modus Ponens

$$(p \Box\!\!\rightarrow q) \rightarrow (p \rightarrow q).$$

Then it is easy to show that the formula $p \rightarrow ((p \Box\!\!\rightarrow q) \leftrightarrow (p \rightarrow q))$, according to which subjunctive conditionals with true antecedents collapse into material conditionals, is a theorem (i.e., a member) of L.[3] Finally, a number of authors, among them Fine (*loc. cit.*), Bennett (*op. cit.*, pp. 387–388), van Fraassen (1976, p. 250), and Nute (1975a, p. 477), have proposed putative counter-examples to (CC).

Advocacy of (CC) within the literature has also assumed a variety of forms. First, the validity of (CC) is a *prima facie* consequence of the formal semantic truth conditions for subjunctive conditionals endorsed by Stalnaker (1968, p. 104), Lewis (1973a, p. 29), Pollock (1976a, p. 473 and 1976b, pp. 14 and 21), and others. Second, Lewis (*op. cit.*, pp. 27–28) and Pollock (1976b, pp. 38–39) have cited natural language examples which allegedly confirm (CC). Finally, Stalnaker (*op. cit.*, pp. 101–102) and Pollock (1976b, pp. 25–26) expressly reject the Connection Hypothesis, and their explanation of its putative failure appears to validate (CC).[4]

Debate over (DD) has stemmed from the following axiomatic considerations. A subjunctive conditional modal logic is said to be *classical* iff it is closed under the inference rules

(AR) Antecedent Replacement

$$(A \leftrightarrow A')/(A \Box\!\!\rightarrow C) \leftrightarrow (A' \Box\!\!\rightarrow C)$$

and

(CR) Consequent Replacement

$$(C \leftrightarrow C')/(A \Box\!\!\rightarrow C) \leftrightarrow (A \Box\!\!\rightarrow C').$$

However, Brian Chellas (1975, p. 151) has observed that the formulas (DD) and

(AS) Antecedent Strengthening

$$(p \mathrel{\Box\!\!\rightarrow} q) \rightarrow ((p \wedge r) \mathrel{\Box\!\!\rightarrow} q)$$

are provably equivalent in any classical logic, indeed in any logic closed under (AR).[5] Since consensus in the field has it that there are decisive counter-examples to (AS), this consequence is considered to spell disaster for either (AR) or (DD).[6]

Additional evidence for the incompatibility of (AR) and (DD) has recently been provided by Nute (1980a, p. 29). Let L be any classical logic which contains (DD) and the formula

(CD) Conjunction Distribution

$$(p \mathrel{\Box\!\!\rightarrow} (q \wedge r)) \rightarrow ((p \mathrel{\Box\!\!\rightarrow} q) \wedge (p \mathrel{\Box\!\!\rightarrow} r)).$$

Then it is possible to show that the formula

(SC) Strict Conditionalization

$$(p \mathrel{\Box\!\!\rightarrow} q) \rightarrow \Box(p \rightarrow q),$$

according to which all subjunctive conditionals are strict conditionals, is a theorem of L, where the unary modal necessity operator $\Box$ is contextually defined from $\Box\!\!\rightarrow$ as follows:

(Df $\Box$) Definition of $\Box$ from $\Box\!\!\rightarrow$

$$\Box p =_{\mathrm{df}} -p \mathrel{\Box\!\!\rightarrow} p.^7$$

However, upon combining (SC) with its converse, one obtains not only (AS) but the allegedly invalid principles

(CS) Conditional Syllogism

$$((p \mathrel{\Box\!\!\rightarrow} q) \wedge (q \mathrel{\Box\!\!\rightarrow} r)) \rightarrow (p \mathrel{\Box\!\!\rightarrow} r)$$

and

(CT) Conditional Transposition

$$(p \mathrel{\Box\!\!\rightarrow} q) \rightarrow (-q \mathrel{\Box\!\!\rightarrow} -p)$$

as well. But since (CR), (CD), and the converse of (SC) are generally regarded as otherwise unobjectionable, the suspicion once again falls to either (AR) or (DD).[8]

As with (CC), opinion in the literature over (DD) has been mixed. Creary and Hill (1975, pp. 342–343), Nute (1975b, p. 776 and 1980a, p. 32), Fine (*op. cit.*, p. 453), and Ellis *et al.* (1977, p. 335) have presented natural language examples which support (DD). However, following a suggestion of Fine (*op. cit.*, pp. 453–454), Loewer (1976, pp. 532–537) and Lewis (1977, pp. 360–361) have attempted to explain this evidence away by denying that the English tokens used to confirm the validity of (DD) truly have this formula's logical form. Creary and Hill (*loc. cit.*) and Nute (1980a, p. 34) have observed that (AR) by itself licenses counterintuitive inferences of the form $(A \vee (A \wedge -C)) \mathrel{\Box\!\!\rightarrow} C$ from $A \mathrel{\Box\!\!\rightarrow} C$, while McKay and van Inwagen (1977, pp. 354–355), Michael Dunn (in conversation) and Gärdenfors (1980, pp. 166–167) have offered putative counterexamples to (DD).[9]

The contents of the present paper are as follows. In the next section, I present a simple argument which I think shows that at least one of (CC) and (DD) *must* be invalid. Then in Sections 3 and 4, respectively, (DD) and (CC) are resubjected to independent scrutiny. Finally, the paper concludes in Section 5 with some general methodological remarks which my studies of the (CC) and (DD) controversies have prompted.

2. A PAIR OF INCOMPATIBILITY RESULTS

Until recently, the disputes over (CC) and (DD) have been waged along separate fronts, although it is a matter of interesting fact that no one in the literature has ever explicitly endorsed both of these formulas simultaneously.[10] However, it has now been clearly suggested by Nute (1980a, pp. 40–41) that the issues of accepting or rejecting (CC) and (DD) are not independent. According to Nute, the strict conditionalization formula (SC) follows from (CC) and (DD) in the presence of certain otherwise *prima facie* innocent formulas.[11] Nute does not present a deduction showing exactly which subjunctive principles suffice with (CC) and (DD) to produce (SC), but I have managed to strengthen his result to this:

OBSERVATION I. Any logic which contains (CC), (DD), and (CMP) contains (SC).

Proof. By deduction (where 'PL' refers to inferences sanctioned by truth-functional propositional logic):

(1)	$(p \mathbin{\Box\!\!\rightarrow} q) \rightarrow (p \rightarrow q)$	(CMP)
(2)	$(p \rightarrow q) \rightarrow (((p \rightarrow q) \vee -(p \rightarrow q)) \wedge (p \rightarrow q))$	Tautology + (US)
(3)	$(((p \rightarrow q) \vee -(p \rightarrow q)) \wedge (p \rightarrow q)) \rightarrow (((p \rightarrow q) \vee -(p \rightarrow q)) \mathbin{\Box\!\!\rightarrow} (p \rightarrow q))$	(CC) + (US)
(4)	$(((p \rightarrow q) \vee -(p \rightarrow q)) \mathbin{\Box\!\!\rightarrow} (p \rightarrow q)) \rightarrow (-(p \rightarrow q) \mathbin{\Box\!\!\rightarrow} (p \rightarrow q))$	(DD) + (US) + PL
(5)	$(p \mathbin{\Box\!\!\rightarrow} q) \rightarrow (-(p \rightarrow q) \mathbin{\Box\!\!\rightarrow} (p \rightarrow q))$	(1)–(4) + PL
(6)	$(p \mathbin{\Box\!\!\rightarrow} q) \rightarrow \Box(p \rightarrow q)$	(5) + (Df$\Box$)

Since the validity of (CMP) seems unimpeachable and (Df$\Box$) is standard, one would expect this result to suffice for most as a clear demonstration of the incompatibility of (CC) and (DD).[12] However, Warmbrōd (1981, p. 278) has recently advocated the identification of subjunctive implication with strict implication, so there is at least some controversy over whether (SC) is implausible after all. But rather than embroil myself in a debate over (SC), I would like to call attention, instead, to the following less defensible fact.

OBSERVATION II. Any logic which contains (CC) and (DD) contains $p \rightarrow \Box p$.[13]

Proof.

(1)	$p \rightarrow ((-p \vee p) \wedge p)$	Tautology
(2)	$((-p \vee p) \wedge p) \rightarrow ((-p \vee p) \mathbin{\Box\!\!\rightarrow} p))$	(CC) + (US)
(3)	$((-p \vee p) \mathbin{\Box\!\!\rightarrow} p) \rightarrow (-p \mathbin{\Box\!\!\rightarrow} p)$	(DD) + (US) + PL
(4)	$p \rightarrow (-p \mathbin{\Box\!\!\rightarrow} p)$	(1)–(3) + PL
(5)	$p \rightarrow \Box p$	(4) + (Df$\Box$)

Now deterministic considerations and general modal scepticism notwithstanding, I consider the principle that anything which is true is necessarily true to be a manifest absurdity. Hence, for me, the preceding deduction is a *reductio* of the possibility of the joint validity of (CC) and (DD). But before I advance to the individual cases for and against (CC) and (DD), I suppose I must say something about (Df$\Box$) since, in principle, one could escape the (CC)–(DD) dilemma by rejecting the inference from (4) to (5) in the deduction above. However, it is unclear to me on what grounds one would do this. For in the way of intuitive justification, if $-p$ implied p, then since $-p$ also implies itself, $-p$ would be self-contradictory in which case p would be logically necessary. Conversely, if p is logically necessary, then denial of p would be self-contradictory in which case everything, including p, would follow. Now I can almost hear the grumblings of the relevance logicians over my last remark, but even if they are right (and on some points of relevance logic, I believe they are), that is immaterial here. For my deduction only invokes the right-to-left direction of (Df$\Box$) which, as far as I can see, does not violate relevantist sensibilities.[14] Moreover, even if there should be some valid objection to this half of the definition, the deduction of $-p \Box\!\!\rightarrow p$ from p would stand, and this result is problematic in itself. For assuming bivalence, notice that $p \rightarrow (-p \Box\!\!\rightarrow p)$ would render counterfactual supposition itself impossible; one could never entertain what things would be like if a given true proposition were false since every proposition would still be true even if it were false. So in my opinion, there is little to be gained from saddling (Df$\Box$) with the blame for either of the foregoing results.

3. REMARKS ON (DD)

There is no question that much of what early enthusiasm there was for (DD) has waned. For example, the defense of (DD) begun in Nute (1975b), continued in Nute (1978), and culminated in Nute (1980a) has been superseded by Nute (1980b, pp. 358–359), where (DD)'s previously staunchest advocate writes:

> Contrary to what I have maintained elsewhere, SDA [= (DD)] is not a generally acceptable thesis of conditional logic.

Moreover, since other initial supporters of (DD) have thus far failed to rally to its defense, it would appear that Nute's present stand on the status of (DD) is representative of current opinion in the field.

But why the shift in support away from (DD)? I think the most decisive factor, aside from the insistence on classicality, has been the appearance of the purported counterexamples. The adherents of (DD) correctly observed that $\Box\!\!\rightarrow$ does seem to distribute over disjunction in certain cases. For instance,

(3.1) If I were the owner of a Porsche or I were the owner of a Mercedes, I would take better care of my car.

does appear to imply both

(3.2) If I were the owner of a Porsche, I would take better care of my car.

and

(3.3) If I were the owner of a Mercedes, I would take better care of my car.

However, it was pointed out only later that there also seem to be true subjunctive conditionals of the form $(A \vee B) \mathbin{\Box\!\!\rightarrow} A$, and that distributing such conditionals along (DD) lines can lead to absurd results.

Consider, for instance, the example proposed by McKay and van Inwagen (*loc. cit.*). Suppose someone were to ask which side Spain joined in the Second World War. The correct reply, of course, would be "neither" since as a matter of historical fact, Spain did not formally enter the war. But nonetheless, it is reasonable to maintain that in light of Spain's political leanings at the time, the following sentence is true:

(3.4) If Spain had fought for the Axis or Spain had fought for the Allies, Spain would have fought for the Axis.

But assuming that (3.4) is, in fact, an instance of (DD)'s antecedent, we would be forced to conclude

(3.5) If Spain had fought for the Allies, Spain would have fought for the Axis.

which on anyone's normal reckoning is false. Dunn's example, as recounted by Nute (1980a, p. 37) is similar. On the supposition that

(3.6) If Gladhand were to run for the Senate or for the House, he would run for the Senate.

it again does not appear to follow, as (DD) would dictate, that

(3.7) If Gladhand were to run for the House, he would run for the Senate.

These examples seem as compelling as one is likely to find in philosophy. However, since Nute (1980a, pp. 37–40) and Warmbrōd (*op. cit.*, pp. 283–285) have defended (DD) against such examples, I will devote the remainder of this section to their replies. As I have already indicated, Nute no longer endorses (DD), so my comments on his responses should be construed as primarily for the record.

In his initial deliberations over (3.4)–(3.7), Nute suggested three possible rejoinders. The first of these begins with the remark that both (3.4) and (3.6) depend on disjuncts that are, in some contingent sense, mutually exclusive. But if so, then it could be claimed that the sense of 'or' in (3.4) and (3.6) is exclusive rather than inclusive. However, since (DD) is a distribution principle for inclusive disjunctions, (3.4) and (3.6) would not be instances of (DD)'s antecedent after all; the logical form of (3.4) and (3.6) would be $((A \vee B) \wedge -(A \wedge B)) \mathbin{\Box\!\!\rightarrow} A$ rather than $(A \vee B) \mathbin{\Box\!\!\rightarrow} A$ and in that case, the alleged counterexamples to (DD) would appear to be blocked.

As Nute (*loc. cit.*) relates, Alan Gibbard has objected to this response on the grounds that there are alternative definitions of exclusive disjunction under which the problem with (DD) persists. For example, if the form of (3.4) is construed as $((A \wedge -B) \vee (-A \wedge B)) \mathbin{\Box\!\!\rightarrow} A$, then an application of (DD) to (3.4) would yield

(3.8) If Spain had not fought for the Axis and had fought for the Allies, Spain would have fought for the Axis.

which is just as bad, if not worse, than (3.5). However, there is another reason why this response won't do: not all putative counterexamples to (DD) turn on mutually exclusive alternatives as the following example will demonstrate.

Given the ups and downs of the philosopher's trade these days, I can imagine myself auditioning for the part of a clown on a children's television show. As part of my screen test, I am offered a choice: take a pie in the face or get sloshed with a bucket of water. The amused director wryly adds, "Of course, you can do both if you like". I realize that I must do one or the other and as the facetious director has said, I may do both. I examine the water and find that it is ice cold. On the other hand, the pie is a shaving cream pie and I need a shave anyway. So based upon my described predilections, the following seems true:

(3.9) If it were the case that either I get hit with a pie or get dowsed with water (or both), then it would be the case that I get hit with a pie and do not get dowsed with water.

However, by (DD), it would follow that

(3.10) If it were the case that I get dowsed with water, then it would be the case that I get hit with a pie and do not get dowsed with water.

which is false. In fact, by the conjunction distribution axiom (CD), (3.10) implies

(3.11) If it were the case that I get dowsed with water, then it would be the case that I do not get dowsed with water.

which by (Df$\Box$) and antecedent replacement of double negatives would make it *necessary* that I do not get wet. So regardless of its effectiveness in cases where it can be applied, the exclusive disjunction formalization statagem does not insulate (DD) from counterexample in general.

The second defense of (DD) suggested by Nute proceeds from his remark that (3.4) and (3.6) appear to have consequences which "conditionals with disjunctive antecedents do not usually have". The claim is that (3.4) and (3.6) seem to imply

(3.12) If Spain had fought for the Axis or Spain had fought for the Allies, Spain would not have fought for the Allies.

and

(3.13) If Gladhand were to run for the Senate or for the House, he would not run for the House.

respectively. In contrast, Nute continues, there are conditionals with the apparent form of (3.4) and (3.6), viz $(A \vee B) \Box\!\!\rightarrow A$, which do not imply sentences of the form $(A \vee B) \Box\!\!\rightarrow -B$. His example is this. Suppose Olive Oyl (Popeye the sailor's consort) knows that Wimpy (Popeye's hamburger-loving friend) is being offered a hamburger and a hot dog. Olive does not know how Wimpy feels about hot dogs, but she knows he adores hamburgers. Then, Nute maintains, Olive correctly believes

(3.14) If Wimpy were to take the hamburger or the hot dog, he would take the hamburger.

However, he also claims that Olive would not believe (and rightly so)

(3.15) If Wimpy were to take the hamburger or the hot dog, he would not take the hot dog.

and would be correct in believing

(3.16) If Wimpy were to take the hot dog, he would (also) take the hamburger.

The foregoing linguistic considerations lead Nute to speculate that perhaps (3.4) and (3.6) are not ordinary subjunctive conditionals at all but rather, cases involving some operator other than $\Box\!\!\rightarrow$ with a special logic of its own. Writing $\blacksquare\!\!\rightarrow$ for the operator in question, Nute's proposal would then be to affirm (DD) for $\Box\!\!\rightarrow$, reject it for $\blacksquare\!\!\rightarrow$, construe the form of cases like (3.14) as $(A \vee B) \Box\!\!\rightarrow A$ (provided they do not imply sentences of the form $(A \vee B) \Box\!\!\rightarrow -B$), and regard cases like (3.4) and (3.6) as instances of $(A \vee B) \blacksquare\!\!\rightarrow A$.[15]

Now I must confess to a certain amount of sympathy for this reply. On the one hand, we have the simple and direct view that the only difference between (3.1) and (3.4) is one of generality, the latter's form, $(A \vee B) \Box\!\!\rightarrow A$, being merely a special case of the former's, $(A \vee B) \Box\!\!\rightarrow C$. On the other hand, I can see how one might claim that (3.1) and (3.4) express different sorts of propositions with different sorts of truth conditions, (3.1) being an assertion that a given state of affairs would obtain if either of two other states of affairs were to obtain, and (3.4) being a claim to the effect that one of two states of affairs (which, in fact, did not obtain) would have been the 'more likely', in some sense, to occur.[16] Indeed, a connection theorist might have some difficulty in subsuming cases like (3.4) under the Connection Hypothesis since they are neither entailments nor paradigmatic of the straightforward sort of causal connection exemplified in

(3.17) If this match were struck, it would light.

As I will suggest in Section 5, I think there may be independent reasons for treating (3.1) and (3.4) as differing in kind. But for now, I simply wish to point out that we needn't do this just to explain (3.12)–(3.16). A natural explanation of Nute's corpus can be given within the standard $\Box\!\!\rightarrow$-framework, and as a matter of fact, the explanation I have in mind exploits a move Nute made in his first reply to McKay, van Inwagen, and Dunn.

Recall that, in effect, Nute claimed that the antecedent of (3.4) was elliptical for something more adequately expressed in

(3.18) If Spain had fought for the Axis or Spain had fought for the Allies, and not for both the Axis and the Allies, Spain would have fought for the Axis.

But then, one could make a similar claim about the *consequent* of (3.4), contending that it is elliptical for what is more fully expressed in

(3.19) If Spain had fought for the Axis or Spain had fought for the Allies, Spain would have fought for the Axis and not for the Allies.

Indeed, you will remember that I employed such literal-mindedness in my formulation of (3.9). But then, one could say that the *apparent* implication of (3.12) by (3.4) is just the *actual* implication of (3.12) by (3.19) as licensed by the conjunction distribution principle (CD). The apparent implication of (3.13) by (3.6) would be explained in the same way. Olive Oyl's lack of belief in (3.15) would be explained by her lack of belief in

(3.20) If Wimpy were to take the hamburger or the hot dog, he would take the hamburger and not take the hot dog.

and finally , if we recast (3.16) as

(3.21) If Wimpy were to take the hot dog, he would take the hamburger and take the hot dog.

we could maintain that (3.16) comes from (3.14) and the negation of (3.15) by, say,

(RDD) Restricted Disjunction Distribution

$$(((p \vee q) \Box\!\!\rightarrow r) \wedge -((p \vee q) \Box\!\!\rightarrow -q)) \rightarrow ((p \Box\!\!\rightarrow r) \wedge (q \Box\!\!\rightarrow r)),$$

(CI) Conditional Identity

$$p \Box\!\!\rightarrow p,$$

and

(CC′) Conjunction Composition

$$((p \Box\!\!\rightarrow q) \wedge (p \Box\!\!\rightarrow r)) \rightarrow (p \Box\!\!\rightarrow (q \wedge r)).$$[17]

So there are explanations of Nute's linguistic evidence which do not require additional modal apparatus or acceptance of (DD).

Nute's third and final defense of (DD), suggested to him by Dan Turner, is to claim that (3.4) and 3.6) are synonymous with

(3.22) If Spain had chosen between fighting for the Axis and fighting for the Allies, Spain would have chosen to fight for the Axis.

and

(3.23) If Gladhand were to choose between running for the Senate and running for the House, he would choose to run for the Senate.

respectively, and to note that (3.22) and (3.23) are not of a form to which (DD) can be applied. However, even if the truth of these remarks be conceded (and I see no reason not to), I fail to see how they can be considered as a response to the examples. For the fact that (3.4) and (3.6) can be paraphrased in ways to which (DD) cannot be applied doesn't show that the axiom cannot be applied to the *original* sentences. So in the absence of some further argument which shows why (3.4) and (3.6) are things which 'cannot be said', this reply does nothing to weaken the credibility of the counterexamples.

I now wish to turn to Warmbrōd's defense of (DD). Space considerations dictate that my synopsis be brief and informal, but in the event that something crucial should be lost in my simpleminded rendition, I refer the reader to Warmbrōd (1981) or Nute (1981, pp. 143–146) for more technically precise presentations.

According to Warmbrōd, putative counterexamples to (DD) involve a type of pragmatic equivocation. An interpretation which makes (3.4) true, he argues, incorporates the presupposition that Spain did not fight for the Allies. But such an interpretation would trivially *verify*, rather than falsify, (3.5). Consequently, Warmbrōd suggests, we shift to a new interpretation in evaluating (3.5) which does not include our original presupposition. It is this construction of separate interpretations for instances of the antecedent and consequent of (DD) that Warmbrōd calls an equivocation, and thus, he contends, the supposed counterexamples are bogus since they rely on a form of equivocation to work.

Now I think there is no denying Warmbrōd's initial observation; the presuppositional adjustments he detects in the examples most surely occur. However, I am not exactly sure what this has to do with the matter at hand. In the case of McKay and van Inwagen, for example, I thought the issue was whether (3.4) and (3.5) constitute an instance of (DD) with an antecedent and consequent which are, *in fact*, respectively true and fase. But if it is, I fail to see how the pragmatic issue of what personal background assumptions people make upon uttering or hearing (3.4) and (3.5) is of relevance here. This suggests that perhaps Warmbrōd has a different project in mind to begin with, and I will further address this possibility in Section 5. Until then, however, questions can be raised about Warmbrōd's theory of subjunctive conditional presupposition itself.

Warmbrōd proposes to write off alleged counterexamples to (DD) and other suspect principles like (CS) and (CT) as equivocal. But for an equivocation to be fallacious, it must be more than a shift of *some* kind; it must be an *illegitimate* shift. However, I hardly think that the kind of adjustment Warmbrōd cites is illegitimate. On the contrary, I believe it is necessitated by the nature of subjunctive implication itself. The presuppositions that are to be held constant in the evaluation of a subjunctive conditional are, in part, a function of the antecedent of the conditional. As such, it is to be expected that subjunctive conditionals with distinct antecedents will ordinarily require distinct presuppositions. The basic idea is that a subjunctive conditional is evaluated against a set of implicit background presuppositions which are altered just enough to accomodate the hypothetical truth of the antecedent without inconsistency. Of course, there will be certain natural constraints on what presuppositional alterations are admissible for subjunctive conditionals, like (3.4) and (3.5), with related antecedents, and semantic theories of subjunctive implication have attempted to explicate these constraints in various ways. However, it is my view that if Warmbrōd's constraints require that the presupposition that Spain did not fight for the Allies be held constant in the evaluation of (3.4) and (3.5), these constraints are just too strong.

I realize that in saying this, I am simply denying what Warmbrōd affirms. According to him, subjunctive conditional presuppositions are fixed at the onset of a piece of human discourse by an initial subjunctive conditional's antecedent, and then those presuppositions are to be held constant throughout the discourse (however discourses are to be individuated), even when subjunctive conditionals with new antecedents appear in the context. But this is merely to proffer an alternative account of subjunctive conditional presupposition to the standard one, and in view of the plausibility of the latter, I think the burden of proof remains with Warmbrōd to show why the standard account, as I outlined it, is mistaken. The fact that Warmbrōd's account can explain away putative counterexamples (if, indeed, it can) does not in itself show that such examples are in fact only putative or that the account underlying the explanations is correct.[18]

4. REMARKS ON (CC)

As stated in Section 1, defense of (CC) within the literature has come from three distinct sources: formal semantics, natural language, and alleged refutation of the Connection Hypothesis. The formal semantic argument for (CC) runs somthing like this. Semantics X, where X = the similarity semantics of either Stalnaker or Lewis or the minimal change semantics of Pollock, is the correct semantics for subjunctive implication. The validity of (CC) is a conceptual consequence of the interpretation of X.[19] Therefore, (CC) is valid.

The soundness of this argument depends, of course, on the premise that Stalnaker, Lewis, or Pollock has the right semantics for subjunctive implication. I personally think this premise is false but unfortunately, my reasons for thinking so involve technical considerations which lie beyond the scope of this paper.[20] However, this omission will prove less serious than it sounds since at least in the cases of Stalnaker and Pollock, their formal semantic analyses are intended as explications of their preformal positions on the Connection Hypothesis, and I intend to discuss the latter in detail.

This brings us to the linguistic evidence for (CC). Lewis (1973a, p. 27) cites the following piece of hypothetical conversation:

> You say: 'If Caspar had come, it would have been a good party.' ... I reply: 'That's true; for he *did*, and it *was* a good party. You didn't see him because you spent the whole time in the kitchen, missing all the fun.'

Pollock (1976b, p. 38) relies on the following considerations:

> ... suppose someone asserts $A \mathrel{\Box\!\!\rightarrow} C$, and upon investigation we find that A and C are both true. This verifies the assertion that if A were true, C would be true; because A is true, and sure enough, C is true too. For example, we might affirm of a political candidate, 'If he were elected, he would end the war.' If the candidate is subsequently elected, and does end the war, this shows that we were right.[21]

Now I do not intend to contest the foregoing evidence, but I do suggest that we refrain from drawing too hasty a conclusion from it. For one thing, we have already seen in the case of (DD) what can happen when one tries to argue indictively from a small sample of favorable instances to the validity of an argument form. For another, as we shall see, the examples Lewis and Pollock cite are not representative of the kinds of cases which have worried advocates of the Connection Hypothesis, viz cases in which the antecedent and consequent are either totally unrelated or accidentally correlated. So in light of previous experience, I think we should regard the linguistic evidence for (CC) as highly inconclusive at best.

So this brings us to the matter of the Connection Hypothesis. As I suggested in Section 1, while there seems to be general agreement that an antecedent-consequent (a-c) connection is a *sufficient* condition for $\Box\!\!\rightarrow$ truth, it has been contended by Stalnaker and Pollock that a connection of this sort is not necessary. For example, speaking in a pragmatic vein, Stalnaker (1968, p. 101) writes:

> It (= connection) is sometimes relevant to the evaluation of a conditional, and sometimes not. If you believe that a causal or logical connection exists, then you will add the consequent to your stock of beliefs along with the antecedent, since the rational man accepts the consequences of his beliefs. On the other hand, if you already believe the consequent (and if you also believe it to be causally independent of the antecedent), then it will remain a part of your stock of beliefs when you add the antecedent, since the rational man does not change his beliefs without reason. In either case, you will affirm the conditional. Thus this answer accounts for the relevance of "connection" when it is relevant without making it a necessary condition of the truth of a conditional.

The following quotation from Pollock (1976b, p. 26) is similar:

> Contrary to the traditional assumption, it seems clear that simple subjunctives do not express a relation of necessitation between their antecedent and consequent. Rather, the presence of such a connection is just one ground for asserting a simple subjunctive. It seems that there are basically two ways that a simple subjunctive can be true. On the one hand, there can be a connection between the antecedent and consequent so that the truth of the antecedent would bring it about, i.e., necessitate, that the consequent would be true. On the other hand, a simple subjunctive can be true because the consequent is already true and there is no connection between the antecedent and the consequent such that the antecedent's being true would interfere with the consequent's being true.

The observation that there are subjunctive conditionals which are true due to the *absence*, rather than the *presence*, of a connection goes back at least as far as Goodman (1947, pp. 5–6). Goodman spoke of a class of subjunctive conditionals he called *semifactuals*; semifactual subjunctive conditionals have true consequents and are typically of the form 'even if it were the case that ..., it would still be the case that _____'. For instance, Pollock (*loc. cit.*) uses the following example to illustrate a case of semifactuality:

(4.1) Even if the witch doctor were to do a rain dance, it still would not rain.

The point here is that if (4.1) is true, it surely is not true because there would be some causal connection between the witch doctor's dancing and it not raining. On the contrary, (4.1) would be true, presumably, because independent meteorological factors have already determined that there is to be no rainfall, and the witch doctor's efforts to induce rain would be causally inefficacious in altering these conditions.

Following Pollock (1975) and (1976b), let us extend our notation and use $\boxed{1}\!\!\rightarrow$ to represent subjunctive conditionals which require an a-c connection (*Type 1* subjunctive conditionals) and $\boxed{2}\!\!\rightarrow$ to represent semifactual (or *Type 2*) subjunctive conditionals. Then the intuitive conception of subjunctive conditional truth proposed by Stalnaker and Pollock may be represented by

(SPH) The Stalnaker–Pollock Hypothesis

$$(p \mathrel{\Box\!\!\rightarrow} q) \leftrightarrow ((p \mathrel{\boxed{1}\!\!\rightarrow} q) \vee (p \mathrel{\boxed{2}\!\!\rightarrow} q)).$$ [22]

It is worth noting that although (SPH) is consistent with both men's views, Stalnaker and Pollock construe semifactuals somewhat differently, and this difference leads to distinct interpretations of (SPH). In maintaining that a semifactual $A \mathrel{\boxed{2}\!\!\rightarrow} C$ holds whenever C does and C's truth depends neither logically nor causally on A's the disjunction in (SPH) for Stalnaker is exclusive. According to Pollock, however, $A \mathrel{\boxed{2}\!\!\rightarrow} C$ holds when C does and there is no connection between A and C such that A's truth would interfere with C's. Now when A, C, and $A \mathrel{\boxed{1}\!\!\rightarrow} C$ all hold, A's truth, in *producing* C's, clearly won't *interfere* with C's truth. So for Pollock, $A \mathrel{\boxed{1}\!\!\rightarrow} C$ and $A \mathrel{\boxed{2}\!\!\rightarrow} C$ are not mutually exclusive, and there are conditions under which the former implies the latter.[23] Personally, I feel that the stronger conception of semifactuality proposed by Stalnaker is the more natural of the two, but let us keep both in mind as we proceed.

(SPH), then, encapsulates the Stalnaker–Pollock explanation of why a-c connections are unnecessary for $\Box\!\!\rightarrow$ truth. However, implicit in (SPH) is not only a refutation of the Connection Hypothesis, but an argument for the validity of (CC) as well. For suppose p and q are both true. Then either p's truth brings about q's or it does not. If it does, then $p \mathrel{\boxed{1}\!\!\rightarrow} q$ and thus $p \mathrel{\Box\!\!\rightarrow} q$ by (SPH). If it does not, then q's truth is independent of p's and since q holds by assumption, $p \mathrel{\boxed{2}\!\!\rightarrow} q$ and $p \mathrel{\Box\!\!\rightarrow} q$ again by (SPH). So when p and q are true, $p \mathrel{\Box\!\!\rightarrow} q$ holds in any case whence (CC) is valid.

Thus, the Stalnaker–Pollock account of *factuals*, i.e. subjunctive conditionals with true antecedents and consequents, is this: when an a-c connection obtains, the connection suffices for the truth of the factual; when no such connection exists, the truth conditions for semifactuals take over and as the argument above shows, this implies the validity of (CC).

Now all of this seems very plausible. So why have there been attempts to construct counterexamples to (CC)? Let's have a look at a couple of these examples, beginning with the following case discussed by Fine (*op. cit.*, p. 453):

> I may speculate on a student's prospects in an exam, the results of which are already settled, and assert: if he had worked hard, he would have passed. My assertion is false if the student worked hard but was only able to pass through cheating. ... Indeed, such counterfactuals hold in virtue of a connection between antecedent and consequent that is not guaranteed by the truth-values of the components alone.

The question is whether or not

(4.2) If he had worked hard, he would have passed.

is true in the described circumstances. However, there are two possibilities consistent with those circumstances:

CASE ONE. The student's hard work was necessary for the student to pass; the cheating alone would not have sufficed.

CASE TWO. The student cheated so assiduously as to render his hard work causally irrelevant.[24]

That is, in the first case,

(4.3) If he had not worked hard, he would not have passed.

is true, while in the second case, this is false.

Taking the second and easier case first, an (SPH) advocate would rule (4.2) true on semifactual grounds. For since the student's hard work was causally preempted by the cheating, the student's passing was causally independent of his work. However, the situation in Case One is more complex. It is clear that (4.2) is meant to assert that the student would pass *because* he worked hard. If we further understand this claim as asserting that the student would pass *simply because* he worked hard, i.e. that the student's hard work would, by itself, be sufficient for the student to pass, then (4.2) would be false in Case One as Fine suggests. But unfortunately, the matter is not that simple. As Mackie (1965, p. 245) has reminded us, a cause is never sufficient *by itself* for its effect; it is always and only sufficient against a background set of prevailing conditions. Even if Fine's student had worked hard enough to pass, he may not have passed had he been late for the exam or received inadequate rest the night before.[25] So (4.2) must mean that under certain background circumstances, the student's hard work would be causally sufficient for the student to pass. But the problem is that among the background circumstances like the student's promptness and restedness is the student's cheating, which together with the student's preparation caused the student to pass. So is (4.2) true? If we count the cheating among the relevant background conditions, we seem forced to the conclusion that (4.2) is true in Case One as well. My intuitions tell me that we should *not* count this condition, but I am not sure why. It is clear enough that one would not *presuppose* the student cheating in a normal context of uttering (4.2), but this a pragmatic point about assertion, not a semantic one about meanings and truth. Perhaps the thing for one unwilling to grant (4.2) to say is that propositions describing the relevant conditions are an implicit part of a subjunctive conditional's meaning, and that (4.2) *means* that under circumstances $C_1, ..., C_n$ (which do not include cheating), the student's hard work would be sufficient for the student to pass.[26] But to the extent that I am unsure about this, I am unsure whether Fine's example constitutes a genuine counterinstance of (CC).

The next example, which is due to Bennett (*op. cit.*, pp. 387–388), is a modification of the example used by Lewis to confirm (CC).

> Suppose that I believe (perhaps on hearsay) that Caspar didn't come to the party and that the party was a bad one, and I say "If Caspar had come, the party would have been a good one". You hear me say this, and you know that Caspar ruins most parties he attends, and that he nearly ruined this one. It was a good party *despite* the fact that Caspar came to it. Everyone on whom I have tried this example insists that the statement "If Caspar had come, the party would have been a good one" is *not true*; most say that it is *false*; ...

However, once again, the (SPH) camp has a straightforward reply. In view of the fact that the party turned out well somehow in spite of Caspar's sociopathic behavior,

(4.4) If Caspar had come, the party would have been a good one.

is true on semifactual grounds; Caspar's presence did not causally contribute to the party's eventual success. So again, the advocate of (SPH) can deny that there is a real counterexample here.

If your thoughts on the (SPH) treatment of these examples are at all like mine, you are by now thinking that something suspect is afoot here. For expository reasons, I shall withhold my explanation of what it is until Section 5, but in the meantime, I want to pursue a somewhat different tack against (CC). If the critics of this formula are right, then we should expect (CC), like

(DD), to have counterintuitive axiomatic consequences. I will confirm this expectation by presenting four, heretofore undiscussed such consequences. The first of them is this:

OBSERVATION III. Any logic which contains (CC) contains

(CB) Conjunction Biconditionalization

$$(p \wedge q) \rightarrow ((p \mathrel{\Box\!\!\rightarrow} q) \wedge (q \mathrel{\Box\!\!\rightarrow} p)).$$

Proof.

(1) $(p \wedge q) \rightarrow (p \mathrel{\Box\!\!\rightarrow} q)$	(CC)
(2) $(p \wedge q) \rightarrow (q \wedge p)$	Tautology
(3) $(q \wedge p) \rightarrow (q \mathrel{\Box\!\!\rightarrow} p)$	(CC) + (US)
(4) $(p \wedge q) \rightarrow (q \mathrel{\Box\!\!\rightarrow} p)$	(2) + (3) + PL
(5) $(p \wedge q) \rightarrow ((p \mathrel{\Box\!\!\rightarrow} q) \wedge (q \mathrel{\Box\!\!\rightarrow} p))$	(1) + (4) + PL

According to (CB), all true propositions are *subjunctively equivalent*: any true proposition subjunctively implies any other and conversely. But in objection to this, suppose it is raining and my lawn is wet. Then although

(4.5) If it were raining, my lawn would be wet.

is not doubt true, its converse

(4.6) If my lawn were wet, it would be raining.

sounds false. Common sense insists that the supposition that my lawn is wet does not imply that it is raining, even if it just so happens to be the case that my lawn is *presently* wet because it is raining. However, what would the advocate of (SPH) say? Well surely, it is not the case, as it is in (4.5), that the antecedent of (4.6) is logically or causally responsible for the truth of the consequent. So by (SPH), it must be that (4.6) is semifactually true; it just so happens that it is now raining outside, and my lawn's being wet would not causally affect this fact. However, do these circumstances suffice for the truth of (4.6)? I contend that they do not for reasons I will now explain.

A number of philosophers have made the point that certain subjunctive conditionals are either implicit generalizations themselves, or require some sort of generalizability for their truth. For example, Fine (*loc. cit.*), in discussing (4.2), comments:

If I say the assertion is true, I cannot generalize it to: if a student of similar ability had worked hard, then he would have passed.

Van Fraassen (1976, p. 250) employs the following example to make the same point:

Suppose you know that I am advocating a theory which you doubt, and I say: if you were to adjust parameter X to value x, you would find that Y had value y. And suppose you carry out the suggested manipulation and you find the described result. Then you cannot deny that I *predicted* correctly, but you will nevertheless not grant yet that my conditional assertion was true. You will say: let us try that again. And if the second time it does not work, you will say that the first outcome was accidental, and did not really show the correctness of my assertion at all.[27]

Finally, there are these remarks of Nute (1975a, p. 477) on the same topic:

Smith and Jones chance to meet Bill Russell on the street without recognizing him. Referring to Russell, Smith says to Jones, "That man would walk exactly that way if he were a basketball player." Although Smith's statement is a counterfactual with true antecedent and consequent, it seems clear that it might yet be false. Jones might reasonably reply, "That's not true. He needn't walk that way just because he happened to be a basketball player. A lot of tall men walk that way and a lot of tall basketball players walk differently.

Now this point about generalizability is obvious enough in the case of 'connectionist' conditionals. But I submit that a similar point holds for certain semifactuals as well. For in the same way that a connection between the propositions expressed by A and C cannot be inferred from a single correlation of A and C, the existence of the absence of a connection between A and C cannot be inferred from a single, perhaps accidental case of A not interfering with C. Remember, Pollock's semifactual truth conditions require that the antecedent's being true *would not* interfere with the truth of the consequent. But when we have a factual, the most we can legitimately say is that the antecedent's truth *did not* interfere with the consequent's truth, and hence that it would not interfere on at least one occasion. However, it does not follow from this that the antecedent's truth does not or would not *generally* interfere.[28] Indeed, make the additional assumptions for my example that I live in the desert, I generally water my lawn every day because it almost never rains, and the rain is the product of a freak storm. Then the antecedent of (4.6) is generally true under conditions which *falsify* its consequent. Bennett's example illustrates this point even more elegantly. Our tendency is to deny (4.4) because Caspar's presence is generally the sort of thing which *ruins* parties.

The same criticism holds under Stalnaker's construal of semifactuals. Some semifactuals are no doubt about particular events or, if I may be permitted to speak that language, about particular *exemplifications* of certain propositions.[29] However, some semifactuals are about more than this, and I think (4.6) is a good case in point. In applying (SPH) to (4.6), one is required to construe this sentence as being 'about' a single situation when it seems clear that the proposition expressed by (4.6) is general, and thus cannot be understood as being about a single situation.[30] Of course, one could reply that even general subjunctive conditionals are verifiable by a single occasion provided that occasion is somehow 'representative' or 'typical'. But this feature of the situation is precisely what is lacking in examples such as Bennett's and mine. So regardless of whether (4.6) is construed connectionistically or semifactually, the truth of the parts does not appear to suffice for the truth of the whole.[31]

My second observation about (CC) is as follows.

OBSERVATION IV. Any logic which contains (CC) contains

(C′C) Consequent Conditionalization

$$q \rightarrow ((p \mathrel{\Box\!\!\rightarrow} q) \vee (-p \mathrel{\Box\!\!\rightarrow} q)).$$

Proof.

(1) $q \rightarrow ((p \wedge q) \vee (-p \wedge q))$	Tautology
(2) $(p \wedge q) \rightarrow (p \mathrel{\Box\!\!\rightarrow} q)$	(CC)
(3) $(-p \wedge q) \rightarrow (-p \mathrel{\Box\!\!\rightarrow} q)$	(CC) + (US)
(4) $((p \wedge q) \vee (-p \wedge q)) \rightarrow ((p \mathrel{\Box\!\!\rightarrow} q) \vee (-p \mathrel{\Box\!\!\rightarrow} q))$	(2) + (3) + PL
(5) $q \rightarrow ((p \mathrel{\Box\!\!\rightarrow} q) \vee (-p \mathrel{\Box\!\!\rightarrow} q))$	(1) + (4) + PL

According to (C′C), any true proposition is subjunctively implied by any other proposition or its negation. But in objection to this, consider the following story. Two criminals are speeding down the street in a car. The driver, Fast Eddie Smith, erroneously believes that the passenger, Crazy Marlene Jones, has robbed a liquor store and that the police are after them. Smith had been reluctant to pull this particular job, having known that the store was staked out. Jones, who had entered the store alone, had realized that Smith had been right about the stake and had not carried out her original plan. So as a matter of fact, the police are not looking for them whence by (C′C), either

(4.7) If you had robbed that store, the cops wouldn't be after us.

or

(4.8) If you hadn't robbed that store, the cops wouldn't be after us.

is true. By the circumstances of the story, (4.7) is false, and you may imagine that Smith asserts (4.8) to Jones. But suppose, again unbeknownst to Smith, that Jones has stolen the Ford they are driving in and she knows that the police are going to issue a bulletin for them any minute on suspicion of grand theft auto, since the two of them were identified by Big Willie Brown: Marlene's ex-boyfriend and the owner of the car. Then I submit that under the circumstances, (4.8) isn't true either, and I don't see how one could seriously claim that the fact that the thieves are not wanted *at the moment* makes (4.8) true. Indeed, were Jones to respond to Smith "You're right", this would be, by my reckoning, a lie.

To motivate my next two observations, let me return to (4.6) for a moment. I claimed that the tendency of common sense is to rule (4.6) false because nothing definite about the weather subjunctively follows from the proposition that my lawn is wet; if my lawn were wet, it *might* be raining, but the grass could be wet for some other reason. The reader may be aware that a number of philosophers, some of whom endorse (CC), have called upon similar intuitions to reject another controversial subjunctive conditional formula:

(CEM) Conditional Excluded Middle

$$(p \mathrel{\Box\!\!\rightarrow} q) \vee (p \mathrel{\Box\!\!\rightarrow} -q).$$

For instance, Pollock (1976b, p. 32) claims that

(4.9) If the temperature outside were not 30°, then the temperature outside would not be 40°.

and

(4.10) If the temperature outside were not 30°, then the temperature outside would not be 40°.

should both be denied on the grounds that "if it weren't 30° out now then it might be 40° out now, but also it might be something else". That is, where the *weak* subjunctive conditional connective $\Diamond\!\!\rightarrow$ (read 'if it were the case that ..., then it might be the case that ______') is defined according to the standard

(Df$\Diamond\!\!\rightarrow$) Definition of $\Diamond\!\!\rightarrow$ from $\Box\!\!\rightarrow$

$$p \mathrel{\Diamond\!\!\rightarrow} q =_{\mathrm{df}} -(p \mathrel{\Box\!\!\rightarrow} -q),$$

Pollock's point, which has been reiterated in numerous places elsewhere, is that there are cases where both $A \Box\!\!\rightarrow C$ and $A \Box\!\!\rightarrow -C$ are false, viz cases in which $A \Diamond\!\!\rightarrow C$ and $A \Diamond\!\!\rightarrow -C$ are both true.[32]

Now Nute (1975a, p. 481) has already established one axiomatic link between (CEM) and (CC): any subjunctive conditional modal logic which contains (CEM) and (CMP) also contains (CC). However, as my next two results show, (CC) implies two weakened versions of (CEM).

OBSERVATION V. Any logic which contains (CC) contains

(AC) Antecedent Conditionalization

$$p \rightarrow ((p \Box\!\!\rightarrow q) \vee (p \Box\!\!\rightarrow -q).$$

Proof. Similar to that for (C′C).

Pollock and other critics of (CEM) never mitigate their denials of sentences like (4.9) and (4.10) with caveats about the actual truth value of the antecedents of such sentences. However, by (AC), it turns out that if it just so happens to be true that it is not 30° out now, then one of (4.9) and (4.10) is true after all. Indeed, if it happens now to be 40°, then it is also not 30° whence (4.9) holds by (CC), and if it happens to be any temperature out now other than 30° or 40°, then (4.10) is true, again by (CC). But then, what has become of the intuitions according to which (4.9) and (4.10) were both false? My intuition is that those original intuitions are still good, even when 'It is not 30°' happens to be true. Pollock (*loc. cit.*) writes:

> Insofar as there are different things that might be the case if p were true, it can happen that neither q nor $-q$ would be true in all the circumstances that might occur if p were true.[33]

But I maintain that different things still *might* be the case if p were true even when some particular things *are* the case because p *is* true.

My final observation about (CC) is this.

OBSERVATION VI. Any logic which contains (CC) contains

(CEF) Conditional Excluded Fifth

$$(p \Box\!\!\rightarrow q) \vee (p \Box\!\!\rightarrow -q) \vee (-p \Box\!\!\rightarrow q) \vee (-p \Box\!\!\rightarrow -q).$$

Proof.

(1)	$(p \wedge q) \to (p \,\Box\!\!\to q)$	(CC)
(2)	$(p \wedge -q) \to (p \,\Box\!\!\to -q)$	(CC) + (US)
(3)	$(-p \wedge q) \to (-p \,\Box\!\!\to q)$	(CC) + (US)
(4)	$(-p \wedge -q) \to (-p \,\Box\!\!\to -q)$	(CC) + (US)
(5)	$(p \wedge q) \vee (p \wedge -q) \vee (-p \wedge q) \vee (-p \wedge -q)$	Tautology
(6)	$(p \,\Box\!\!\to q) \vee (p \,\Box\!\!\to -q) \vee (-p \,\Box\!\!\to q) \vee (-p \,\Box\!\!\to -q)$	(1)–(5) + PL

However, in objection to (CEF), consider the following example. There is a room with an overhead light which is controlled by two ordinary, independent wall switches, i.e. the light can be turned on or off with either switch. I am trying to explain the workings of this electrical system to a child who is laboring under the misconception that the position of one of the toggle switches controls not only the light, but the position of the other switch as well. That is, the child mistakenly believes that when one of the light switches is flipped to the on-position, the other switch is automatically flipped to this position and so on. To show the child the error, I assert the following:

(4.11) No dear, you see, if the first switch were on, the second switch might be on, but if the first switch were on, then it could also be that the other switch is not on. In the same way, if the first switch were not on, then the second switch might also not be on, but the second switch could be on if the first switch were not on too.

It would seem that each of my weak subjunctive assertions is true whence by (Df$\Diamond\!\!\to$), so are their $\Box\!\!\to$ equivalents, contrary to (CEF). Moreover, although I would consider it endearingly precocious, it would be beside the point for the child to deny, say, my second conditional on the grounds that presently, it just so happens to be the case that both switches are on. For in explaining the general theory behind the system, the current positions of the switches are quite irrelevant to the truth or falsehood of my subjunctive assertions.

Such, then, are my axiomatic misgivings about (CC). However, since my case has relied in part upon guilt by association with (CEM), it is only appropriate that I end this section with some remarks in response to Stalnaker (1981) wherein (CEM) is defended. Since that article is more a defense of the semantics which validates (CEM) rather than of the intuitive plausibility of (CEM) itself, I shall confine myself to those of Stalnaker's remarks which bear directly on the formula.

For purposes of illustration, Stalnaker fixes on the following pair of conditionals which are based on examples due to Quine (1972, p. 21):

(4.12) If Bizet and Verdi had been compatriots, Bizet would have been Italian.

(4.13) If Bizet and Verdi had been compatriots, Bizet would not have been Italian.[34]

As I have already indicated, on accounts such as those of Lewis and Pollock that reject (CEM), (4.12) and (4.13) are both reckoned as false. But since Stalnaker endorses (CEM), he adopts the position that (4.12) and (4.13) are *indeterminate* (neither true nor false) rather than false. Stalnaker contends this truth-value gap is due to the fact that (4.12) and (4.13) are vague sentences. According to the theory of vagueness Stalnaker favors, viz the supervaluation theory of van Fraassen (1966), a vague sentence is true iff (roughly speaking) it is true under every way of making it precise; false iff it is false under every way of making it precise; and neither true nor false iff there are ways of making it precise under which it is true, and ways of making it precise under which it is false. Presumably, then, the sentence (4.12) is vague because its antecedent 'Bizet and Verdi are compatriots' is vague. This sentence could be "precisified" by 'Bizet and Verdi are Italian', 'Bizet and Verdi are French', and so on. But under the first precisification, (4.12) is true and under the second, it is false which makes (4.12) indeterminate as claimed. Yet as Stalnaker notes, the validity of (CEM) is unaffected by this theory. For under any way of making the antecedent of (4.12) precise, either (4.12) will be true or (4.13) will. So, Stalnaker concludes, one may retain (CEM) without being committed to saying that one in a pair of sentences like (4.12) and (4.13) must be true.[35]

The upshot of these remarks seems to be more that (CEM) is harmless rather than plausible. But Stalnaker bolsters his position with further considerations. First, he argues that his invocation of the supervaluation theory is not a resort to an *ad hoc*, theory-saving device since "some account of semantic indeterminacy is necessary anyway to account for pervasive semantic indeterminacy is necessary anyway to account for pervasive semantic underdetermination in natural language" and that it is commonly agreed that "vagueness is particularly prevalent in the use of conditional sentences".[36] Second, Stalnaker claims that his position on (4.12) and (4.13) favors "unreflective linguistic intuition" in a way which judging them both false does not. He writes:

> I think most speakers would be as hesitant to deny as to affirm either of the conditionals, and it seems as clear that one cannot deny them both as it is that one cannot affirm them both.[37]

and goes on to quote Lewis (1973a, p. 80) who says:

> Given Conditional Excluded Middle, we cannot truly say such things as this:
>
> It is not the case that if Bizet and Verdi were compatriots, Bizet would be Italian; and it is not the case that if Bizet and Verdi were compatriots, Bizet would not be Italian; nevertheless, if Bizet and Verdi were compatriots, Bizet either would or would not be Italian ...
>
> I want to say this, and think it is probably true; my own theory was designed to make it true. But offhand, I must admit, it does sound like a contradiction. Stalnaker's theory does, and mine does not, respect the opinion of any ordinary language speaker who cares to insist that it is a contradiction.

Now the first issue I would like to raise concerns Stalnaker's claim about "unreflective linguistic intuition". As I shall contend in Section 5, I think such intuitions are generally beside the point of philosophical logic anyway, but they seem particularly inconclusive here. For one thing, I wonder whether most speakers *would* be hesitant to deny both (4.12) and (4.13). I wonder if they wouldn't just say, as I would on hearing these sentences: "Not necessarily; the mere fact that they are compatriots doesn't imply which country they'd be from, so both claims are false". Second, even if a survey should prove me wrong on this count, I think that unreflective intuition would find

(4.14) It is not true that if Bizet and Verdi were compatriots, Bizet would be Italian; and it is not true that if Bizet and Verdi were compatriots, Bizet would not be Italian; nevertheless, it is true that if Bizet and Verdi were compatriots, then Bizet would not be Italian or if Bizet and Verdi were compatriots, Bizet would not be Italian.

which Stalnaker's account sanctions, at least as anomalous as Lewis's assertion. Consequently, I don't think unreflective linguistic intuition should be called on to adjudicate here.

My second point concerns the matter of vagueness itself. I agree with

Stalnaker that there is something indeterminate about the antecedent of (4.12) and (4.13), although I prefer the phrase 'semantically indefinite' to 'vague'. Paradigm cases of vague sentences are those which contain vague predicates like 'big' whose meanings are imprecise. But the meaning of the word 'compatriot' is not imprecise; it means being citizens of the same country. Of course, the term is indefinite, in some sense, since it does not specify *which* country the citizens are citizens *of*. But my worry is that if Stalnaker's theory commits us to construing every subjunctive conditional with a semantically indefinite antecedent as indeterminate, the theory commits us to too much. To illustrate, I take it that Stalnaker would contend that Pollock's temperature examples (4.9) and (4.10) are also indeterminate, on the grounds that the sentence 'It is not 30°' is vague in that it fails to specify what the temperature *is*. But then, does this also hold for

(4.15) If it were not raining, it would be snowing.

and

(4.16) If it were not raining, it would not be snowing.

because 'It is not raining' does not state what precipitation conditions *do* prevail? In short, my suspicion is that most, if not all, negated sentences exhibit the kind of semantic indefiniteness present in the Bizet/Verdi conditionals. But if to save (CEM) I must adopt a theory according to which all negated sentences are vague and all subjunctive conditionals with negations for antecedents are neither true nor false, I prefer to stand by the less radical proposal that sentences like (4.15) and (4.16) are false simply because their antecedents just do not imply their consequents according to any reasonable notion of implication.

The second problem that I have with applying the indeterminacy solution to all semantically indefinite conditionals is that in the process, the key notion of precisification itself becomes imprecise. For example, in the case of a classically vague sentence like 'Herbert is bald', it is clear enough what will count as a precisification: a sentence specifying how many hairs Herbert has.[38] However, reconsider (4.15). I suggested that the indefiniteness of 'It is not raining' lay in the fact that this sentence fails to specify exact precipitation conditions. However, it also fails to specify wind conditions, barometric conditions, and so forth, so must these also be specified in the antecedent of the precisification? Where is the line to be drawn? We can't just say that *any* affirmative sentence about the weather will count as a precisification since, clearly,

(4.17) If the weather were being reported on the news, it would be snowing.

shouldn't count. Thus, the problem is that not only do we not have clear boundaries on the *degree* of precision needed to precisify a sentence like (4.15), we do not even have a clear account of when a given sentence is a genuine precisification and when it is just another sentence. I am not saying that additional theorizing could not produce such details (although I imagine a rigorous account would be quite hard to come by). I am just reluctant, given these deficiencies, to adopt the indeterminacy account for cases like (4.15) when the simpler falsehood account seems to work at least as well.

So far, I have argued that however plausible Stalnaker's indeterminacy solution may seem in the Bizet/Verdi case, there are similar cases for which that solution seems implausible. However, I have reservations about the efficacy of the solution even in Stalnaker's chosen case. To explain, consider the following pair of conditionals:

(4.18) If Bizet and Verdi had both been Italian or Bizet and Verdi had both been French, then Bizet would have been Italian.

(4.19) If Bizet and Verdi had both been Italian or Bizet and Verdi had both been French, then Bizet would not have been Italian.

I consider (4.18) and (4.19) to be precisifications of (4.12) and (4.13), respectively. If they are, then according to the supervaluation theory, one of (4.18) and (4.19) is true. Do you know which one? I certainly don't. So it looks as though the problem the supervaluation theory was called on to solve persists under application of the theory.

The only reply that I can anticipate to this objection would be that although (4.18) and (4.19) are more precise than (4.12) and (4.13), they are not precise enough; they are still vague, and thus, indeterminate by Stalnaker's account. But now, it looks as though we must construe *every* subjunctive conditional with a disjunctive antecedent as indeterminate on the grounds that disjunctions are vague because they don't specify which disjunct is true. However, I doubt that many will be willing to tolerate this consequence since, among other things, it would mean that there could be no counterexamples to (DD).

To summarize then, in light of the indeterminacy solution's apparent ramifications for subjunctive conditionals with negated and disjunctive antecedents, I do not think this account constitutes a satisfactory response to criticism of (CEM), or to the weaker bretheren of (CEM) I have introduced in this paper. Since the latter are consequences of (CC), I believe that further suspicion has been cast on the claim that Conjunction Conditionalization is valid.

5. CONCLUSIONS

In the course of my study of the (DD) and (CC) controversies, I have discerned two distinct methodological orientations toward the study of subjunctive implication. According to the first, subjunctive conditional research is a branch of *linguistics*. A semantic analysis of subjunctive implication is an empirical hypothesis about the linguistic practices and conventions of normal English speakers, an account of what such speakers mean, think, or do when they speak with subjunctive conditionals. A subjunctive conditional logic is a descriptive account of the principles of subjunctive reasoning ordinary people, in fact, presuppose, the logic being elicited from the semantics in much the way, say, utility functions can be elicited from preference behavior.

According to the second orientation, subjunctive conditional research is a branch of *metaphysics*. Subjunctive implication is an objective relation between propositions, and a semantic analysis of subjunctive implication is an *a priori* thesis about the necessary and sufficient conditions for this relation to obtain, i.e. the conditions under which a subjunctive conditional is true. A subjunctive conditional logic, which is again educed from the semantics, then represents the *theory* of the subjunctive implication relation, the necessary truths about the relation which obtain independently of what particular propositions happen to stand in its field.

Thus, on the first orientation, subjunctive conditional scholars are researching the linguistic habits of human beings, whereas on the second, such scholars are engaged in ontological investigation of a portion of human-independent reality. However, it is essential that these two preoccupations be distinguished since they are not necessarily coextensive. One could give a correct description of what a speaker 'intends' by a subjunctive conditional assertion without giving correct truth conditions for the assertion itself; an unreflective speaker (or even a reflective one) could simply be mistaken about what would make the proposition he or she expressed in the assertion true. Conversely, it is clear that one could speculate about the exemplification conditions of a certain relation without ever even considering the language practices of English or any other speakers. So it would seem that writers should take care to clarify and consistently follow their chosen orientations if only to avoid disputes which are in effect due to talking at cross purposes.

However, the fact is that some authors appear to vacillate between the two aforementioned orientations. Some come down clearly on the linguistic side. For example, Nute (1980a, pp. 2–3) does when he writes:

> The truth conditions for conditional assertions or statements simply are part of the conventions we have adopted.

Warmbrōd (*op. cit.*, p. 287) does when he says that he is postulating a theory to "explain how listeners interpret conditionals". In other works, however, the methodological posture adopted is not always univocal. For instance, Stalnaker (1968, pp. 99, 100, and 102) claims to be defending a hypothesis about (nonconventional) truth conditions, but then goes on in Stalnaker (1980, p. 87) to defend that hypothesis with the claim that his theory "gives a better account of the way conditionals work in natural language". Lewis (1973a, pp. 84–95) goes to great lengths to defend the metaphysics of the similarity relation which forms the basis of his semantics for subjunctive conditionals, but then in the course of that defense, Lewis (*op. cit.*, p. 91) says of that same concept of similarity that it is a matter of the relative importances human beings attach to certain respects of comparison.

The debates over (CC) and (DD) effectively illustrate the importance of clarity and consistency in one's methodological goals. For example, we have seen that a number of people have proposed putative counterexamples to (DD), i.e. examples designed to show that there are instances of (DD) which are false. However, if all that is being claimed about (DD) is that this principle is presupposed by speakers of English, as Nute's methodological remarks suggest, then assuming a nonconventional theory of truth, a counterexample, in the classic sense of the term, is entirely irrelevant to this claim.[39] All such an example would show is that English speakers presuppose a principle which is, in fact, invalid. Similarly, the fact that a given semantic theory more tightly fits certain evidence from ordinary usage is beside the point of its status as a correct metaphysical theory.

If I may be forgiven a bit of personal editorializing, I frankly think that if the linguistic conception exhausts all there really is to subjunctive conditional studies, then I feel I am justified in posing the same question that was put to ordinary language philosophers: what does this have to do with philosophy? For one thing, if all we want to know is what "competent speakers" mean by their subjunctive conditionals or what logics they use, then why don't we just *ask* them – in statistical surveys with sound experimental designs?[40] But apart from the procedural issue, there is the question of what philosophical import such a study could have in the first place. My impression has always been that the main reason philosophers were interested in truth conditions for subjunctive conditionals, besides that which is intrinsic, was for the purpose of understanding and *assessing* positions formulated with the help of subjunctive conditionals in *philosophical* contexts: positions on the nature of scientific laws and disposition statements, utilitarian and ideal observer theories in ethics, counterfactual analyses of causation in metaphysics, and so forth. But if so, then I fail to see why the mere description of the linguistic behavior of typical speakers can be considered so crucial to this enterprise.[41] Perhaps I am naive or old-fashioned, but I have always thought that philosophers were engaged in something more than the mere reporting of how other people speak and think. I have always thought that they were engaged in the activity of assessing whether certain things people say and think are *true*. So when an author claims to be providing truth conditions for subjunctive conditionals, I think that author should be taken literally and not construed as merely providing an account of when people *think* such expressions are true. Similarly, when an author proposes a semantic analysis of subjunctive implication which employs the concepts of possible worlds and similarity, I think that analysis should be taken as making ontological claims, and not as just a thesis about the 'conceptual resources' or presuppositions of subjunctive conditional users.

Back in Section 4, I promised to reveal in this section what I think is wrong with the Stalnaker–Pollock Hypothesis. As I have already indicated, I am inclined toward the metaphysical persuasion myself, but I will speak first as a linguist. If (SPH) is construed as an empirical claim about how subjunctive conditionals are ordinarily used, then I conjecture that (SPH) is false. I think that when people assert a $\Box\!\!\rightarrow$-type subjunctive conditional, they do *not* mean to assert a Type 1/Type 2 disjunction. Rather, they make a Type 1 assertion or a Type 2 assertion, or something else equally definite. As I hinted in my discussion of Fine's example, (4.2) is clearly a Type 1 conditional; it expresses a causal proposition, and can only be construed as such in the context. But then, it follows that one cannot correctly apply semifactual truth conditions to (4.2) to make it come out true; to do so would be to commit a type of category mistake. The same holds true for Bennett's (4.4). In the context described, (4.4) clearly expresses a Type 1 proposition. So the fact that the party's success had nothing to do with Caspar obviously doesn't verify (4.4). On the contrary, it renders it false. The fact is, a $\Box\!\!\rightarrow$ assertion may be a Type 1 assertion or a Type 2 assertion, but it surely is not some third kind of assertion which we are free to interpret connectionistically or semifactually as the circumstances dictate. Indeed, just imagine what you would do were you to bet against someone who says

(5.1) If I were to wish for that to happen, it would happen.

and then the speaker tried to collect from you on the wager citing semifactual grounds!

In Stalnaker (1968, pp. 100–101), there is an example which seems to run contrary to what I have just been saying. Imagine having been faced with a true-false political opinion survey during the Vietnam war which included the following statement:

(5.2) If the Chinese were to enter the Vietnam conflict, the United States would use nuclear weapons.[42]

Stalnaker would maintain that anyone who believed that Chinese involvement would trigger U.S. nuclear retaliation should answer "true" for (5.2). But he also writes:

> You firmly believe that the use of nuclear weapons by the United States in this war is inevitable because of the arrogance of power, the bellicosity of our president, rising pressure from congressional hawks, or other *domestic* causes. You have no opinion about future Chinese actions, but you do not think they will make much difference one way of the other to nuclear escalation. Clearly, you believe the opinion survey statement to be true even though you believe the antecedent and consequent to be logically and causally independent of each other.

However, this example fails to impress me. We all know how poorly-designed questionnaires pressure us into giving answers we wouldn't give if the questionnaire had contained more alternatives, and being the sort of person who delights in pointing out the shortcomings of such tests to their designers, I would answer "false" for (5.2) were I to have the beliefs Stalnaker enumerates, and would 'write in'

(5.3) The U.S. would use nuclear weapons even if the Chinese didn't enter the conflict.

That is, I would interpret (5.2) as a causal claim, and use (5.3) to express my reason for thinking it false.

Does all of this mean that Fine's and Bennett's examples are counterexamples after all? Well, counterexamples to what? Bennett's example is clearly a counterexample to

(CCC) Connectionist Conjunction Conditionalization

$$(p \wedge q) \rightarrow (p \boxed{1}\!\!\rightarrow q).$$ [43]

But surely, no philosopher as ever proposed (CCC); to do so would be to commit the fallacy of false cause. No, like $\rightarrow$, the (SPH)-defined $\Box\!\!\rightarrow$ strikes me as a logicians' fiction, and to the extent that this connective is absent from everyday usage, the question of whether (CC) is descriptively accurate is moot.

What about (SPH) from the metaphysical perspective? Well surely, the (SPH) $\Box\!\!\rightarrow$ concept exists, and one is free to investigate it if one chooses; but I can't think of why one would want to. The (SPH) analysis confers a type of conceptual ambiguity on the $\Box\!\!\rightarrow$ construction. But since when have logicians favored ambiguity? As distinction-drawing has always been one of philosophy's finer qualities, I think this shows that we should be less concerned with the logic of $\Box\!\!\rightarrow$ than we are with the logics of $\boxed{1}\!\!\rightarrow$ and $\boxed{2}\!\!\rightarrow$.[44] In the same way that there are different semantic senses of the words 'or' (inclusive, exclusive) and 'is' (identity, predication), there seem to be different senses of the subjunctive conditional construction (logical, causal, semifactual, comparative, ...). But if so, then $\Box\!\!\rightarrow$, syntactically based as it is, represents a poor choice of primitives. As with 'is' and 'or', its different senses should be 'factored out' and investigated individually. It just doesn't seem profitable to ask for the truth conditions of a single syntactic construction if that construction is and can be called on to perform a multitude of distinct semantic functions.

You may have noticed that I sort of trailed off at the end of Section 3 without clearly stating my position on (DD). But now, I think you can see why. Do we now want to postulate a Type 1 or a Type 2 version of (DD), and if so, in light of the questionability of categorizing McKay and van Inwagen's (3.4) and Dunn's (3.6) as Type 1 conditionals, what is the true status of these examples? At this point, I really don't know, but I think you can see why I hesitated to dismiss Nute's second response to the 'counterexamples'.[45]

Finally, the question arises as to whether or not the kind of *'modal factorization'* I have been discussing could be pushed even deeper with illuminating results. I think the answer to this question is "yes", and I will illustrate what I mean with an example. As reported by Nute (1980a, p. 7), Pollock has produced compelling evidence that the principle

(CM) Conditional Monotonicity

$$((p \boxed{1}\!\!\rightarrow q) \wedge (q \Rightarrow r)) \rightarrow (p \boxed{1}\!\!\rightarrow r)$$

fails, where $\Rightarrow$ represents (logical entailment. The example is this. Suppose it is true that if I push a certain button, a certain doorbell will ring. Then as Nute points out, although there is a connection between my pushing the button and the doorbell ringing, and the ringing of the doorbell entails that that doorbell exists, there is no connection between my pushing the button and the existence of the doorbell.

Now Pollock's observation strikes me as right. However, a further application of modal factorization can explain *why* it is right. We have been assuming all along that $A \boxed{1}\!\!\rightarrow C$ holds in virtue of a logical or causal connection between A and C. So let's make this assumption explicit, as (SPH) did for $\Box\!\!\rightarrow$, as follows:

(CFH) The Connection Factorization Hypothesis

$$(p \boxed{1}\!\!\rightarrow q) \leftrightarrow ((p \Rightarrow q) \vee (p \boxed{c}\!\!\rightarrow q)),$$

where $\boxed{c}\!\!\rightarrow$ represents subjunctive causal implication.[46] Then although

(ES) Entailment Syllogism

$$((p \Rightarrow q) \wedge (q \Rightarrow r)) \rightarrow (p \Rightarrow r)$$

surely holds, and

(C'S) Causal Syllogism

$$((p \boxed{c}\!\!\rightarrow q) \wedge (q \boxed{c}\!\!\rightarrow r)) \rightarrow (p \boxed{c}\!\!\rightarrow r)$$

maybe holds, neither of the mixing formulas $((p \boxed{c}\!\!\rightarrow q) \wedge (q \Rightarrow r)) \rightarrow (p \Rightarrow r)$ or $((p \boxed{c}\!\!\rightarrow q) \wedge (q \Rightarrow r)) \rightarrow (p \boxed{c}\!\!\rightarrow r)$ holds, and this is just what the example illustrates. There is no connection between depressing the button and the doorbell existing because the button's depression neither entails nor causes the doorbell's existence. Does this mean that, as with the study of $\Box\!\!\rightarrow$, I think that study of $\boxdot\!\!\rightarrow$ is a waste of time and that we should be concentrating our efforts on entailment and causal logic? I think I have made enough controversial claims for one paper; I shall leave this one to the reader.

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NOTES

* This paper was made possible by National Endowment for the Humanities Fellowship No. FB–20706–81–1510 and a leave from Hamilton College; my thanks to both institutions for their support.

1 Here and throughout the paper, I adopt the convention of using logical ideographs autonymously in lieu of use/mention quotation marks. Since (DD) implies $((p \lor q) \Box\!\!\rightarrow r) \rightarrow (p \Box\!\!\rightarrow r)$, it is usually construed as a principle of simplification for subjunctive conditionals with disjunctive antecedents, and as such, often goes by the acronym (SDA).

2 I use the term 'valid' in this paper, unless indicated otherwise, in the following intuitive, extrasystemic sense: a formula is *valid* iff it is logically impossible for any natural language substitution-instance of the formula to be false.

3 This fact is an axiomatic generalization of a semantic observation of Lewis (1973a, p. 26); see Bigelow (*op. cit.*, pp. 215–216) for criticism.

4 Additional commentary on the (CC) controversy may be found in Nute (1980a, pp. 6–9, and 41).

5 A number of authors, among them Fine (*op. cit.*, p. 453) and Ellis *et al.* (1977, pp. 356–357), have noted the implication from (DD) to (AS) in such a logic, but only Chellas mentions the equivalence.

6 See Stalnaker (*op. cit.*, p. 106), Lewis (*op. cit.*, p. 10), and Bennett (*op. cit.*, p. 384) for counterexamples to (AS).

7 A deduction substantiating this observation, which is a strengthened version of Nute's, may be obtained by replacing p with $((p \land -q) \lor (p \land q))$ and q with $((-p \lor q) \land (p \lor q))$ in $p \Box\!\!\rightarrow q$ by (AR) and (CR), simplifying by (DD) and (CD) to get $(p \land -q) \Box\!\!\rightarrow (-p \lor q)$, replacing $(p \land -q)$ with $-(p \rightarrow q)$ and $(-p \lor q)$ with $(p \rightarrow q)$ by (AR) and (CR) again, and then applying (Df$\Box$). Also, notice how addition of (CC) to this picture would result in $(p \land q) \rightarrow \Box(p \rightarrow q)$.

8 CR has recently been criticized by Geoffrey Hunter (1982, p. 138).

9 An extensive survey of the (DD) controversy may be found in Nute (1980a, pp. 29–51).

10 However, the semantics of Warmbrōd (1981) will formally validate both (CC) and (DD) if the similarity relation Warmbrōd employs satisfies the centering condition of Lewis (1973b, p. 442) and if the accessibility relation used to evaluate (CC) results from what Warmbrōd calls a "standard interpretation of p relative to the similarity relation"; see Warmbrōd (*op. cit.*, p. 280).

11 More precisely, Nute claims that (SC) is contained in any $\Box$-normal extension of his minimal logic W which contains (CC) and (DD), where a $\Box$-*normal* logic is one which contains the formula $\Box(p \rightarrow q) \rightarrow (\Box p \rightarrow \Box q)$ and is closed under the rule of Necessitation, A/$\Box$A, for the $\Box\!\!\rightarrow$-defined necessity operator $\Box$.

[12] Pollock (1981, p. 252) has recently rejected the right-to-left direction of (Df$\Box$), apparently because it conflicts with certain other semantic assumptions about subjunctive implication Pollock accepts. However, until I see an intuitive argument against (Df$\Box$) *itself*, I am more inclined to reject Pollock's semantics than (Df$\Box$).
[13] I originally stumbled across this fact in the spring of 1978.
[14] Besides, even the left-to-right direction of (Df$\Box$) can be 'relevantly' justified if we are willing to grant that a self-contradictory proposition implies the conjunction of its negation with itself.
[15] Nute speculates further that perhaps the occurrence of 'or' in cases like (3.4) and (3.6) is superfluous surface structure and that $\Box\!\!\rightarrow$ is reducible to something like the binary strict comparative possibility operator $<$ of Lewis (1973a, pp. 52–56) (read '... is more possible than ____ '). However, notice that Nute cannot enlist *Lewis's* $<$ operator and also maintain that (DD) holds for $\Box\!\!\rightarrow$. For Lewis (1973b, p. 426) contextually defines $p < q$ as $(\Diamond p \wedge ((p \vee q) \Box\!\!\rightarrow (p \wedge -q))$, where $\Diamond p =_{\mathrm{df}} -\Box -p$, which by (DD) and (CD) would yield (3.5) from (3.4) all over again. So ultimately, Nute's proposal would require either two $\Box\!\!\rightarrow$ operators (his and Lewis's) or an analysis of $<$ distinct from the one Lewis provides.
[16] Notice how this construal of (3.1) contrasts with one which treats 'I am the owner of a Porsche or I am the owner of a Mercedes' as descriptive of a single state of affairs.
[17] That is, we have

(i) Wimpy takes the hot dog $\Box\!\!\rightarrow$ Wimpy takes the hamburger

by (3.14) $\wedge$ –(3.15) and (RDD),

(ii) Wimpy takes the hot dog $\Box\!\!\rightarrow$ Wimpy takes the hot dog

by (CI), and (3.16) by (i) $\wedge$ (ii) and (CC′).

(RDD) is discussed in Nute (1981, p. 130). My use of it here should not be construed as an endorsement, but if it should test out all right, perhaps it or some other strengthened version of (DD) might account for the cases which appear favorable to (DD) itself. I should think that a 'suppressed premise' solution to the (DD) evidence would be preferable to a pragmatic solution such as that of Nute (1980b) or the wide-scope conjunction solution of Loewer (1976) and Lewis (1977); as Warmbrōd (*op. cit.*, pp. 273–274) correctly points out, the latter gives seemingly wrong answers for cases like (3.4) and (3.6) in rendering them false.
[18] Before pressing on with (CC), I would like to mention one other possible avenue of response open to (DD) advocates which has not been tried in the literature: denial of (3.4) and (3.6). That is, rather than construe (3.4) and (3.5) as, respectively, true and false and thus indicative of the failure of (DD), and strategy would be to hold fast to (DD) and argue that the falsity of (3.5) shows the falsity of (3.4). For example, one might conceivably deny (3.4) on the grounds that if Spain had fought for the Axis or the Allies, it *might* have fought for the Axis, but it also *might* have fought for the Allies (although the latter possibility is admittedly more remote). Of course, to avoid being *ad hoc*, this response would require independent justification of (DD) and a general explanation of the falsehood of cases like (3.4) and (3.6).
[19] Under the semantics of Stalnaker (1968, pp. 104–105) and Lewis (1973a, p. 29), the validity of (CC) is a consequence of the apparently analytic truth that when a proposition X is true at a world w, no world distinct from w where X is true is as similar to w as w itself is. However, on Pollock's semantics, the validity of (CC) follows from the assumption that when X is true at w, the only world minimally changed from w where X is true is w itself. I do not find this assumption as self-evident as the corresponding similarity postulate, and this suggests that perhaps a semantics based on the notion of minimal change could accommodate the failure of (CC) without loss of plausibility.
[20] My objections to similarity and minimality ordering semantics for subjunctive impli-

cation will be aired elsewhere. In the meantime, surveys of the controversies surrounding the subject of subjunctive conditional semantics may be found in Lewis (1976), Nute (1980a), Pollock (1981) and McCarthy (1981).

[21] I have doctored the notation in this and other quotations to bring it into agreement with that of the present paper.

[22] (SPH) appears explicitly in Pollock (1976b, p. 42) and is implicit in Stalnaker (1968). Pollock uses > for $\Box\!\!\rightarrow$, >> for $\boxed{1}\!\!\rightarrow$, and E for $\boxed{2}\!\!\rightarrow$. Since Pollock's truth conditions for $\boxed{2}\!\!\rightarrow$ formally validate $(p \boxed{2}\!\!\rightarrow q) \rightarrow q$, it follows from (SPH) for Pollock that *counterfactuals*, i.e., subjunctive conditionals with false antecedents and consequents, can only hold in virtue of an a-c connection; see Pollock (1976b, pp. 30–31, and 41).

Pollock calls Type 2 conditionals *'even if'* conditionals, but this syntactic categorization seems inferior to the semantic semifactual one. As related by Pollock (1976b, pp. 30–31), David Lewis has pointed out that there are 'even if' conditionals which are not semifactual, e.g., the second conditional in

(i) If he were to drink, he would be fired, and even if he were to drink just a little, he would still be fired.

Furthermore, semifactuality is sometimes expressed without the use of the 'even if'/'still' construction. The most frequent case of this is in the statement of subjunctive conditional dilemmas. For example, to express the fact that there will be no precipitation *no matter what* the witch doctor of Pollock's example does, one could say

(ii) If the witch doctor were to do a dance, it would not rain, and if the witch doctor were not to do a dance, it would not rain.

and both of the conditionals in (ii) are semifactuals.

[23] That is, suppose C and $A \boxed{1}\!\!\rightarrow C$. Then since Pollock (1976a, p. 30) maintains that $(p \boxed{1}\!\!\rightarrow q) \rightarrow (p \Box\!\!\rightarrow q)$ and $(p \boxed{2}\!\!\rightarrow q) \leftrightarrow (q \wedge (p \Box\!\!\rightarrow q))$, we have $A \boxed{1}\!\!\rightarrow C$ and $A \boxed{2}\!\!\rightarrow C$.

[24] I am excluding the possibility that (4.2) means that if the student had worked hard at *cheating*, he would have passed.

[25] Note the similarity between Mackie's 'INUS condition' account of causation and Goodman's 'relevant conditions' analysis of subjunctive conditionals.

[26] Pollock (1976b, p. 9) maintains that if one cannot enumerate the conditions relevant to a subjunctive conditional's truth (and in most cases, I agree we can't), then they cannot be 'part' of what one means when asserts the conditional. However, I think this is to confuse *sentence* meaning and *speaker's* meaning. The condition propositions could be part of the sentence's meaning, but in my ignorance of what those conditions are, *my* meaning when I assert the sentence could be that the relevant conditions, *whatever they are*, and the antecedent condition are sufficient to guarantee the consequent condition. It does not disturb me to hold that people often assert sentences without full knowledge of what they mean. Moreover, I think it would be reasonable to say that even if one did not know how to fill out the C_is in (4.2) completely, one can at least know that cheating should not appear in the enumeration.

[27] I disagree with van Fraassen that one would have to rule the first correlation accidental in the case described. Perhaps the first X-adjustment *did* cause the y-value, but we failed to produce the same result on the second trial because some other relevant parameter (i.e., a Mackian INUS condition) was absent in the second trial.

[28] Nute (1980a, p. 68) makes this same point.

[29] Nearly all of the conditionals which appear in Stalnaker (1968) can be construed in this way without difficulty.

[30] I should mention at this point that Pollock (1975, p. 51) does claim to be postulating (CC) only for what he calls 'singular' subjunctive conditionals. However, he offers no characterization of the concept of singularity and, as such, fails to suggest a criterion which might help us discriminate between singular and implicitly general subjunctive

conditionals or formally restrict the range of (CC). Perhaps the treatment of subjunctive generalizations in Pollock (1976b, pp. 46–69) could be extended to cases like (4.6), but it is not obvious to me how this would proceed since, for example, it is not clear what the variables implicit in a case like (4.6) would range over.

[31] In saying this, I am denying the validity of $(p \wedge q) \rightarrow (p \boxed{2}\!\!\rightarrow q)$, an axiom endorsed by Pollock (1976b, p. 31).

[32] For example, see Lewis (1973b, pp. 422–424) and Nute (1980a, p. 66).

[33] Notice how Pollock here invokes the very kind of generality intuition I exploited in discussion of (CB).

[34] Quine originally paired (4.12) with

(4.13′) If Bizet and Verdi had been compatriots, Bizet would have been French.

However, discussion of (CEM) requires a pair of conditionals with contradictory consequents.

[35] My exposition of the supervaluation theory closely follows Fine (1975b).

[36] Stalnaker (1981, p. 92).

[37] Stalnaker (*loc. cit.*).

[38] This example is due to Fine (1975b, p. 268).

[39] Of course, counterexamples could be relevant from the linguistic perspective *provided* they are reconstrued from things which are nonconventionally false to things which normal English speakers 'would not say.' But if this is how they are intended, I think this should be made clear, and this is not always done.

[40] See Mates (1971) for a similar methodological criticism of ordinary language philosophy.

[41] Of course, linguistic data can be a 'guiding factor' in the metaphysical enterprise in much the same way observations can assist one in the formulation of an abstract scientific theory. However, it must be kept in mind that the metaphysical hypothesis is about some *independent* phenomenon, and is not a hypothesis about the linguistic data *itself*.

[42] Stalnaker's conditional is framed in the future indicative, but I don't think this matters to the issue at hand.

[43] I am not quite sure what to say about Fine's example in Case One. If the student's hard work merely *contributed* to his passing, then is it true or false that the student passed *because* he studied?

[44] Pollock (1975) and (1976b) undertakes separate study of the logics of $\boxed{1}\!\!\rightarrow$ and $\boxed{2}\!\!\rightarrow$, but then goes on to take $\Box\!\!\rightarrow$ as fundamental.

[45] In fact, we may have here the beginnings of an explanation of the results of Section 2: perhaps (CC) and (DD) presuppose distinct logical concepts which can only be combined under pain of paradox.

[46] I intend that $\boxed{c}\!\!\mapsto$ be read something like 'its being the case that ... would cause it to be the case that ______,' but as such, I do not intend (CFH) to be taken as a serious proposal. As Pollock (1976b, p. 26) suggests, there are some contingent Type 1 subjunctives like 'if that bird were a raven, it would be black' which appear to lie beyond the scope of $\boxed{c}\!\!\mapsto$.

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