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On the Temporal Dimension of Counterfactuality

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1. Conditional Statements

In the past thirty years philosophers and linguists have believed that conditional statements come in two varieties, indicative and subjunctive conditionals. These two kinds of conditionals are morphologically distinct: the latter shows subjunctive morphology, whereas the former shows indicative morphology. The pair in (1)-(2) illustrates this difference. Notice that, because of the lack of subjunctive morphology, English subjunctive counterfactuals show past morphology instead (*arrived*): as shown by its co-occurrence with the temporal adverb *tomorrow*, the past is not interpreted temporally.

- (1) *Indicative conditional*
If Charlie arrives tomorrow, he will meet Lucy.
- (2) *Subjunctive conditional*
If Charlie arrived tomorrow, he would meet Lucy.

They believed that this partition was sufficient to account for the differences in the felicity conditions of conditional statements. Thus, two pragmatic constraints were proposed to capture the meaning difference between (1) and (2). What is the difference between (1) and (2)? Intuitively, when the subjunctive conditional in (2) is uttered instead of the indicative conditional in (1), the information is conveyed that the speaker believes that the hypothetical event expressed by the antecedent clause, e.g. the event of Charlie arriving tomorrow, is unlikely to happen or is not going to happen. On the other hand, in uttering the indicative conditional in (1), the speaker is neutral as to whether Charlie will or will not arrive tomorrow. Stalnaker (1975) addressed this point and explicitly connected this meaning difference to the morphological difference between the two types of conditionals. He suggested that the subjunctive mood in English and other languages is a conventional device to indicate that the selection function is one that may reach outside the context set. The absence of the subjunctive mood, on the other hand, indicates that the

selection function reaches inside the context set. In order to understand this claim, let me sketch Stalnaker's theory of conditionals.

A *context* is the common knowledge, or presumed common knowledge, of the participants in the conversation. Following Stalnaker's terminology, let us call this (presumed) common knowledge the *presuppositions of the speaker*. This presupposed information can also be represented as a set of possible worlds, i.e. those possible worlds where all that is presupposed is true. Call this set of possible worlds the *context set*. A conditional statement *if A, then B* is an assertion that the consequent is true in the world as it would be if the antecedent were true. The *selection function* *f* is precisely the function that takes the actual world *w* and the proposition *p* expressed by the antecedent into a possible world, i.e. the world as it would be if the antecedent were true. Thus, the conditional *if A, then B* is true in a possible world *w* just in case *B* is true in *f(A, w)*. In addition, a pragmatic constraint holds: if the world of evaluation is within the context set, then the worlds selected by the selection function must be within the context set too (that is, where *C* is the context set, if $w \in C$, then $f(A, w) \in C$). Intuitively, everything that is presupposed to hold in the actual world is presupposed to hold in the hypothetical world in which the antecedent is true. The contribution of the subjunctive mood signals that the selection function is reaching outside the context set, i.e. is possibly selecting a world where some of the presuppositions that hold in the actual world have been suspended. In other words, the subjunctive mood indicates that counterfactual worlds are in the domain of the function.

In this paper, I argue that the distinction between indicative and subjunctive counterfactuals is necessary but not sufficient to account for the felicity conditions of all conditional statements. A further partition is required and I claim that this partition has to be drawn along the temporal dimension of conditionals. I discuss some problematic counterfactual statements, and I develop a formal proposal in order to account for their meaning. Furthermore, I argue that the proposal introduced in this paper is independently needed to account for other properties of counterfactuals, which are unaccounted for by the traditional view.

The pair (1) and (2) points to the indicative versus subjunctive distinction within the domain of conditionals. In turn, the domain of subjunctive conditionals is divided into two subgroups: non-past subjunctive conditionals and past subjunctive conditionals. The sentence in (2) – repeated in (3) – exemplifies the former kind; the sentence in (3) exemplifies the latter.

- (3) If Charlie arrived tomorrow, he would meet Lucy.
 (4) If Charlie had arrived yesterday, he would have met Lucy.

Going back to our original remarks, it is often suggested in informal treatments of subjunctive conditionals that the past tense in the antecedent of (5) is not a real past, but a 'modal-past' (Palmer 1986, 2001). Thus, the label "subjunctive" conditional.

- (5) If Mary came, John would stay. [Palmer 2001, 14]

The intuition behind the label 'modal-past' is that the past tense in the antecedent does not locate the event in the past, but removes the speaker from the actual situation and places him into an unreal one. Now consider (6), where the past tense is marked twice.

- (6) If John had come, Bill might have left. [Palmer 2001, 208]

Here the suggestion is that the past is marked once for unreality, once for past time, since "have functions in English as both a marker of perfect aspect and of past time" (Palmer 2001, 208).

Iatridou (2000) exploits this intuition as well. She argues that mood is not a necessary ingredient of Counterfactuality, and that language-specific rules may be responsible for its occurrence. In her proposal, the past tense morphology instantiates what she calls the *exclusion feature*. This feature can either be interpreted in the domain of time or in the domain of worlds. In the former case, a sentence with past will be interpreted as talking about a time different from the time of the utterance; in the latter case, a sentence with past will be interpreted as talking about worlds different from the actual world. In a simple sentence such as *John left* past is interpreted temporally and the sentence talks about a past time at which an event of John's leaving took place. The possibility of interpreting past modally (i.e. as excluding the actual world) is exploited in conditionals like (5) or (6). The difference between (5) and (6) is that, in the latter, two layers of past occur, the one occurring on the auxiliary *have* and the one instantiated by the past *-ed*. Iatridou's proposal is fundamentally similar to Palmer's: one layer of past is interpreted modally, thus contributing to the modal interpretation of the structure; the other layer of past is interpreted temporally, i.e. as expressing a relation of anteriority between the hypothetical event and the utterance time.

Notice that this has an important consequence. The layer of past that is interpreted temporally locates the hypothetical event in time and, as such, is required to be interpreted *inside* the proposition expressed by the antecedent. This is exactly parallel to what happens in a simple sentence with the past tense: in (7), the past tense locates the event of playing in the past, reason why it is compatible with the past adverb *yesterday* but not with *tomorrow*.

- (7) Charlie played with Lucy (yesterday/#tomorrow).

Informally, the conditional in (6) is true iff the consequent is true in all the accessible possible worlds where the proposition that John *came* is true.

2. Mismatched Past Counterfactuals

Past counterfactuals do not always talk about the past. Sometimes they talk about the future despite their overt past morphology. Imagine the following scenario. Charlie got married yesterday. Unfortunately, after the ceremony a violent thunderstorm broke out and they had to call off the outdoor reception. I have just heard the forecast on TV: the rain will finally cease tonight. In these circumstances, (8) is felicitous but (9) isn't. Call

conditionals like (8) *mismatched past subjunctive counterfactuals* (MPSC) and conditionals like (9) *non-past subjunctive conditionals* (NPSC).¹

- (8) If Charlie had gotten married tomorrow, they could have had the outdoor reception.
- (9) #If Charlie got married tomorrow, they could have the outdoor reception.

The pair in (8)-(9) is puzzling for two reasons. (i) The subjunctive conditional in (8) describes a future hypothetical eventuality despite the past morphology. (ii) The non-past subjunctive conditional in (9) cannot be used to talk about a future hypothetical event. Now consider a modification of the above scenario. Charlie had planned to get married yesterday but, having heard about the furious storm that was approaching, decided to postpone the ceremony to a better day. Having just heard the forecast on TV, I can utter (9) but *not* (8). The situation is now reversed. The conclusion is that for a MPSC to be felicitous, the event described in the antecedent must be impossible (false).

The proposal above is unable to account for the mismatched past counterfactuals. The reason is that the analysis requires one layer of past to be interpreted inside the antecedent, but because of the future adverb *tomorrow*, the result is nonsensical. Thus, we have made a step forward: at least in the case of mismatched past counterfactuals, we know that the past tense cannot be interpreted inside the antecedent. These cases are beyond the reach of the theories I sketched above.

In what follows I will present my proposal for MPSCs and for why their felicity conditions differ from those of the NPSCs. Then, I will present new data and show that the standard theory of counterfactuals cannot account for them and I will argue that the semantic theory I develop can and, consequently, is to be preferred.

2. The Interpretation of the Past

The discussion of the MPSCs above uncovered the two crucial properties of these conditionals. The first property has to do with their felicity condition: a MPSC is felicitous only if the proposition expressed by the antecedent is understood to be impossible. The second property is what we may for the time being call a "morphological" property: the occurrence of two layers of past, none of which locating the hypothetical event purported by the antecedent in the past. The objective of the present investigation is to develop a semantic theory where these properties follow without stipulations.

2.1 Past and Accessibility Relations

Following Ippolito (2001a), I suggest that the connection between the two layers of past and the impossibility of the antecedent is that the extra past tense in a MPSC *is* the source of the impossibility.

¹ Similar examples are discussed for example in Dudman (1983), (1984) and Ogihara (2000). The latter, in particular, offers an interesting discussion and a formal proposal. In Ippolito (2001), I have discussed his proposal in great detail and showed that, despite its many insights, it cannot be maintained.

I shall assume the possible world semantics and the theory of conditionals developed in Kratzer (1981), (1986) and (1991).² In the same vein as Lewis (1975)'s treatment of adverbs of quantification, Kratzer does not analyze the connective *if* as a two-place operator taking the antecedent and the consequent as its arguments. Instead, a conditional sentence is analyzed as a tripartite structure: the *if*-clause is interpreted in the restriction of a possibly *covert modal operator*, whereas the consequent is interpreted in the nuclear scope. Thus, the structure determined by a modal operator is similar to any other quantificational structure.

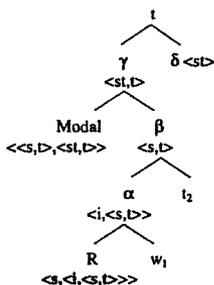
Quantification over worlds is restricted by an *accessibility relation*: only those possible worlds "relevantly" accessible from the actual world will be selected to be in the domain of the modal operator. What counts as the "relevantly accessible" depends on the lexical meaning of the modal involved. For example, epistemic modals such as *must* in *Charlie must be at home by now* involve epistemic accessibility relation: only the possible worlds compatible with what the speaker knows in the actual world will be selected. The accessibility relation for deontic modals such as *must* in *Children must be accompanied by a parent* selects only those possible worlds where what is a law in the actual world is true. Thus, accessibility relations must be binary relations between worlds.

But this is not enough. In fact, knowledge, beliefs, plans, desires and other human attitudes change over time. Also the relevant facts about the world change over time. Therefore, the set of worlds over which modal operators quantify will depend not only on what the actual world is but also on what the time of evaluation is. What I know, believe, plan or desire may be different from what I knew, believed, planned, desired in the past. Also, the world now may be different from what it used to be. Therefore, what was compatible with knowledge or beliefs or plans, or the world *then* may be incompatible with it *now*.

This is why accessibility relations cannot simply be binary relations between worlds. Accessibility relations must at least be binary relations between a *world-time pair* and a *world*. Their type must be $\langle s, \langle i, \langle s, t \rangle \rangle \rangle$, where $i \in I$ (I = the domain of times), and not the simple $\langle s, \langle s, t \rangle \rangle$. The possible worlds over which the modal operator quantifies will not only be relative to the world of evaluation but also to the *time of evaluation*. As in the case of worlds, the time of evaluation will by default be the time of the speaker (the time of the utterance), *unless specified otherwise*. The structure will look like the one in (10), where w_1 is the world of evaluation and t_2 is the time of evaluation. By default, w_1 and t_2 will be assigned the actual world and the utterance time respectively.

² A quantificational theory of modality was developed in Carnap (1947), Hintikka (1961) and Kripke (1959) and (1963), among others. A theory of possible worlds in relation to counterfactuals was developed by Lewis (1986) and (1973).

(10)

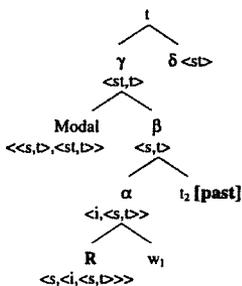


I will assume that the only true tense is the past because the future is semantically a modal and the present is the interpretation of a T node when it is marked as non-past (the default interpretation). Also, I will assume the presuppositional variant of the referential analysis of tense developed by Partee (1973), Enç (1987) and Kratzer (1998). Heim (1994) suggests that the tense feature [past] is interpreted as a presupposition: the sentence will only be defined if there is a relevant past time in the context. The lexical entry is given in (11).

(11) $[[\text{PAST}_1]]^{E,c}$ defined only if $g(1) < t_c$; if defined, then $[[\text{PAST}_1]]^{E,c} = g(1)$

Let us go back to the structure in (10) and concentrate on t_2 . As I said above, t_2 will get the utterance time as the default value, unless t_2 is forced to get a different value. I suggest that this is what happens when the past tense is interpreted on t_2 .

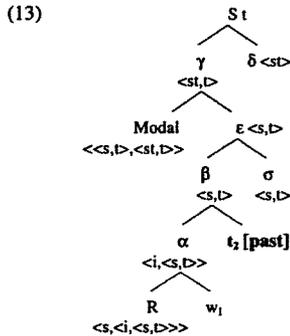
(12)



To sum up, accessibility relations have to be relations between a world and a world-time pair. The time argument gets the utterance time as the default value, unless the past tense is interpreted outside the proposition where it occurs, i.e. within R. We are now in a position to start building the solution to the puzzle of MPCSSs.

2.2 The Solution to the Temporal Mismatch

I analyze a conditional sentence as a quantificational structure *à la* Kratzer, where the antecedent is interpreted in the restriction of the modal operator, and the consequent in the nuclear scope. Given that the modal operator will always be restricted by an accessibility relation R , the antecedent will actually have to compose with R . The structure will be like the one in (13): σ is the antecedent, δ the consequent.



Node ϵ is the conjunction of β and σ and will be composed by some version of the Predicate Modification (cf. Heim and Kratzer 1998). The truth-conditions for (8) – repeated in (14) – are given in (15). The nature of the modality is left unspecified: in (15) the set of worlds w over which we quantify is the set of those worlds *compatible with some relevant aspect of the actual world*.³ Moreover, as a consequence of the fact that the tense is interpreted inside β , both propositions σ and δ are interpreted as tenseless propositions.

(14) If Charlie had gotten married tomorrow, they could have had the outdoor reception.

(15) $[[S]]^{\epsilon c} = 1$ iff $\forall w \in W$ [w is accessible from $g(1)$ at $g(2)$ and Charlie gets married tomorrow in $w \rightarrow$ they have the outdoor reception in w] defined only if $g(2) < t_c$.

The assignment function g will assign the actual world to the index 1 (i.e. $g(1) = w_c$). Informally, (14) is true if and only if for all the worlds w compatible with the actual world at some (contextually salient) past time and such that Charlie gets married tomorrow in w , they have the outdoor reception in w . This is all the semantics gives you.

We naturally achieve an important result: the mismatched past subjunctive counterfactual in (14) is like the non-past subjunctive conditional in (9) – repeated in (16) – but without the contribution of the past tense:

³ In what follows I may sometime use the shorter “compatible with the actual world” instead of the correct but longer “compatible with some relevant aspect of the world”. Whenever I do that, I mean the latter.

- (16) If Charlie got married tomorrow, they could have the outdoor reception.

The truth-conditions for (16) are like those for (14), except for the lack of [past] constraining the time variable t_2 . The set of worlds quantified over is the set of worlds compatible with the actual world at the time of the utterance (the default time). As above, $g(1) = w_c$.

- (17) $[[S]]^{tc} = 1$ iff $\forall w \in W$ [w is accessible from $g(1)$ at $g(2)$ and Charlie gets married tomorrow in $w \rightarrow$ they have the outdoor reception in w] $g(2) = t_c$.

We have explained the role of the second layer of past and the apparent mismatch between the tense and the future adverb in the antecedent. But, if the truth-conditions in (15) are all the semantics gives us, we still have not explained the felicity condition on the antecedent, i.e. that it be impossible. This is the goal of the next two sections.

3. Presuppositions

The purpose of this section is to show that the contrast between the felicity conditions of NPSC and MPSC in (14) and (16) is not isolated and that in order to explain it, we must have a general theory about the presuppositions of NPSCs and MPSCs.

I shall adopt Stalnaker (1975)'s notion of Context Set, defined as in (18).⁴

- (18) Context Set $C = \{w \in W : w \models p \text{ for all } p \text{ in the Common Ground}\}$
 (19) Common Ground = $\{p \subseteq W : p \text{ is presupposed by the participants to the conversation}\}$

I shall make the notion of context set and common ground time-sensitive, as follows. Let C_u be the context set at the utterance time, that is to say the set of all possible worlds w such that all the propositions true in the common ground at t_u (the utterance time) are true in w .

- (20) a. Context Set $C_u = \{w \in W : w \models p \text{ for all } p \text{ in the Common Ground at } t_u\}$
 b. $CG_u = \{p \subseteq W : p \text{ is presupposed by the participants to the conversation at } t_u\}$
 c. Context Set $C_n = \{w \in W : w \models p \text{ for all } p \text{ in the Common Ground at } t_n\}$
 d. $CG_n = \{p \subseteq W : p \text{ is presupposed by the participants to the conversation at } t_n\}$

Now consider the non-past subjunctive conditional in (21).

- (21) #Charlie is dead. If he came to the party tomorrow, he would meet Sally.

⁴ In Stalnaker's words "The most important element of a context, I suggest, is the common knowledge, or presumed common knowledge and common assumptions of the participants in the discourse" (Stalnaker 1975, p. 67). A little later he explicitly says that the (presumed) common ground are the *presuppositions of the speaker*: they are common to the speaker and his audience in so far as he assumes they are. Thus, in defining the Common Ground, I will only make reference to the participants in the conversation, with the understanding that the presuppositions are the *presuppositions of the speaker*, which are projected onto his audience as well.

Charlie cannot come to the party because he is dead. Intuitively, the deviance of (21) is due to the fact that coming to the party tomorrow presupposes being alive and this is inconsistent with Charlie being dead. In different terms: the deviance of this sentence is due to the fact that the presuppositions of the antecedent will have to hold in that context, thus causing the context to be inconsistent. Therefore, there must be a condition on the felicity of a non-past subjunctive conditional: the presuppositions of the antecedent must not be inconsistent with the context of the utterance. More formally, let P be the set of all worlds w such that the conjunction of all the presuppositions of the antecedent p of the conditional is true in w . (22) says that a non-past subjunctive conditional presupposes that the intersection of P and C_u is not empty. In other words, there must be worlds in the context set where the conjunction of all the presuppositions of p is true, i.e. what the antecedent presupposes must be consistent with what is known (assumed) at the utterance time.

- (22) **Felicity Condition for NPSCs**
 $P \cap C_u \neq \emptyset$

Recall the truth-conditions for a non-past subjunctive conditional, for example (16), repeated below in (23).

- (23) $[[S]]^{f^c} = 1$ iff $\forall w \in W$ [w is accessible from $g(1)$ at $g(2)$ and Charlie gets married tomorrow in $w \rightarrow$ they have the outdoor reception in w] $g(2) = t_c$.

Notice that the time of the evaluation in the truth-conditions corresponds to the time of C in the felicity condition. I'll make the hypothesis that in general the time relevant for the felicity condition is identical to the time of the evaluation.

- (24) **Hypothesis**
 The time relevant for the felicity conditions of a subjunctive conditional is identical to the value of the time argument of the accessibility relation.

Thus, in a mismatched past subjunctive counterfactual too the time of C will depend on the time of evaluation, which in this case is a (contextually salient) past time. If the hypothesis is correct, the felicity condition for a mismatched past subjunctive counterfactual will be as in (25). In (26) I repeat the truth-conditions for a mismatched past counterfactual.

- (25) **Felicity Condition for MPSCs**
 $P \cap C_{t_2, c_u} \neq \emptyset$

- (26) $[[S]]^{f^c} = 1$ iff $\forall w \in W$ [w is accessible from $g(1)$ at $g(2)$ and Charlie gets married tomorrow in $w \rightarrow$ they have the outdoor reception in w] *defined only if* $g(2) < t_c$

C_{2, c_u} is the context set built on CG_{2, c_u} .

- (27) a. Context Set $C_{2, c_u} = \{w \in W: w \models p \text{ for all } p \text{ in the Common Ground at } t_{2, c_u}\}$
 b. $CG_{2, c_u} = \{p \subseteq W: p \text{ is presupposed by the participants to the conversation at } t_{2, c_u}\}$

The felicity condition in (25) says that a mismatched past counterfactual presupposes that the intersection between the set of worlds w such that the conjunction of the presuppositions of the antecedent is true in w and the set of worlds w' such that all that is presupposed at some (contextually salient) past time t_2 is true in w' is not empty. In other words, the presuppositions of the antecedent must be consistent with what was known (assumed) *at some past time*.

We predict that the propositions in C_u (the propositions true in CG_u) should be irrelevant to the felicity of a mismatched past counterfactual. I have found that this is indeed correct, at least with respect to some presuppositions. Suppose Charlie died last week. Coming to the party tomorrow presupposes being alive tomorrow and this is inconsistent with Charlie being dead at the utterance time. Nevertheless, the mismatched past counterfactual in (28a) is acceptable. Notice the contrast with (21) above.

- (28) a. Charlie is dead. If he had come to the party tomorrow, he would have met Sally.
b. Charlie is dead. If he had come to the party yesterday, he would have met Sally.

The behavior of non-past and mismatched past subjunctive conditionals is consistent across a number of different presuppositions. Let us consider the presupposition of *to sell, to quit* and the existence presupposition of definites.

The verb *to sell* presupposes that the object that is sold is owned by the seller immediately before the selling takes place. In other words, to sell something presupposes to own it at the time of the selling. Negation tests for presupposition in (29).

- (29) a. Charlie sold the Ducati.
PRESUPPOSITION: Charlie owned the Ducati
b. Charlie didn't sell the Ducati.
PRESUPPOSITION: Charlie owned the Ducati.

Being a presupposition trigger, the verb *to own* can be used to test my hypothesis that whereas in non-past subjunctive conditionals the presuppositions of the antecedent have to be consistent with what the speaker knows at the utterance time, in mismatched past counterfactuals the presuppositions of the antecedent have to be consistent with what the speaker knew at some past time.

The following examples support the hypothesis.

- (30) Charlie used to own a lot of stocks but ten years ago, after a crisis of the stock market, he sold everything and since then he's never had any stocks.
(a) #Too bad. If Charlie sold his stocks tomorrow, he would make a lot of money.
(b) Too bad. If Charlie had sold his stocks tomorrow, he would have made a lot of money.
(c) Too bad. If Charlie had sold his stocks yesterday, he would have made a lot of money.

In the example (a), the presupposition required by the counterfactual event is that Charlie owns the stocks until tomorrow, which is inconsistent with the presupposition in the utterance context. No accommodation is possible and the sentence is deviant.

Interestingly, the acceptability of the mismatched past counterfactual in (b) tells us that in the world in which the antecedent is true, the proposition that Charlie owns the stocks until tomorrow is true too, despite its inconsistency with the presupposition in the utterance context that Charlie hasn't owned stocks for the past ten years. Notice that the same is true for the past counterfactual in (c), which follows the pattern of the mismatched past counterfactual in (b).

According to the hypothesis I am arguing for, the felicity condition for (30b) is (25): $P \cap C_{t_1 < t_0} \neq \emptyset$. The intersection between the set of worlds w such that the conjunction of all the presuppositions of the antecedent is true in w and the set of worlds where the conjunction of all the presuppositions in the common ground at some past time is true, must not be empty. In other words, the felicity condition for a mismatched past counterfactual is that the presuppositions of the antecedent not be inconsistent with some *past* epistemic state. Of course, this allows for the possibility that they could be inconsistent with the *current* epistemic state, which is a welcome result, given the acceptability of (28a) and (30b).

Incidentally, notice that the non-mismatched past counterfactual in (30c) is not deviant either. The fact that non-mismatched past counterfactuals seem to pattern like mismatched past counterfactuals with respect to presuppositions' cancellation and accommodation but differently from non-past conditionals, suggests that in non-mismatched past counterfactuals too the (extra) past tense may actually restrict the accessibility relation, thus forcing the evaluation time to be past to the utterance time. I leave the investigation of this issue to the future.

More. To quit an activity x requires that x goes on at the time of the quitting. Thus, we say that to quit smoking presupposes to smoke immediately before the quitting time. Negation, again, tests for the presupposition.

- (31) a. Lucy quit smoking.
 PRESUPPOSITION: Lucy smoked
 b. Lucy didn't quit smoking.
 PRESUPPOSITION: Lucy smoked

Again, the counterfactuals behave exactly as predicted by our hypothesis.

- (32) Lucy was a heavy smoker but she quit smoking ten years ago, after she had pneumonia. A new law was passed last week that says that if you quit smoking from now on, you have to undergo a new medical test which is quite painful even if very useful in detecting problems for the lungs of the ex-smoker. Thinking about Lucy, I say:
- (a) #Good for her! If she quit smoking tomorrow, she would have to take the new painful test.
 (b) Good for her! If she had quit smoking tomorrow, she would have had to take the new painful test.
 (c) Good for her! If she had quit smoking yesterday, she would have had to take the new painful test.

Again, the presupposition that Lucy's smoking stretches up to yesterday is not accommodated in (a), but it is accommodated in (b), the only difference between the two

being the extra layer of past in the antecedent (and in the consequent). As before, the presupposition is also accommodated in (c), which thus patterns like (b) and not like (a).

Lastly, let me consider the case of an existence presupposition. In (33a) the presupposition required by the antecedent – that there is a guitar and that Lucy owns it until tomorrow – is not accommodated; in (33b), it is.

- (33) Lucy's unique guitar burnt in the fire that destroyed her home six months ago.
 (a) #Too bad. If Lucy played her guitar tomorrow, she would make a lot of money.
 (b) Too bad. If Lucy had played her guitar tomorrow, she would have made a lot of money.
 (c) Too bad. If Lucy had played her guitar yesterday, she would have made a lot of money.

The conclusion is that the restriction that the presuppositions of the antecedent must not be inconsistent with the presuppositions of the utterance (main) context only holds for non-past subjunctive conditionals. Pluperfect subjunctive conditionals do not obey this restriction. In other words, a non-past subjunctive conditional cannot presuppose something that is inconsistent with the main context (the context of the utterance). A pluperfect subjunctive conditional can; this is so regardless of when the counterfactual eventuality takes place (past or future) and, therefore, regardless of when the relevant presupposition is required to hold (past or future).⁵

3. Scalar Implicatures at the Presupposition Level

The felicity conditions in (22) and (25) talk about the relation between the presuppositions of the antecedent of a conditional and the epistemic state of the speaker at the time at which the conditional is evaluated. My proposal is that the condition that the antecedent of a MPSC be impossible is a *scalar implicature* and that it is at the level of the felicity conditions (presuppositions) that the competition occurs.

A scalar implicature results from a competition between two propositions, α and β , in a relation of asymmetric entailment ($\alpha \rightarrow \beta$). If the speaker chooses to utter β (the entailed or 'weaker' proposition), his interlocutors will reason as follows: If the speaker was in the position to utter α , he would have done so; instead, he said something weaker (less informative). Thus, it must be the case that he was not in the position to utter α , i.e. either he did not know that α or he knew that $\neg\alpha$.

In order to explain the falsity of the antecedent in a mismatched past subjunctive counterfactual as a scalar implicature, there have to be two propositions in an asymmetric entailment relation. In the next two sections I propose that the implicature of falsity derives from the competition between the *presuppositions* of conditionals. Thus, we have an extension of the Gricean theory: not only can *two assertions* in relation of asymmetric entailment compete, but *two presuppositions* in that relation can compete too. We shall see how this proposal is in accordance with other research in the domain of presuppositions.

⁵ The presuppositions facts discussed above and, more generally, the proposal defended here have important repercussions for the presupposition projection puzzle discussed for example in Heim (1992). See Ippolito (2001b) for some discussion.

The felicity conditions given above require that the presuppositions of the antecedent be compatible with the common ground at some specific time. As Stalnaker wrote in the quote above, presuppositions can be *presumed* common knowledge. Whereas knowledge is always true (factive), presumed knowledge may turn out to be false. But in the dynamics of a conversation, this distinction turns out to be irrelevant: if both the speaker and his interlocutors believe that what they assume to be true, *is* true (i.e. is knowledge), then the inferences that they will draw are the same as those that they would draw if what they assume to be true were actually true. Consequently, for the sake of simplicity, we will be simply talking about knowledge.

Knowledge is factive. When you know that *p*, you believe that *p*, you have good evidence that *p* and *p* is true. I cannot discover that what I knew at some past time is no longer true now, because if I now know that it is not true, then I didn't know it, I merely believed it.⁶

Hence, being a proposition compatible with my knowledge at the utterance time entails being compatible with my knowledge at any time *t* earlier than the utterance time. But not vice versa: being compatible with what I knew at some past time, does not entail being compatible with what I know now because, for example, I may have learned that the proposition in question is false. Thus we have what we needed: two propositions in a relation of asymmetric entailment. Because the notion of presupposition is built on knowledge, we can conclude that being compatible with the common ground at the utterance time entails being compatible with the common ground at any time earlier than the utterance time. Therefore, we obtain the asymmetric entailment in (34).

$$(34) \quad \text{PrnC}_u \neq \emptyset \text{ entails } \text{PrnC}_{[2-cu]} \neq \emptyset \\ \text{PrnC}_{[2-cu]} \neq \emptyset \text{ does not entail } \text{PrnC}_u \neq \emptyset$$

The asymmetric entailment in (34) draws a distinction between beliefs on one hand and knowledge and presumed knowledge on the other. It is neither the case that if I believe a proposition *p* at some time *t*', I believe it at any time *t*'' later than *t*', nor that if I believe *p* now, then *p* must have been consistent with my beliefs at any time *t*' earlier than now. Beliefs change over time: I may believe now that what I believed yesterday is false; or I may now believe true some proposition that yesterday I believed to be false. The same is true for other kinds of human attitudes (desires, plans and wishes constantly change) and for the way the world is (states of affairs constantly change). Thus, none of these modalities makes the asymmetric entailment (34) above true.⁷

Having construed the desired asymmetric entailments, we can derive the scalar implicature. This is schematized in (35).

⁶ Knowledge is generally defined *in terms* of belief; indeed it is a belief that has the property of being true. That knowledge *cannot just* be justified true belief was shown by E. Gettier in his (1963) article "Is justified true belief knowledge?". Philosophically, important epistemological questions arise with respect to a satisfactory definition of knowledge. For our purposes, though, the discussion above is sufficient.

⁷ See Ippolito (2001b) for a more thorough discussion of these issues.

(35) *Gricean competition*

- | | | |
|-----|------------------------|--------------------------------------|
| (a) | You presupposed: | $P \cap C_{u,cu} \neq \emptyset$ |
| (b) | You didn't presuppose: | $P \cap C_u \neq \emptyset$ |
| (c) | Thus: | $\neg K (P \cap C_u \neq \emptyset)$ |
| (d) | | $K \neg (P \cap C_u \neq \emptyset)$ |
| (e) | \equiv | $K (P \cap C_u = \emptyset)$ |

Line (c) is the step we are familiar with from classical examples of scalar implicatures: because the speaker appealed to the less informative presupposition, the interlocutor will implicate that the speaker does not know that P is incompatible with the common ground at the utterance time. Because it is assumed that the speaker knows what he presupposes, step (d) and (e) follow: the speaker knows that P is incompatible with the common ground at the utterance time. For this to be true, it is sufficient that one of the presuppositions of the antecedent is false. If (at least) one presupposition of the antecedent is inconsistent with the context, then the antecedent is not true.⁸ As I said in section 4, the result of a Gricean competition is that the speaker is not in a position to assert the strong proposition *p*. This is consistent with two possibilities: that he does not know that *p* or that he knows that $\neg p$. In most cases of scalar implicatures, the stronger result (that he knows that $\neg p$) has to be stipulated. On the contrary, in our competition the stronger result (i.e. line (d)) follows naturally. The weaker option is discarded because it is assumed that the speaker knows what he is presupposing. In other words, if the presuppositions of the utterance that the speaker made are not compatible with what he in fact presupposes, then the speaker knows that they are not.⁹

3.1 Cancelability

I have argued above that the falsity of the antecedent of a mismatched past counterfactual is an implicature. Implicatures are cancelable. Therefore, the falsity of the antecedent of a mismatched past counterfactual must be cancelable. I will show that, despite appearances, it is cancelable.

It seems natural to assume the following pragmatic principle: in engaging in a conversation with other people, we are interested in what the epistemic state of these people is *at the time at which the conversation takes place*. Vice versa, they will be interested in what *our current* epistemic state is. My claim above has been that the implicature of falsity in mismatched past counterfactuals is drawn because the speaker's presupposition makes reference to his *past epistemic state* rather than his *current* epistemic state, which would have been more informative given the principle above.

⁸ The Context Change Potential of a sentence – as defined in Heim (1992) – is a partial function: it is defined only for those contexts that satisfy the presuppositions of the sentence in question. This clarifies what I wrote above: if the presuppositions of the antecedent are not satisfied in C (i.e. if the C does not entail them), then the antecedent will not be defined.

⁹ The idea of a scalar implicature at the presupposition level rather than at the assertion level is very similar to an idea that Heim (1991) suggests in her discussion of indefinites. She argues that in order to account for the felicity/infelicity of sentences with indefinite articles, the principle "Presuppose as much as possible" seems to be needed. I refer the reader to her article for a detailed discussion of the issue. Hawkins (1991) also makes a similar point.

Therefore, the circumstances in which the implicature will be canceled are those in which it would not have been more relevant for the speaker to inform his interlocutor about his *current* epistemic state. In other words, in those circumstances in which it is enough to inform his audience about his past epistemic states, the implicature won't be drawn.

I believe this is indeed the case. In the following example, the mismatched past counterfactuals can be used even though the antecedent of one of them (the one referring to tomorrow) is actually true.

- (36) Lucy wanted to visit her mother but she was afraid she will fight with her brother and sister, with whom she does not get along at all. I met Charlie this morning and I asked him whether he knew what Lucy has decided to do. Charlie said:
Yes, she decided to go tomorrow. When I saw her last she was deeply torn: she had to choose between tomorrow and the day after, because those are her only days off work. She didn't know what to do: true, *if she had gone to visit her mom tomorrow, she would have met her brother* but, *if she had gone the day after tomorrow, she would have met both her siblings*, which is certainly worse. She chose tomorrow so as to meet only one of them.

Canceling the implicature of falsity in (36) is possible because the relevant epistemic state here is not that of the speaker at the utterance time but that of Lucy at the time she was making the decision. Charlie – the speaker – is reporting Lucy's thinking: the thoughts she went through in order to decide between tomorrow and the day after.

This is exactly the same mechanism at work in other cases of implicature cancellation. Normally, if somebody says, "I own two cars", his interlocutors will draw the implicature that he does not own three (or more) cars. But, now, consider the following scenario: In order to get a meal plan you must have at least two children. Suppose B has four children and he's applying for a meal plan. The following exchange takes place between A – the employee – and B.

- (37) A: Do you have two children?
B: Yes, I do.

Here, the employee will correctly not draw the implicature that B only has two children. Why? Because the information about the exact number of children B has is not expected (it's actually irrelevant). Hence, B not giving that piece of information will not have any significance whatsoever.

4. Covert Modality

This paper is about how temporal mismatches in conditionals are cases of tense (past) being interpreted outside the proposition where it occurs in surface structure. The proposal is that (at least in cases of temporal mismatch) Past is interpreted in the domain of the modal operator (more precisely, it is interpreted inside the accessibility relation).¹⁰

¹⁰ This hypothesis is supported by further data, thorough discussion of which the reader can find in Ippolito (2001). The relation between modal operators and the complementizer's domain has already been exploited, for example in Stowell (1982). More specifically, in the literature on the syntax of conditionals,

Notice that in mismatched conditionals this is the only option available, as Past *cannot* be interpreted inside the antecedent because of the future temporal adverb.

This can be generalized to all sentences with temporal mismatches. In no sentence with a temporal mismatch can Past be interpreted inside the proposition where the future temporal adverb occurs. In other words, in every temporally mismatched sentence Past must be interpreted in the domain of the modal operator, more specifically, in the accessibility relation of a modal operator. Consequently, we predict that all sentences with a temporal mismatch will be interpreted modally. The goal of this section is to show that this is correct.

Sentence (38) has a special interpretation. It *only* has a special interpretation.

(38) Originally, Charlie left tomorrow.

The Past cannot be interpreted inside the proposition; that is to say, it cannot locate the event of leaving in the past. If it did, the event of Charlie's leaving would be said to occur both tomorrow and past relative to the utterance time, and the sentence would be as nonsensical as (39).¹¹

(39) #Tomorrow, Charlie left.

The former sentence is acceptable, though. What does the past do? In order to answer this question, we need to ask what (38) intuitively means and in what circumstances it would be felicitously uttered. Suppose today is Monday and Charlie had scheduled to leave tomorrow (Tuesday). I meet Lucy and she tells me that Charlie is coming to dinner on Wednesday. I am surprised and I tell her that I thought he would have already gone by then. She can then felicitously utter (38). A similar example is (40).

it has been observed that there exists a kind of subjunctive conditional where (one layer of) past moves overtly to C (Pesetsky 1989, Iatridou and Embick 1994). Iatridou and al. also observe that 'inverted conditionals' have a stronger 'irrealis' flavor when compared with their non-inverted counterpart:

- (i) Had Lucy met him for the first time yesterday, she would not have married him.
- (ii) If Lucy had met him for the first time yesterday, she would not have married him.

The former sentence suggests more strongly that the antecedent is false and, consequently, would resist Anderson's type of examples. Indeed, a future adverb can replace *yesterday* in (i): according to the speakers I have consulted, (iii) is the preferred way to talk about a future impossibility.

- (iii) Had Lucy met him for the first time tomorrow, she would not have married him.

Turkish offers another case of overt movement of Past to C and, interestingly, this movement is associated with the falsity of the antecedent (see Ippolito (2001a) for a discussion of the Turkish data).

¹¹ The same point can be duplicated using the past progressive:

- (i) Charlie was leaving tomorrow.

I have chosen the simple past forms so as to isolate the contribution of tense from the contribution of aspect. The speakers I have consulted accepted these sentences in the appropriate context. I found similar examples in Dudman (1983). For analysis of the interaction between progressive aspect and modality, see Dowty (1977) and Copley (2001).

- (40) It is 10am and Charlie has just told Sally that they will play the basketball game tomorrow. Sally was told last week that they would play tonight. So, she says:
Didn't we play tonight?

Intuitively, (38) talks about what should have been the case if some plans had been realized. The truth of the proposition expressed by a mismatched sentence such as (68) is evaluated in all those worlds compatible with some relevant aspect of the actual world: plans, beliefs, desires, etc. Sentence (38) is a *modal sentence*, even though its modality is hidden.

The broader generalization I made above finds support: in every temporally mismatched sentence, the Past must be interpreted inside the accessibility relation, thus escaping the nonsensical interpretation. The analysis that I proposed for MPSCs can naturally be extended to these simpler cases.¹²

5. Conclusion

One issue open for future investigation is whether non-mismatched past counterfactuals such as *If Charlie had gotten married yesterday, they would have had the outdoor reception* should be given an analysis on the lines of MPSCs. Above, we observed that they behave like MPSCs with respect to the presupposition problem. Can the second layer of past in standard past counterfactual be interpreted as constraining the time-argument of the accessibility relation? Because this interpretation is available to MPSCs, it will be available to standard past counterfactual as well. Nevertheless, we do not yet have an argument that standard past counterfactuals *must* be interpreted this way. A satisfactory discussion of this issue will have to be postponed, but let me mention that the contrast between inverted and non-inverted past counterfactuals mentioned in footnote 10, seems to indicate that standard past counterfactuals are in fact ambiguous structures depending on whether the past tense is interpreted inside the proposition expressed by the antecedent or outside that proposition.

For lack of space, I have also ignored the question of the formal differences between counterfactuals (subjunctive conditionals) and indicative conditionals. This will have to be the subject of a future paper.

I have argued in this paper that the distinction between subjunctive and indicative conditionals is too course-grained. A further distinction within the class of subjunctive conditionals has to be drawn along the temporal dimension. Without this distinction, we are left with no explanation of problematic cases such as MPSCs and, more generally, with no true understanding of the felicity conditions of conditionals.

¹² For the details, see Ippolito (2001b).

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