Counterfactuals with unspecific antecedents

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1 Counterfactuals and similarity

If I were to drill a hole through the wall behind my desk, I could look through it into Bob Goodin's office. That's because Bob's office is on the other side of that wall. If Bob had recently swapped offices with Daniel Stoljar, the hole would lead to Daniel's office, not Bob's. The truth-value of the conditional therefore depends on whose office is behind the wall. When we evaluate the counterfactual, we consider what happens in possible situations where I drill a hole through the wall behind my desk, but we don't consider *all* such situations. We ignore possibilities that differ gratuitously from how things actually are over and above the difference that comes with the truth of the antecedent.

Thus we reach the classical Lewis-Stalnaker analysis of counterfactuals, according to which (roughly speaking) $A \mathrel{\Box\!\!\rightarrow} C$ is true in a situation s iff C is true at all situations where A is true and that are otherwise as similar to s as possible. (This is a hybrid between Lewis's and Stalnaker's proposals, making the 'Limit Assumption' but not the 'Uniqueness Assumption'.)

As Lewis emphasized from the beginning, 'similar' should here be understood as a quasi-technical term: "we must use what we know about the truth and falsity of counterfactuals to see if we can find some sort of similarity relation [. . .] that combines with [the analysis] to yield the proper truth conditions" [1979: 43]. Notoriously, to get the right truth-conditions for

(1) if Nixon had pressed the button, there would have been a nuclear holocaust (from [Fine 1975]),

we need to assume that worlds where Nixon presses the button and there's a nuclear holocaust are more similar to the actual world than worlds where the mechanism of the button malfunctions and the holocaust is avoided. It isn't hard to find general standards for similarity that do the job at least for most statements about concrete events like (1). Roughly, the "most similar A-worlds" are here worlds where everything that's causally independent of (the occurrence or absence of) the A event is held fixed and where everything else evolves in accordance with the actual laws of nature applied to the state where A came about.

There are tricky questions of detail. Can the standards be spelled out without reference to causation, as required for Lewis's great metaphysical project of Humean Supervenience?

How exactly does the A event come about in the closest worlds? Do unusual outcomes of chance events detract from similarity?

Not all counterfactuals specify a concrete event (at a particular time) in the antecedent. The similarity standards sketched above (or the ones proposed in [Lewis 1979: 47f.]) don't give sensible results for 'if the laws of nature had been different', 'if the Hurricane hadn't destroyed our house', 'if kangaroos had no tails' or 'if my coat had been stolen yesterday'. This isn't especially surprising or problematic, as the above standards clearly weren't meant to cover all cases.

There is one phenomenon that seems to cast doubt on the similarity-based account in general, no matter how similarity is spelled out. The problem is best known from disjunctive antecedents.

(2) If I had arrived 5 or 10 minutes later, I would still have caught the train.

Intuitively, (2) implies that if I had arrived 10 minutes later, I would (still) have caught the train. On the similarity account, it would follow that worlds where I arrive 10 minutes later are no further away from (i.e., no more dissimilar to) actuality than worlds where I arrive 5 minutes later.

So far so good. We already knew that 'similarity' is not be judged by direct intuitions about likeness between possible worlds. However, the phenomenon is quite general. $A \vee B \mathrel{\Box\!\!\rightarrow} C$ (almost) always seems to imply $A \mathrel{\Box\!\!\rightarrow} C$ and $B \mathrel{\Box\!\!\rightarrow} C$. (I will return to the exceptions.) But if for arbitrary A and B, the closest A worlds are equally far away than the closest B worlds, then all worlds are equally close to one another. By the similarity account, it would follow that $A \mathrel{\Box\!\!\rightarrow} B$ is only true if B is true at absolutely all A worlds. Counterfactuals could not be used to express contingent propositions about the world.

Now this argument is a little too quick. There are compelling reasons to believe that the similarity standards for the evaluation of counterfactuals are context-dependent. The phenomenon of reverse Sobel sequences even suggests that they are highly sensitive to what possibilities are salient in the conversation: merely mentioning the possibility that all states could dismantle their nuclear weapons seems to let this possibility into the "closest" (most similar) scenarios in which the US dismantle their weapons. One could similarly argue that *in a context where* $A \vee B \mathrel{\Box\!\!\rightarrow} C$ *is uttered*, the similarity standards usually change in such a way that the closest worlds include both A and B worlds: merely mentioning A and B has made them equally "close" to the actual world. Then it wouldn't follow that $A \mathrel{\Box\!\!\rightarrow} B$ is an unrestricted strict conditional.

I think this defense isn't quite as desperate and ad hoc as it appears at first sight. After all, it is true that when we evaluate $A \vee B \mathrel{\Box\!\!\rightarrow} C$, we generally require C to be true both at certain A-worlds and at certain B-worlds, but not at all A-worlds and B-worlds. So if the "closest" $A \vee B$-worlds are, by definition, those at which we evaluate C, then uttering $A \vee B$ has indeed made A and B equally close to actuality. On the other hand, one would like to understand better how this effect comes about – in particular as it is really quite widespread: it has nothing in particular to do with disjunctions, nor with conditionals.

2 Phenomenology

That the phenomenon in (2) is not due to the presence of 'or' is obvious. Consider:

(3) If Fred had drunk from a bottle on the top shelf, he would have died.

In normal contexts, we take this to imply that for any bottle on the top shelf, if Fred had drunk from it, he would have died. Likewise:

(4) If the dart had landed anywhere on the left-hand side of the board, I would have won.

This implies that I would have won no matter where on the left-hand side the dart might have landed. In normal contexts, the implication remains even without the 'anywhere':

(5) If the dart had landed on the left-hand side of the board, I would have won.

So what generates the effect is not the fact that the antecedent explicitly mentions a range of possibilities. The antecedent in (5) specifies a single way things could have been: the dart could have landed on the left-hand side of the board. Of course, this is not a maximally specific way things could be. It doesn't say where exactly the dart landed. Nor does it say what happened earlier in the game or who will win the next elections. But there is a difference between the things left open by the antecedent of (5). In some intuitive sense, it is *explicitly* left open where on the left-hand side the dart lands, while facts about the earlier game or forthcoming elections are only *implicitly* left open. The difference is important. (5) suggests that I would have won no matter where on the left-hand side the dart had landed, but it doesn't suggest that I would have won no matter how the earlier parts of the game had gone.

From this perspective, the phenomenon at issue is very widespread indeed. Consider:

(6) If I had tossed this coin, it would have landed heads.

Here the antecedent is explicitly neutral on how exactly I would have tossed the coin: at what height, with what angular velocity, etc. Consequently, (6) is normally taken to imply that the coin would have landed heads no matter how (within reason) I had tossed it.

For the previous example it doesn't matter whether the coin is *indeterministic* in the sense that the laws of nature leave open how it lands even given a precise way of tossing. But suppose we have such a coin, and let W be a precise way of tossing, and consider

(7) If I had tossed this indeterministic coin in way W, it would have landed heads.

This suggests that the coin would have landed heads no matter how the chance process had developed. This could be an instance of the same pattern as above, if we assume that an antecedent that mentions a chance process is "explicitly neutral" about the outcome.

A large number of alleged problems or counterexamples to the Lewis-Stalnaker account turn out to fall under this pattern. For example, Stephan Leuenberger once pointed out that

(8) If lots of big miracles had occurred yesterday, things would now be just as they actually are

sounds clearly false, although by the similarity standards of [Lewis 1979] one would expect the closest antecedent worlds to be worlds where the miracles happen to undo each other. (A similar case is discussed in [Kment 2006: 280].) Intuitively, a conditional that begins with 'if lots of big miracles had occurred yesterday' is true only if the consequent is true no matter what miracles had happened (within reason, perhaps). Similarly, the above discussion of (7) suggests that we don't always need to find "quasi-miracles" to prevent accidental reconvergence in indeterministic worlds. . Again, the problem of Pollock's coat ('if my coat had been stolen yesterday, it would have been stolen at midnight' sounds wrong) could be explained by noting that the antecedent is explicitly neutral on where and when the coat was stolen.

Let me emphasize the difference between what is explicitly and only implicitly left open. In none of the above cases do we regard the conditional to make a claim about absolutely all antecedent worlds. If Fred has a severe allergy to alcohol and all bottles on the top shelf contain alcohol, then (3) is true. The fact that Fred would not have died if he hadn't been allergic to alcohol is irrelevant. I haven't explained what exactly it means for a sentence to be explicitly neutral about something. This clearly isn't just a matter of truth-conditional content. If B is unrelated to A, then $(A \land B) \lor (A \land \neg B)$ is explicitly neutral on B, but A is not, although the two sentences have the same truth-conditional content. But as the discussion above suggests, it also isn't just a matter of syntax: it is not a matter of containing terms like 'or', 'any', etc.

To sum up, we have found that if a statement A' entails A and A is explicitly neutral (in some intuitive and imprecise sense) on whether A is realized by A', then we often interpret $A \mathrel{\Box\!\!\to} C$ as if it entailed $A' \mathrel{\Box\!\!\to} B$.

This kind of phenomenon is not limited to the antecedent of counterfactuals. For one thing, it also occurs in the antecedent of indicative conditionals:

(9) If Fred drinks from a bottle on the top shelf, he will die.

And it occurs on other occasions where an *if* or *when* clause restricts an operator, here 'usually':

(10) Fred is usually alone when he is in the mountains or at the beach.

In normal context, this implies that Fred is usually alone when he is in the mountains, even if Fred more often goes to the beach than to the mountains (so that he could be mostly alone within the disjunctive class of situations where he is at the mountains or at the beach even if he is never alone at the mountains).

The phenomenon is well-known for permission:

(11) You may have beer or wine

normally implies that you may have beer. If there are a number of different coins on the table, some silver some golden, then

(12) you can take a silver coin

normally implies that you're allowed to take any of the silver coins.

Unsurprisingly, the effect carries over to epistemic possibility:

(13) Fred might have had beer or wine.

And nomic possibility:

(14) It is (nomically) possible for this cup to move sideways or even upwards when dropped.

(14) suggests that it is nomically possible for the cup to move upwards when dropped.

In all these cases, the phenomenon clashes with attractive and popular interpretations of the relevant constructions, such as the idea that 'might p' is true iff p is true at some contextually open epistemic possibilities. Indeed, since the phenomenon depends not only on the truth-conditions of the relevant sentences, but also on their syntax ($\Diamond((p \wedge q) \vee (p \wedge \neg q))$ implies $\Diamond(p \wedge q)$, but $\Diamond p$ does not), it seems to clash with any purely *intensional* semantics of the relevant constructions.

Before we look at possible explanations, let's note that the phenomenon does not seem to arise for "box contexts":

(15) I know that Fred is either in the pub or in the library,

doesn't imply that I know that Fred is in the pub. Likewise

(16) you must hand in the paper within 2 weeks

doesn't imply that you must hand in the paper after exactly 12 days.

3 Explanation

If A' entails A and A is explicitly neutral on A', then $A \Box\!\!\rightarrow B$ often seems to imply $A' \Box\!\!\rightarrow B$. Why is that?

A simple answer is that $A \Box\!\!\rightarrow B$ really does entail $A' \Box\!\!\rightarrow B$ for all A' that entail A. Alan Hajek has toyed with this suggestion. But it doesn't look very promising. First, it makes it mysterious how we can use counterfactuals to convey contingent information. Second, it doesn't explain why it seems to matter whether A is *explicitly neutral* on A' – why, for example, (3) intuitively doesn't imply that Fred would die even if he weren't allergic to alcohol. Third, the response doesn't seem to carry over to 'might' or 'would probably' counterfactuals, and it looks completely untenable for the other constructions mentioned in the previous section: 'you may have a cookie' surely doesn't entail 'you may have a cookie and burn down the house'.

Another line of response is to jettison the Lewis-Stalnaker account and attempt a completely different, hyperintensional semantics for counterfactuals – and, presumably, for other uses of *if* and for deontic, epistemic and nomic possibility. (Kit Fine seems to have gone down that route.) I take it that this is what we have to do if all else fails. But we should first see if there isn't an easier way out.

A third possibility is to suggest that if A is explicitly neutral between $A_1, \ldots, A_n$, then the semantic value of A is not a single proposition, but a set of propositions: $\{A_1, \ldots, A_n\}$. In particular, the semantic value of 'A or B' is not $A \cup B$, but $\{A, B\}$. One can then easily adjust the usual interpretation of conditionals and modals, by some form of supervaluationism. Thus if A expresses the set of propositions $\{A_1, \ldots, A_n\}$, then $A \Box\!\!\rightarrow B$ is true iff all $A_i \Box\!\!\rightarrow B$ are true. [I think I've seen this somewhere in the literature.] My own proposal won't be too far from this, but I hope it will be a little less ad hoc.

A fourth type of response is to try to explain the phenomenon as some kind of implicature. ([Loewer 1976] is an early example.) The idea is that if A is explicitly neutral between $A_1, \ldots, A_n$, then there is an implicature that what is said is true for all A_i in place of A. The proposal I want to make falls under this type.

To begin, consider statements like the following.

(17) The rooms are between 12.7 and 16.5 square meters in size.

(18) The best things in life are illegal, immoral or fattening.

Arguably, (17) is *true* if all the rooms at issue have a size of exactly 14 m^2. On the other hand, (17) *implicates* that some room has only 12.7 m^2 and another 16.5. Likewise, (18) is true if all the best things in life are illegal and none are fattening. But there is a strong implicature that some of the best things are fattening.

The implicature is easy to explain along Gricean lines. If all rooms are known to have a size of 14 m^2, then there is an obvious alternative to uttering (17) that's both simpler and more informative. (Notice that the implicature gets weaker and can even disappear if the speaker isn't taken to know the exact sizes of the rooms.)

The general structure of (17) and (18) is that a *range of properties* is attributed to a *collection of objects*. The unsurprising implicature is that the objects variously instantiate properties from across the whole range.

The "objects" needn't be ordinary objects. They can be times or worlds, and the attribution can take the form a sentence evaluated at a corresponding collection of times or worlds.

(19) When the sun was shining, she always brought mushrooms or flowers.

Here the "attribute" is the semantic value of 'she brought mushrooms or flowers', which can be true on some days and false on others. It is attributed to the collection of days when the sun was shining. The implicature is that on some of these days she brought mushrooms and on some flowers. Of course, we can leave it to conversational context to determine the relevant collection:

(20) She always brought mushrooms or flowers.

Next, consider

(21) Sometimes [or: sometimes when the sun was shining] she brought mushrooms or flowers.

This also suggests that she sometimes brought mushrooms and sometimes flowers, unlike

(22) at least once [or: at least once when the sun was shining] she brought mushrooms or flowers.

Why is that? The reason, I think, is that 'sometimes' acts as a *plural* quantifier, like 'some critics' in 'some critics only cite each other' and 'all humans' in 'all humans have a common ancestor'. I.e., *sometimes p* is true iff there is a *non-empty collection* of relevant times that satisfy *p*.

Compare:

(23) Some rooms are between 12 and 16 square meters.

And:

(24) At least one room is between 12 and 16 square meters.

(23) says that there is a collection of rooms of between 12 and 16 square meters, (24) does not. Accordingly, only (23) generates the implicature. [‘Some’ may also implicate ‘more than one’, but this doesn’t explain the difference, since (24) still doesn’t generate the implicature if we replace ‘At least one room is’ by ‘at least two rooms are’.]

Next consider ‘might’.

(25) She might bring mushrooms or flowers.

Suppose *might p* means not *there is at least one epistemically open world that satisfies p* but *there are some epistemically open worlds that satisfy p*, i.e. *there is a non-empty collection of worlds that satisfy p*. The case is then analogous to (21) and (23). A collection is introduced by quantification, and a range of “properties” attributed to its members.

(Are there independent reasons to assume plural quantification here? One reason might be that it seems to account more naturally for modal subordination:

(26) She might get lost on the way back through the forest. Nobody would hear her.

This doesn’t merely say that there is an epistemically open world where she gets lost and nobody hears her. Rather, it says that throughout the collection of worlds where she gets lost, nobody hears her. The plural analysis makes (26) parallel to ‘some people do like vegemite; they are all Australians’.)

The present explanation applies equally to deontic examples like (11) or nomic/circumstantial examples like (14). Note that like in (17), the implicature is strong only if we assume that the speaker knows how the mentioned properties distribute among the relevant worlds. If someone utters

(14) It is (nomically) possible for this cup to move sideways or even upwards when dropped.

and it is known in the context that she has forgotten exactly what the laws of physics say about dropped plates, the implicature goes away.

Why does the implicature not arise for “box contexts” such as

(15) I know that Fred is either in the pub or in the library,

and

(16) you must hand in the paper within 2 weeks,

which don’t imply that I know that Fred is in the pub and that you must hand in the paper after exactly 12 days? The answer is that it does. Here, too, it is implicated that the range distributes over the selected cases – the doxastically possible worlds or the legally acceptable worlds. Thus (15) implicates that at some of my doxastically possible worlds, Fred is in the pub, and (16) implicates that you may hand in the paper after exactly 12 days. If one thinks of the phenomenon as an or-to-and inference, it looks like it only affects diamond contexts, but if one thinks of it as a distribution-over-all-selected-items implicature, it applies throughout.

Instead of simply attributing a range of properties to a collection, one can also use it to restrict a wider collection. This happens in

(27) Some rooms between 12 and 16 square meters in size are available for rent,

and

(28) All rooms between 12 and 16 square meters in size are available for rent

which both suggest that some room with 12 m^2 is available for rent, as is at least one room with 16 m^2. If a collection is picked out by a range of properties, it is usually implicated that the properties are suitably distributed over the collection.

This is also what happens in the antecedent of conditionals and in *if* clauses more generally. *If* and *when* clauses serve to pick out a class of situations or events from some larger class. So reconsider

(9) If Fred drinks from a bottle on the top shelf, he will die.

Here the antecedent identifies a class of situations, of which it is claimed that they are situations where Fred will die. What class is this? It is not normally the class of absolutely all possible situations in which the antecedent is true. (9) doesn't imply that Fred dies even if his allergy is suddenly cured. Roughly speaking, only situations that are live possibilities in the conversational contexts count. However, in a context where (9) is uttered, it may well be that no situation in which Fred drinks one of the relevant bottles is considered a realistic possibility. Then the context must be updated to accommodate the presupposition that the antecedent is not ruled out. That is, there is a pragmatic rule that the class of live possibilities must be adjusted so that *some of them* satisfy the condition that Fred drinks from a bottle on the top shelf. And since this condition is explicitly neutral on which bottle Fred chooses, there is a further implicature that all the different cases are realized among the chosen possibilities. So we end up with a context set that includes situations where Fred drinks from the first bottle on the top shelf, others where he drinks from the second, and so on. (9) claims that Fred will die in all those situations. This is why it pragmatically implies that Fred will die no matter which bottle he tries.

The pragmatic effect is fragile. In another context, one could say

(29) If Fred drinks from a bottle on the top shelf, it will be the Martini.

Clearly this doesn't imply that no matter which bottle Fred chooses, it will be the Martini.

The case of subjunctives is similar.

(3) If Fred had drunk from a bottle on the top shelf, he would have died.

Again, the antecedent identifies a class of situations, of which it is claimed that they are situations where Fred will die. What class is this? Again, it is not normally the class of absolutely all possible situations in which Fred drinks a bottle from the top shelf. This time, the restriction isn't by what counts as a live possibility in the context, but by "similarity" to the actual utterance situation. The basic function of the *if* clause is the same as before: it serves to filter out a class of situations from some wider class. As before, the wider class must include *some* situations at which the embedded clause (the antecedent) is true. Since the antecedent in (3) is explicitly neutral on which bottle Fred chooses, we normally assume that the relevant situations cover all the possibilities. That is, the "sphere of possibilities" is expanded to contain situations where Fred drinks from the first bottle, others where he drinks from the second, and so on.

Again, this pragmatic effect is fragile: it can be broken in

(30) If Fred had drunk from a bottle on the top shelf, it would have been the Martini.

4 Complications

The present proposal (more or less) nicely handles simple 'if A then B' conditionals. But it seems to make the wrong predictions for other types of conditionals. Consider

(31) If Fred drinks from a bottle on the top shelf, he will *probably* die.

This can imply that no matter which bottle Fred chooses, he will probably die. But that's not what we would expect from the above proposal, together with a natural interpretation of 'probably'. The natural interpretation I have in mind is that 'if A then probably B' is true iff among the contextually open worlds that are left after filtering out the A world, the proposition B has high probability. Hence (31) is true as long there is a high probability of Fred dying among the various situations (in the modified context set) where he drinks from the top shelf. From this it would not follow that the probability of dying is high for each particular bottle. It could even be true that some bottles are entirely harmless and wouldn't affect Fred at all. (There is a counterexample here to a naive reading of Adam's Thesis.)

Again the effect also appears for counterfactuals:

(32) If Fred had drunk from a bottle on the top shelf, he would probably have died.

And it isn't restricted to 'probably'. Consider

(33) If Fred had been in the lecture theater or in the parking lot, he might have seen Jones.

In a suitable context, this implies that Fred might have seen Jones if he had been in the parking lot. This is unexpected if 'might p' is true as long as p is true at some of the relevant worlds. On the account above, the sphere of relevant worlds expands to let in some worlds where Fred is in the lecture theater and some where he is in the parking lot; those worlds are then filtered out by the *if* clause, and it is claimed that *some of them* are worlds where Fred saw Jones. Why then does (32) imply that such worlds can be found both among lecture theater worlds and among parking lot worlds?

Notice that this effect seems to be limited to *if* (and *when*) clauses.

(34) Fred probably tried one of the bottles from the top shelf

doesn't imply that Fred probably tried all of them. (So it isn't generally true that when A is explicitly neutral between $A_1, \ldots, A_n$, then we evaluate the entire sentence for all choices of A_i.)

What's going on here? Perhaps the "natural interpretations" of 'probably' and 'might' assumed above are too simple. Notice that (31) and (32) come out as expected if we assume that probability facts (or possibility facts, for (33)) are built into the relevant worlds, so that 'if A then probably B' says that the relevant A-worlds all have high built-in probability for B: this evidently implies that each of the A-worlds individually has high probability for B. So assume 'if – then probably/might –' conditionals are really would-conditionals with 'probably'/'might' in the consequent. The challenge is to explain how we get the right probabilities (and possibilities) built into the A-worlds.

To get the intended interpretation, clearly the probabilities must be given by the utterance context, not by what happens in the relevant A-world w. But they can't be the unconditional probabilities from the utterance context, otherwise 'if A then probably B' comes out equivalent to 'probably B'. Nor can they be the probabilities from the utterance context conditional on the antecedent A, which would make the new proposal equivalent to the previous one. They also can't be the probabilities conditional on the world w, which would reduce all probabilities to 0 and 1. What we need are the probabilities from the utterance context conditionalized on a *subset* of the A worlds, a subset that contains w. For example, in (31), the probability measure "built into" a relevant world w where Fred drinks from the Martini bottle should be our actual probability measure conditionalized on Fred drinking from the Martini bottle. Similarly, to get the intended interpretation of a 'might' version of (31), the possibility facts built into w must turn on what happens at other worlds where Fred drinks from the Martini bottle.

Now we'd need (i) a plausible story of *why* embedded modals are interpreted in this way by conditionalizing on a cell of a partition of the A-worlds, and (ii) a plausible story of how the relevant partition is determined.

(ii) looks easier. All along we assumed that in a suitable context, some sentences A are "explicitly neutral" about whether A is realized in one of the more specific ways $A_1, \ldots, A_n$. I haven't said how this partition $A_1, \ldots, A_n$ is determined, but it doesn't look entirely mysterious. And of course this is precisely the partition we need.

What about (i)? One way (i) could come about is if we evaluated 'if A then B' not by checking whether each relevant A-*world* is a B-world, but whether each relevant A-*scenario* is a B-scenario, where a *scenario* is a set of worlds, determined by the partition $A_1, \ldots, A_n$ (i.e. the A-scenarios are the cells of $\{A_i\}$ intersected with the total space of relevant worlds). Truth at a scenario would be defined so that a non-modal sentence is true at a scenario s iff it is true at all worlds in s; 'might C' is true at s iff C is true at some worlds in s; 'probably C' is true at s iff the probability of C given s is high. For specific antecedents, there is only one relevant scenario, so the semantics turns into a version of Stalnaker's 1968 proposal, where there is always a unique closest A-world, except that the "worlds" are now rather coarse-grained. For non-modal consequents, the semantics is equivalent to the simpler version which identifies worlds with scenarios.

I'm not entirely happy with this explanation of (i), but it also doesn't look terrible.

References

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