Indicative Scorekeeping

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Abstract

Folklore has it that counterfactual Sobel sequences favor a variably strict analysis of conditionals over its plainly strict alternative. Recent discussions of the lore have focussed on the question whether data about reverse counterfactual Sobel sequences actually speak in favor of a dynamic revival of the strict analysis. This paper takes the discussion into a new direction by looking at straight indicative Sobel sequences. The observation is that a variably strict analysis fails to predict the felicity of these sequences given minimal semantic and pragmatic assumptions. A properly elaborated dynamic analysis of indicatives, in contrast, handles the data with grace.

1 Indicative Sobel Sequences

Lewis [6] famously argues that the felicity of Sobel sequences speaks against a strict analysis of counterfactuals and instead supports a *variably* strict interpretation on which conditional consequents are evaluated at the *closest* possible worlds that verify the antecedent. Recent discussions of Lewis's argument have focussed on Heim's observation that *reverse* counterfactual Sobel sequences tend to be infelicitous: von Fintel [2] and Gillies [4] argue that this observation favors a *dynamic* strict interpretation of counterfactuals over a (static) variably strict analysis, but Moss [7] counters that the data can be handled by a pragmatic supplement to Lewis's account. This paper takes the discussion into a new direction by arguing that straight *indicative* Sobel sequences favor a dynamic strict interpretation of conditionals.

Indicative Sobel sequences are just as felicitous as their counterfactual cousins:

(1) (a) If Alice comes to the party, it will be fun. (b) But if Alice and Bert come, it will not be fun. (c) But if Charles comes as well, it will be fun...

A variably strict analysis of indicatives à la Stalnaker [8] predicts that (1) is consistent, the simple observation being that the closest possible worlds at which Alice comes to the party need not be worlds at which Bert comes too and that the closest possible worlds at which both show up may be such that Charles stays at home.

Variably Strict Analysis. Take a connected and transitive relation $\leqslant$ that is provided by context and keeps track of relative similarity or closeness between worlds:

1. $\min_{\leqslant,w}(\phi) = \{w' : w' \in [\![\phi]\!] \text{ and for all } w'' : \text{ if } w'' \in [\![\phi]\!], \text{ then } w' \leqslant_w w''\}$
2. $[\![(\text{if } \phi)(\psi)]\!]^w = 1 \text{ iff } \min_{\leqslant,w}(\phi) \subseteq [\![\psi]\!]$

This is fine as far as it goes, but it is not sufficient to predict that the sequence in (1) is felicitous since indicative conditionals also impose distinct constraints on the discourse context to be assertible. Compare:

(2) (a) # Mary is not in New York. If she is in New York, she will meet Alex.
(b) ✓ Mary is not in New York. If she were in New York, she would meet Alex.

The textbook explanation for the observation that (2a) is marked goes as follows. The first member of the sequence expresses the proposition that Mary is not in New York and eliminates from the context set—the set of possible worlds compatible with what is common ground—all possible worlds at which that proposition is false (see [10]). But for the subsequent indicative to be felicitous there must be at least one such world in the context set because indicative conditionals—unlike their counterfactual cousins—presuppose that their antecedents are compatible with the common ground (see [9]).

The textbook explanation just given relies on two pragmatic assumptions that are widely accepted in the literature. Given some context c, let s_c be the context set of c:

1. If ϕ expresses a proposition $[\![\phi]\!]$ in context c, then the result of asserting ϕ in c, $c+\phi$, is such that $s_{c+\phi} = s_c \cap [\![\phi]\!]$.
2. An utterance of an indicative conditional of the form ⌜(if ϕ)(ψ)⌝ in context c presupposes that $s_{c+\phi} \neq \varnothing$.

The problem for the variably strict analysis is this: while it correctly predicts that indicative Sobel sequences are consistent, it wrongly predicts that such sequences are infelicitous given minimal constraints on the semantics of conditionals. I assume—as Lewis and Stalnaker do—that modus ponens is valid and thus that the members of (1) are bounded from below by the material conditional ($\supset$) in the following sense:

3. (if ϕ)(ψ) $\vDash \phi \supset \psi$

Accordingly, on a variably strict analysis the similarity relation for the conditionals in (1) must be *weakly centered*: for all w and w', $w \leqslant_w w'$. (Linguists are less concerned with modus ponens than philosophers but there are no attested counterexamples to this rule for the kind of indicative conditionals that figure in simple Sobel sequences.) But then the result of uttering (if A)(F) and (if $A \wedge B$)($\neg F$) in any context cannot contain an $(A \wedge B)$-world since this would have to be an $(F \wedge \neg F)$-world, and so the antecedent of (1c) is incompatible with what is common ground once its predecessors have been asserted. So if a variably strict semantics were right, we would expect the utterance of (1c) in the Sobel sequence to be marked due to presupposition failure, which is simply not the case.

One might suggest that the presupposition carried by (1c) is accommodated via expanding the context set but then we would expect this expansion to take place in (2a) as well since in both cases the conditional's antecedent is incompatible with the context set. One might also suggest that the presupposition violation is real but overlooked/ignored in discourse, but then Sobel sequences would have no bite against a plain strict analysis in the first place since it is hard to see why *its* predictions should not be overlooked/ignored in discourse as well. A variably strict interpretation thus has no good explanation for why indicative Sobel sequences should be felicitous.

The purpose of the next sections is to demonstrate that a proper *dynamic* strict analysis of indicative conditionals avoids the problem of its static variably strict alternative while preserving the pragmatic and semantic constraints articulated earlier. Assuming that conditionals are subject to a uniform semantic analysis, this result also suggests that a dynamic analysis of counterfactuals is on the right track.

2 Dynamics

The dynamic story I am about to tell is in the spirit of Gillies's [3] analysis of conditionals as tests on an information carrier and thus owes a lot of inspiration to Veltman's [12] update semantics. But it crucially departs from the classical conception of an input context as a plain set of possible worlds in order to distinguish between possibilities that are merely compatible with what is common ground and those that are 'live' in the sense that they are explicitly treated as relevant. The guiding intuition here is that indicative conditionals have the potential to highlight certain hitherto ignored possibilities in virtue of their presupposed content and then, in virtue of their asserted content, establish the corresponding material conditional as necessary in light of the possibilities treated as live. These two features conspire to account for the felicity of indicative Sobel sequences, as we will see momentarily. But the first point to notice is that, at least for current purposes, it will not do to think of contexts as plain sets of possible worlds since in these models all possibilities are created equal. Instead I will model a context as a *set of sets of possible worlds* and define the notions of a (live) possibility in a supervaluationist fashion (see [13]).

I will first define the language under consideration and then make the notion of a context state more precise.

Definition 1 (Language). $\mathcal{L}$ is the smallest set that contains a set of sentential atoms $\mathcal{A} = \{p, q, ...\}$ and is closed under negation ($\neg$), conjunction ($\wedge$), the epistemic modals *might* ($\Diamond$) and *must* ($\Box$), and the indicative conditional (if $\cdot$)($\cdot$). $\mathcal{L}^+ = \mathcal{L} \cup \{\partial\phi \colon \phi \in \mathcal{L}\}$. $\mathcal{L}_0$ is defined as the non-modal fragment of $\mathcal{L}$. Disjunction ($\vee$) and the material conditional ($\supset$) are defined in the usual way.

Definition 2 (Possible Worlds, Context States). w is a *possible world* iff $w \colon \mathcal{A} \to \{0, 1\}$. W is the set of such w's, $\mathcal{P}(W)$ is the powerset of W. Σ is a *context state* iff $\Sigma \subseteq (\mathcal{P}(W)\backslash\varnothing)$, that is, a context state is a (possibly empty) set of nonempty sets of possible worlds. I is the set of such Σ's. The set of *minimal* elements of Σ is defined as $\textsc{Min}(\Sigma) = \{\sigma \in \Sigma \colon \neg\exists\sigma' \in \Sigma.\ \sigma' \subset \sigma\}$.

A context state, intuitively, is the set of sets of possible worlds satisfying everything that is common ground, and we distinguish between p being a possibility in the common ground and it being common ground that p is a possibility in the common ground. If p is a possibility in the common ground, $\neg p$ fails to be common ground and so there is at least one set of possible worlds satisfying everything that is common ground and that contains a p-world. So it makes sense to say that if Σ is our model of the common ground, then p is a possibility in Σ just in case there is *some* $\sigma \in \Sigma$ that contains a p-world. And whenever p is a live possibility in Σ—whenever it is common ground that p is a possibility in discourse—then *every* $\sigma \in \Sigma$ contains a p-world. Relatedly, notice that the set of minimal elements of Σ corresponds to the set of possible worlds just weak enough to accommodate all the possibilities that are live in discourse, and so it makes sense to say that ϕ is a necessity in light of the live possibilities in Σ—what I call a 'live necessity' in Σ—just in case ϕ is true throughout the minimal elements of Σ.

Definition 3 (Propositions, Possibilities, Necessities). Consider any $\Sigma \in I$ and $\phi \in \mathcal{L}_0$, and let the function $[\![.]\!]$ assign to each $\phi \in \mathcal{L}_0$ a *proposition*, understood as a subset of W, in the familiar fashion. Define:

1. ϕ is a *possibility* in Σ iff $\exists\sigma \in \Sigma\ \exists w \in \sigma \colon w \in [\![\phi]\!]$
2. ϕ is a *live* possibility in Σ iff $\forall\sigma \in \textsc{Min}(\Sigma)\ \exists w \in \sigma \colon w \in [\![\phi]\!]$
3. ϕ is a *necessity* in Σ iff $\forall\sigma \in \Sigma\ \forall w \in \sigma \colon w \in [\![\phi]\!]$
4. ϕ is a *live* necessity in Σ iff $\forall\sigma \in \textsc{Min}(\Sigma)\ \forall w \in \sigma \colon w \in [\![\phi]\!]$

Notice here that live necessities may be *defeated* as hitherto ignored possibilities come into view: raising a possibility to a live possibility may *expand* the minimal elements of the common ground and thus remove a proposition from the set of its live necessities.

Context states are updated by updating each of their elements and so we first define an update operation on elements of such states.

Definition 4 (Updates on Elements of Context States). Consider any $\Sigma \in I$ and $p \in \mathcal{A}$, $\phi, \psi \in \mathcal{L}^+$. The operation $\uparrow \colon I \mapsto (\mathcal{L}^+ \mapsto \mathcal{P}(W)^{\mathcal{P}(W)})$ is defined as follows:

1. $\sigma \uparrow_\Sigma p = \{w \in \sigma \colon w(p) = 1\}$

2. $\sigma \uparrow_\Sigma \neg\phi = \sigma \backslash (\sigma \uparrow_\Sigma \phi)$
3. $\sigma \uparrow_\Sigma (\phi \wedge \psi) = (\sigma \uparrow_\Sigma \phi) \uparrow_{\Sigma'} \psi$, where $\Sigma' = \{\sigma \uparrow_\Sigma \phi \colon \sigma \in \Sigma\}$
4. $\sigma \uparrow_\Sigma \Diamond\phi = \{w \in \sigma \colon \exists\sigma' \in \Sigma.\ \sigma' \subseteq \sigma\ \&\ \sigma' \uparrow_\Sigma \phi \neq \varnothing\}$
5. $\sigma \uparrow_\Sigma \Box\phi = \{w \in \sigma \colon \exists\sigma' \in \Sigma.\ \sigma' \subseteq \sigma\ \&\ \sigma' \uparrow_\Sigma \phi = \sigma'\}$
6. $\sigma \uparrow_\Sigma \partial\phi = \sigma$ iff $\sigma \uparrow_\Sigma \phi = \sigma$
7. $\sigma \uparrow_\Sigma (\text{if } \phi)(\psi) = \sigma \uparrow_\Sigma (\partial\Diamond\phi \wedge \Box(\phi \supset \psi))$

Updating is defined relative to some context state Σ since the update rules for modals do not simply appeal to the information provided by the input set of possible worlds, as we will see momentarily. The rules for atomic sentences, negation, and conjunction are straightforward. An update of σ with an atomic sentence eliminates all possible worlds from σ at which the atomic sentence is false. To update with a negation, eliminate all possible worlds in the result of updating with what is negated. Updating σ with a conjunction basically comes down to an update with the first conjunct followed by an update with the second conjunct, but to arrive at an 'internally dynamic' conception of conjunction we stipulate that the second update takes place in light of a derived context state whose elements have been updated with the first conjunct.

To understand the update rules for *might* and *must*, remember that a context state is a subset of $\mathcal{P}(W)$ and thus corresponds to a set of sets of possible worlds ordered by the inclusion relation $\subseteq$, and that we have identified the live possibilities and necessities in the common ground in terms of its minimal elements. The simple idea then is that epistemic *might* and *must* update the common ground so that its prejacent becomes a live possibility and live necessity, respectively. Precisely, epistemic *might* trims each set of sets of possible worlds ordered by $\subseteq$ so that its minimal element can be consistently updated with the prejacent. Epistemic *must* trims each set of sets of possible worlds ordered by $\subseteq$ so that its minimal element satisfies the prejacent. Whenever the prejacent ϕ is a propositional formula, this just means that such a set of sets of possible worlds is eliminated from the common ground just in case ϕ fails to be true throughout its minimal sphere.

The rule for the presupposition operator repeats Beaver's [1] analysis, which in turn articulates Heim's [5] conception of presuppositions as definedness conditions: updating σ with $\ulcorner\partial\phi\urcorner$ returns σ in case updating σ with ϕ idles, and is undefined otherwise.

The final clause articulates the hypothesis that indicative conditionals are strict over a dynamically evolving domain of quantification: they can be analyzed as articulating the presupposition that their antecedent might be the case coupled with the assertion that the corresponding material conditional is a live necessity in the common ground.

Define the following relations between a context state Σ and some $\phi \in \mathcal{L}^+$:

Definition 5 (Satisfaction, Support, Admission). Consider arbitrary $\sigma \subseteq W$, $\Sigma \in I$, and $\phi \in \mathcal{L}^+$:

1. σ *satisfies* ϕ with respect to Σ, $\sigma \Vdash_\Sigma \phi$, iff $\sigma \uparrow_\Sigma \phi = \sigma$
2. Σ *supports* ϕ, $\Sigma \Vdash \phi$, iff for all $\sigma \in \textsc{Min}(\Sigma)\colon \sigma \Vdash_\Sigma \phi$
3. Σ *admits* ϕ, $\Sigma \rhd \phi$, iff for some $\sigma \in \textsc{Min}(\Sigma)\colon \sigma \uparrow_\Sigma \phi \neq \varnothing$

An element σ of a context state Σ satisfies ϕ just in case updating σ with ϕ in light of Σ idles. Σ supports ϕ just in case ϕ is satisfied by the minimal elements of Σ, that is, just in case ϕ is a weak necessity in Σ. Finally, Σ admits ϕ just in case some of its minimal elements may be consistently updated with ϕ, that is, just in case $\ulcorner\neg\phi\urcorner$ fails to be a weak necessity in Σ. This is all we need to say how exactly context states are updated:

Definition 6 (Updates on Context States). Consider arbitrary $\Sigma \in I$ and $\phi \in \mathcal{L}^+$. The update operation $[\phi]\colon I \mapsto I$ is defined as follows:

$$\Sigma[\phi] = \{\sigma\colon \Sigma \rhd \phi \;\&\; \sigma \neq \varnothing \;\&\; \exists\sigma' \in \Sigma.\; \sigma' \uparrow_\Sigma = \sigma\}$$

An update of Σ with ϕ in effect tests whether Σ already accepts the negation of ϕ. If it does, the update returns the absurd state; otherwise, we update each element of Σ with ϕ and collect the results, leaving out the empty set. This yields the output state.

The notions of entailment and consistency are defined in the obvious fashion.

Definition 7 (Entailment, Consistency). Consider arbitrary $\phi_1, \ldots, \phi_n, \psi \in \mathcal{L}^+$:

1. $\phi_1, \ldots, \phi_n$ *entails* ψ, $\phi_1, \ldots, \phi_n \vDash \psi$, iff for all $\Sigma \in I$: $\Sigma[\phi_1]\ldots[\phi_n] \Vdash \psi$
2. $\phi_1, \ldots, \phi_n$ is *consistent* iff for some $\Sigma \in I$: $\Sigma[\phi_1]\ldots[\phi_n] \neq \varnothing$

An argument is valid just in case its conclusion is supported by every state once updated with its premises. A sequence is consistent just in case there is some context state that can be updated with that sequence without resulting in the absurd state. Notice that $\phi_1, \ldots, \phi_n$ entails ψ just in case $\phi_1, \ldots, \phi_n, \neg\psi$ is inconsistent.

So much for the semantics. As far as the pragmatics is concerned, all we need to say here is that the result of uttering ϕ in some context c, $c + \phi$, is such that $\Sigma_{c+\phi} = \Sigma_c[\phi]$, where Σ_c and $\Sigma_{c+\phi}$ are the context states of c and $c + \phi$, respectively. Notice here that $\bigcup \Sigma_c = s_c$, which just means that context states allow us to say everything about discourse contexts that context sets allow us to say, and—as we saw earlier—a bit more.

3 Output

Let me now make a few observations about the framework developed here, the first one being that we preserve the constraints that figured prominently in the textbook explanation of why the sequence in (2a) is marked. Start with the following fact:

Fact 1. Consider arbitrary $\phi \in \mathcal{L}_0$ and $\Sigma \in I$: $\bigcup \Sigma[\phi] = \bigcup \Sigma \cap [\![\phi]\!]$

It follows that an utterance of an element from the propositional fragment of $\mathcal{L}$ in some context adds the proposition expressed to the context set. This is just the familiar picture, but as in Veltman's update semantics we leave room for context change that is not mediated by propositional content.

The next fact concerns the presuppositions of indicative conditionals. Start by defining what it takes for a sentence to presuppose another one (see [1] for inspiration):

Definition 8 (Presupposition). ϕ *presupposes* ψ, $\phi \gg \psi$, iff for all $\sigma \subseteq W$ and $\Sigma \in I$: if $\sigma \uparrow_\Sigma \phi$ is defined, then σ satisfies ψ with respect to Σ.

It then follows immediately that indicative conditionals presuppose that their antecedent might be the case:

Fact 2. $(\text{if } \phi)(\psi) \gg \Diamond\phi$

Given the semantics for epistemic *might*, it is then easy to verify that $\Sigma[(\text{if } \phi)(\psi)] \neq \varnothing$ only if $\exists\sigma \in \Sigma\colon \sigma \uparrow_\Sigma \phi \neq \varnothing$, that is, only if $\bigcup \Sigma[\phi] \neq \varnothing$. Notice, furthermore, that the *might*-content carried by an indicative conditional *projects* just in the way we expect in case it is presupposed. For instance, we predict that $\ulcorner(\text{if } \phi)(\psi)\urcorner$ as well as its negation presuppose that the antecedent ϕ might be the case.

The previous two observations, together with the general pragmatic assumption that assertions affect a context by updating the corresponding context state, show that the framework developed here preserves the key aspects of the textbook explanation for why a sequence such as (2a) is marked. In addition, modus ponens is valid:

Fact 3. $(\text{if } \phi)(\psi) \vDash \phi \supset \psi$

This is because an update with $\ulcorner(\text{if } \phi)(\psi)\urcorner$ involves an update with $\ulcorner\Box(\phi \supset \psi)\urcorner$ and thus establishes the material conditional as a live necessity in the common ground.

All of that, and we can *still* make sense of the observation that indicative Sobel sequences are felicitous. To show that this is so, it is sufficient to demonstrate that indicative Sobel sequences are consistent, since updating with a presupposition that cannot be accommodated is guaranteed to result in the absurd state. Here is the first thing to notice:

Fact 4. $(\text{if } A)(F), (\text{if } A \wedge B)(\neg F)$ is consistent

For consider $\Sigma' = \Sigma[(\text{if } A)(F)]$: then $\Sigma' \Vdash \Diamond A$ and $\Sigma' \Vdash A \supset F$. But $\Diamond A \nvDash \Diamond(A \wedge B)$ and so it may very well be that $\Sigma' \nVdash \Diamond(A \wedge B)$. In that case, accommodating the presupposition carried by $(\text{if } A \wedge B)(F)$ in Σ' will induce a non-trivial change and, in particular, may defeat $A \supset F$ as a live necessity, leaving room for consistent update with $\Box((A \wedge B) \supset \neg F)$.

What caused the trouble for a variably strict semantics was that (1a) and (1b) are consistent but entail that Alex and Bert will not both come to the party. This result is avoided in the current framework:

Fact 5. $(\text{if } A)(F), (\text{if } A \wedge B)(\neg F) \nvDash \neg(A \wedge B)$

True enough, $(\text{if } A)(F) \vDash A \supset F$ and $(\text{if } A \wedge B)(\neg F) \vDash (A \wedge B) \supset \neg F$, and also $A \supset F, (A \wedge B) \supset \neg F \vDash \neg(A \wedge B)$. But crucially $(\text{if } A)(F), (\text{if } A \wedge B)(\neg F) \nvDash A \supset F$ since live necessities may be defeated as open but hitherto ignored possibilities come into view. So just as it is possible to update $\Sigma[(\text{if } A)(F)]$ with $(\text{if } A \wedge B)(\neg F)$ since $\Diamond A \nvDash \Diamond(A \wedge B)$, it is possible to update $\Sigma[(\text{if } A)(F)][(\text{if } A \wedge B)(\neg F)]$ with $(\text{if } A \wedge B \wedge C)(F)$ since $\Diamond(A \wedge B) \nvDash \Diamond(A \wedge B \wedge C)$.

A very simple example of a context that may be consistently updated with the sequence in (1) is the following. Consider $\Sigma = \{\{w_1\}, \{w_1, w_2\}, \{w_1, w_2, w_3\}\}$ and suppose that $w_1 \in [\![A \wedge \neg B \wedge \neg C \wedge F]\!]$, $w_2 \in [\![A \wedge B \wedge \neg C \wedge \neg F]\!]$, and $w_3 \in [\![A \wedge B \wedge C \wedge F]\!]$. Then $\Sigma[(\text{if } A)(F)] = \Sigma$ since $\Sigma[\partial\Diamond A] = \Sigma$ and $\textsc{Min}(\Sigma) \Vdash A \supset F$ (simply observe here that $\textsc{Min}(\Sigma) = \{\{w_1\}\}$). But $\Sigma' = \Sigma[\partial\Diamond(A \wedge B)] = \{\{w_1, w_2\}, \{w_1, w_2, w_3\}\}$ and so $\textsc{Min}(\Sigma') = \{\{w_1, w_2\}\}$. Accordingly, even though it holds that $\Sigma[\Box((A \wedge B) \supset \neg F)] = \varnothing$, $\Sigma[\partial\Diamond(A \wedge B)] \Vdash \Box((A \wedge B) \supset \neg F)$. Finally, $\Sigma'' = \Sigma'[\partial\Diamond(A \wedge B \wedge C)] = \{\{w_1, w_2, w_3\}\}$ and clearly $\Sigma'' \Vdash \Box((A \wedge B \wedge C) \supset F)$. Accordingly, Σ can be consistently updated with the sequence in (1) without resulting in the empty set, which is sufficient to show that indicative Sobel sequences are predicted to be felicitous.

What explains the consistency of indicative Sobel sequences is that the dynamic logical consequence relation is *nonmonotonic*, and in particular we have:

Fact 6. $(\text{if } A)(F) \vDash (\text{if } A)(F)$ but $(\text{if } A)(F), (\text{if } A \wedge B)(\neg F) \nvDash (\text{if } A)(F)$

On the view developed here, then, indicative Sobel sequences are consistent because each member of the sequence *defeats* its predecessor. The reason is familiar: the predecessor establishes its corresponding material conditional as a live necessity, but live necessities may be defeated as hitherto ignored possibilities come into view—which is just what the subsequent conditional does in virtue of its presupposed content. This dynamic approach crucially differs from the static variably strict analysis on which Sobel sequences are classically consistent since their consequents are evaluated with respect to disjoint modal domains. If what I have said is right here, a nonmonotonic perspective on indicative Sobel sequences is inevitable if we take the validity of modus ponens seriously and subscribe to the textbook explanation of why (2a) is marked.

4 Previous Dynamic Analyses

Let me briefly outline how the framework developed here differs from previous dynamic analyses of conditionals. The proposals by Gillies [3] and Starr [11] also analyze indicative conditionals as strict material conditionals with an additional presuppositional flavor but model their semantics as tests on contexts understood as plain sets of possible worlds. This is good enough for their purposes, but it is easy to verify that it will not be good enough to handle the data that interest us here. For suppose that input contexts were just singletons of the form $\Sigma = \{\sigma\}$. Then $\Sigma' = \Sigma[(\text{if } \phi)(\chi)]$ does not admit $\ulcorner(\text{if } \phi \wedge \psi)(\neg\chi)\urcorner$ for either $\Sigma' \not\Vdash \Diamond(\phi \wedge \psi)$ and thus $\Sigma'[\partial\Diamond(\phi \wedge \psi)] = \varnothing$ or $\Sigma \Vdash \Diamond(\phi \wedge \psi)$ and then $\Sigma[\Box((\phi \wedge \psi) \supset \neg\chi)] = \varnothing$. A more complex conception of a context and, accordingly, of how assertions operate on contexts is needed to articulate how the elements of a dynamic analysis conspire to leave room for felicitous indicative Sobel sequences.

The proposals by von Fintel [2] and Gillies [4], while different in detail, effectively assign to counterfactuals strict truth-conditions with respect to a possible world w and a single, dynamically evolving system of spheres initially centered on w. They do not address indicatives but it makes sense to ask why we cannot do something similar to handle the case at hand. To see the issue more clearly, define the *admissible domains* around w as S_w and say that $\sigma \in S_w$ iff $\exists v \in W$ such that $\sigma = \{u \colon u \leqslant_w v\}$. The suggestion then is that indicatives are assigned truth-values relative to a possible world w and a *hyperdomain* π at w, which is nothing but a subset of S_w ordered by $\subseteq$. Using the framework developed earlier, we may then state what it takes for an indicative to be true as follows:

$$[\![(\text{if } \phi)(\psi)]\!]^{w,\pi} = 1 \text{ iff } \pi[\partial\Diamond\phi] \Vdash \Box(\phi \supset \psi)$$

If we now assume that the hyperdomain dynamically evolves as discourse proceeds, the resulting proposal looks close to the framework developed earlier. But there are very good reasons for telling the story just the way I did. Let me explain.

First, the truth-conditional proposal under consideration does not avoid the main problem of its classical alternative since it predicts that (if A)(F) and (if $A \wedge B$)($\neg F$) entail $\neg(A \wedge B)$. For suppose that $w \in [\![A \wedge B]\!]$ and let π be an arbitrary hyperdomain at w: since $\{w\}$ is a subset of $\textsc{Min}(\pi)$ by design, the *might*-presuppositions carried by (if A)(F) and (if $A \wedge B$)($\neg F$) cannot trigger an expansion of the minimal sphere in π, and so there would be no way for the two conditionals to be true at w and π. Accordingly, it once again becomes hard to see why a context that has been updated with (1a) and (1b) should admit an update with (1c). For no such context—assuming that contexts inherit the semantic commitments that come with their updates—will admit the presupposition that Alice and Bert and Charles might come to the party, and so we once again do not expect that (1c) may be uttered without fuss once (1a) and (1b) have been asserted.

The second reason is that the framework developed here offers distinct advantages over the dynamic truth-conditional proposal when it comes to *might*-conditionals. Conditionals, I have said, transform open but hitherto ignored possibilities into view in virtue of their presupposed content. But that is not the only source of shiftiness since, intuitively, *might*-conditionals may do so as well in virtue of their asserted content. Consider:

(3) (a) If Alice comes to the party, it will be fun. (b) But if Alice comes, Bert might come as well, and then it will not be fun...

The fact that (3) seems felicitous strongly suggests that (3b) highlights the possibility of Alice and Bert's coming to the party, and this is just what the framework developed here predicts. For remember that an indicative establishes the corresponding material conditional as a live necessity in virtue of its asserted content and that ϕ is a live necessity in Σ just in case each of its minimal elements satisfies ϕ with respect to that context state. But σ satisfies $A \supset \Diamond(A \wedge B)$ just in case σ either contains no A-world or includes at least some $(A \wedge B)$-world. But every element of Σ will contain an A-world once the presupposition of (3b) has been accommodated, and so updating Σ with its asserted content establishes Alice and Bert's coming to the party as a live possibility.

On the truth-conditional alternative under consideration, in contrast, a conditional's asserted content does *not* have the potential to modify a hyperdomain but is simply evaluated for truth or falsity with respect to some hyperdomain. Gillies recognizes this limitation and suggests that conditionals do not only presuppose that their antecedent is a possibility, but also that their consequent is a possibility. While this move predicts that (3b) highlights the possibility of Alice and Bert's coming to the party, it seems fair to say that it relies on a plain stipulation with little independent support. No such additional stipulation is needed in the dynamic framework suggested here.

5 Conclusion

The felicity of straight indicative Sobel sequences favors a dynamic strict analysis of conditionals over its static variably strict alternative. I have not discussed how the story told here may be expanded to cover counterfactuals and what a dynamic story has to say about the complex data surrounding reverse Sobel sequences. While doing so is not an entirely trivial affair, I submit that the data discussed here strongly suggest that a dynamic semantic analysis of conditionals is on the right track.

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