Aboutness and Modality*

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In this paper I would like to offer a new framework for hypothetical reasoning, with the goal of predicting what scenarios we consider when we interpret a conditional or causal claim (such as a sentence containing the word *because*). The idea is that when we interpret a conditional or causal claim, we identify a part of the world to change and imagine changing that. Sentences are about parts of the world: when we interpret a conditional antecedent or *because* clause, we allow the part of the world it is about to vary. This expands our modal horizons, which we restrict to those scenarios where the sentence we are asked to imagine true is indeed true. To evaluate a whole conditional or causal claim we look to the possible futures after this change.

My main evidence for this approach is that it gives just the right range of hypothetical scenarios to account for how we interpret both conditionals and causal claims. Some approaches (such as Stalnaker and Lewis's semantics of conditionals based on similarity, and Kratzer's premise semantics) consider too few scenarios, while others (such as Fine's 2012 truthmaker semantics of conditionals) consider too many. The present approach inhabits a Goldilocks zone between these extremes: not too restrictive, not too permissive, but just right.

Section 1 motivates giving a uniform account of modality for conditionals and causal claims. In Sections 2 and 3 we address a challenge for uniformity. Section 4 uses aboutness to model how sentences raise hypothetical scenarios and compares this approach with alternatives.

1 Modal uniformity

A compelling idea in the analysis of causality is that conditionals and causal claims raise hypothetical scenarios in a uniform way; in other words, the two constructions activate the same general faculty of hypothetical reasoning. Call this idea *modal uniformity.* One piece of evidence for modal uniformity is that we so often paraphrase one construction with the other. David Hume inaugurated counterfactual approaches to causation in 1748 when he wrote

> We may define a cause to be an object followed by another ... where, if the first object had not been, the second never had existed. (*Enquiry*, Section VII)

The parallel between conditionals and causal claims lives on today in the panoply of counterfactual analyses of causation.[1] Here is a more contemporary illustration of the close connection between conditionals and causal claims. Title VII of the U.S. Civil Rights Act states

> It shall be an unlawful employment practice for an employer to fail or refuse to hire or to discharge any individual . . . because of such individual's race, color, religion, sex, or national origin. (78 Statute 241, Section 703(a)(1), p. 255)

The text uses a causal word: *because.* Now here is Justice Elena Kagan discussing the same law at oral argument for a 2019 U.S. Supreme Court case, *Bostock v Clayton County.*

> Kagan: What you do when you look to see whether there is [sex] discrimination under Title VII is, you say, would the same thing have happened to you if you were of a different sex? (Oral argument, pp. 41–42)

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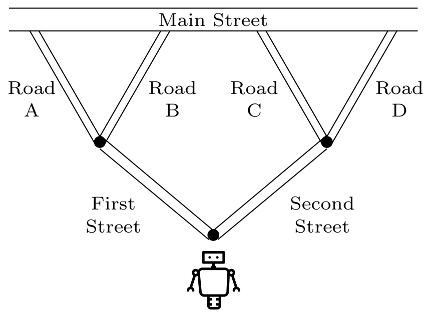
[1]Examples include Lewis (1973a, 2000), the approaches in Collins, Hall, and Paul (2004), and many more.

Notice how Kagan uses a conditional ("if you were of a different sex") to express a causal claim ("because of ... sex"). A causal claim winds up as a conditional. In fact, Title VII does not contain any conditionals of the kind uttered by Kagan. If conditionals and causal claims did not raise hypothetical scenarios in a uniform way, the fact that we so often paraphrase one construction with the other—as David Hume and Elena Kagan did—would be mysterious.

There is one main challenge to modal uniformity: sufficiency, which we turn to now.

2 Sufficiency

An often overlooked aspect of the meaning of *cause* and *because* is that they imply that the cause was in some sense sufficient for the effect. To illustrate, imagine a robot has to get to Main Street (see right). At each fork it turns at random. On this particular day, it took First Street and then Road B. Consider (1) in this context.



(1) a. The fact that the robot took First Street caused it to take Road B.
b. The robot took Road B because it took First Street.

(1) are unacceptable in this context. Intuitively this is because after taking First Street, the robot could have taken Road A instead. This suggests the following, informal principle.

Sufficiency requirement. *E because C* and *C cause E* entail that C is sufficient for E.

To test this, let us minimally change the context to make taking First Street sufficient for taking Road B. Imagine, say, that the robot has been programmed to always change direction. For example, if it turns left at one fork it must turn right at the next. Consider (1) in this context.

(1) are much better. Counterfactual dependence does not account for the contrast between the turn-at-random and always-change-direction contexts. For in both, if the robot hadn't taken First Street it wouldn't have taken Road B. The difference is rather a difference in sufficiency.

We can account for this contrast by incorporating the openness of the future into the analysis of sufficiency. Informally, let us say that for sentence A to be sufficient for sentence C, C must be true in every nomically possible future after A becomes true.[2] When the robot turns at random, but not when it is programmed to always change direction, it is nomically possible for it to take Road A after First Street. If we then assume that *C cause E* and *E because C* imply that C is sufficient for E, we correctly predict (1) to be unacceptable when the robot turns at random but acceptable when it is programmed to always change direction.[3]

Some violations of sufficiency do not involve the openness of the future. Consider (2)–(4).

(2) *Yves only buys a specific shade of blue paint: ultramarine. In a paint shop he sees paints in various colours, including various shades of blue. He bought some ultramarine paint.*
a. Yves bought this paint because it is blue.
b. The fact that this paint is blue caused Yves to buy it.

(3) *Alice is 16 and tried to get into a bar for over 18s. The bouncer did not let her in.*

[2] Semantics of conditionals that use the openness of the future include Thomason (1970), Thomason and Gupta (1980), Arregui (2005), Ippolito (2013), Khoo (2015), and Canavotto (2020).

[3] We assume we have some way to extract sentence C from the noun and sentence E from the *to*-infinitive.

a. The bouncer did not let Alice in because she is under 30.
b. The fact that Alice is under 30 caused the bouncer to not let her in.

(4) *Ali was born in Ireland and has Irish citizenship.*
a. Ali has an Irish passport because he was born in Europe.
b. The fact that Ali was born in Europe caused him to get Irish citizenship.

These sentences greatly improve when we replace the cause with a minimally different one that is sufficient for the effect; e.g. replacing *blue* with *ultramarine*, *under 30* with *under 18*, and *Europe* with *Ireland*. These contrasts are not due to a difference in counterfactual dependence. For example, if Alice had been over 18, or over 30, she would have gotten in. Nor are they due to the openness of the future. Accounting for, say, (2)'s unacceptability in this way would require a time when the paint was blue but not yet determined that it would be ultramarine. But specific shades do not come after general shades in time – every blue is a kind of blue.

Given modal uniformity, a natural idea is that A is sufficient for C just in case the *would*-conditional "if A, would C" (denoted $A > C$) is true. A problem is that almost all semantics of *would*-conditionals validate conjunctive sufficiency, that $A \wedge C$ entails $A > C$.[4] This is a natural principle on similarity approaches to conditionals. It follows from *strong centering*: the assumption that no world is as similar to any world w as w is to itself. But then we cannot say that A is sufficient for C just in case $A > C$ is true. For example, when the robot turned at random, it took First Street and Road B, but taking First Street was not sufficient for it take Road B. Even though Ali was born in Europe and has an Irish passport, being born in Europe is not sufficient to have an Irish passport.

3 Selection functions to the rescue

There is, however, a way out. For there is no evidence that the strong centering requirement of conditionals must come from our general capacity to imagine hypothetical scenarios (say, from the nature of similarity). Indeed, Mandelkern (2018) and Cariani and Santorio (2018) and Cariani (2021) propose that strong centering has another source: the meaning of *will* and *would* involves a selection function which chooses a world from a set of worlds. The only additional constraint is that if the selection function can choose the world of evaluation, it must.

(5) A selection function $s : (W \times \wp(W)) \to W$ takes a world w and a set of worlds p and returns a world, where $s(w, p) \in p$ (*success*) and if $w \in p$ then $s(w, p) = w$ (*centering*).

Selection functions allow us to rescue modal uniformity. For we can propose that we have a general capacity to consider hypothetical scenarios in response to a sentence – one we use to interpret both conditionals and causal claims – that is not strongly centered. In addition, *would* contributes a selection function but *cause* and *because* do not. Put another way, *would*-conditionals and *(be)cause* have the same modal horizon but a different modal force.

Some evidence that *would* and *(be)cause* have a different modal force comes from bets and probability judgements. Suppose the robot took First Street. Consider (6).

(6) a. Ali: "If the robot had taken Second Street, it would have taken Road C because it took Second Street."
b. Bob: "If the robot had taken Second Street, it taking Second Street would have caused it to take Road C."

[4] E.g. Stalnaker (1968), Lewis (1973b), Pollock (1976), and Kratzer (2012) validate conjunctive sufficiency.

c. Carl: "If the robot had taken Second Street, it would have taken Road C."

Suppose Alison says, "I bet that what Ali said is true." Bea says: "I bet that what Bob said is true" and Cleo says, "I bet that what Carl said is true." The three are then told that the robot was programmed to turn at random. Who won their bet? Intuitively, Alison and Bea lost. This is expected if *cause* and *because* quantify universally over possible futures after the cause occurs. In contrast, Cleo's bet intuitively remains undecided. A number of authors observe that this is unexpected if Carl's utterance meant that in *all* possible futures after the robot takes Second Street, it takes Road C – since this is clearly false.[5] Similar remarks apply concerning probability. Consider: what is the probability that what Ali/Bob/Carl said is true?[6] Intuitively, Ali and Bob's sentences have a much lower probability of being true than Carl's.

In light of these data, we propose that sufficiency involves universal quantification over a set of worlds, while *would*-conditionals select a world from this set. Schematically, for any world w and sentence A, we let $mh(w, A)$ be this set of worlds, which following von Fintel (2001) we call the *modal horizon*. For any sentence A let $|A|$ be the set of worlds where A is true. We propose the following clauses for sufficiency ($\gg$) and *would*-conditionals ($>$).

(7) Where mh is the modal horizon function and s the selection function,

$$\begin{array}{llll} A \gg C & \text{is true at } w & \text{if and only if} & mh(w,A) \cap |A| \subseteq |C| \\ A > C & \text{is true at } w & \text{if and only if} & s\big(w, mh(w,A) \cap |A|\big) \in |C| \end{array}$$

These clauses allow us to have our cake and eat it. They preserve modal uniformity while only selectively validating conjunctive sufficiency: $A \wedge C$ entails $A > C$ but not $A \gg C$ (assuming every world is in its own modal horizon, i.e. $w \in mh(w, A)$, a fact we prove below).

How does sufficiency fit into the overall meaning of *cause* and *because*? McHugh (forthcoming) analyses their meaning in terms of two relations between sentences, sufficiency and production, whereby E *because* C and C *cause* E are equivalent to the following.

(8) **Meaning of *(be)cause*:** $C \wedge \big(C \gg (C \textit{ produce } E)\big) \wedge \neg\big(\neg C \gg (\neg C \textit{ produce } E)\big)$.

Here we will only discuss the sufficiency requirement. It follows from the fact that $\gg$ validates right weakening: if A is sufficient for C and C entails D then A is sufficient for D. Then assuming production is factive (C *produce* E entails $C \wedge E$), we derive the sufficiency requirement:

$$E \textit{ because } C \quad \Rightarrow \quad C \gg (C \textit{ produce } E) \quad \Rightarrow \quad C \gg (C \wedge E) \quad \Rightarrow \quad C \gg E.$$

4 The modal horizon

Our question now is how to analyse the modal horizon. In other words, what hypothetical scenarios do we consider when we evaluate a conditional or causal claim? To give a flavour of the approach I would like to adopt, consider the image on the right, of an orange circle on a blue background. Imagine the circle with a different colour. What images come to mind?

[5]This observation regarding conditionals in betting contexts has been discussed by Prior (1976:100), Moss (2013), Belnap, Perloff, and Xu (2001:160), Cariani and Santorio (2018) and Cariani (2021:63).

[6]This way of formulating the question follows a strategy by Mandelkern (2018) to avoid the objection that conditionals are not assigned probabilities. When one is asked "What is the probability that what x said is true?" where x said a conditional, one is asked to assign a probability to an entire conditional, rather than a probability to the consequent while supposing the antecedent. For discussion see Mandelkern (2018:304–305).

Here are some images we may consider (left), and some images we do not consider (right).

I ✓ II ✓ III ✗ IV ✗ V ✗

Remarkably, we all seem to imagine the same kinds of images. We are only given the image and the sentence "imagine the circle with a different colour". We are not explicitly told what stays the same, but figure that out ourselves. How do we do this?

One idea – inspired by similarity approaches to conditionals – is that we rank all possible images in terms of similarity to the actual image. Another – inspired by premise semantics – is that we identify a set of true propositions, and seek to preserve the truth of as many of these as possible while maintaining consistency with the circle being different colour.

On second thought, however, when we are asked to imagine the circle a different colour, intuitively we do not rank all images by similarity, nor do we compare all images in terms of what propositions they make true. Rather, we identify a part of the image that needs to change and change that. All else is background, so to speak, so it is kept the same – it is the *ceteris* in *ceteris paribus*.[7] Let us therefore start with a simple question: when we imagine the circle a different colour, what parts of the image change, and what parts stay the same?

We can answer this question without much thought at all. Let us list some parts of the image and check for each whether it stays the same when we imagine the circle a different colour. This is illustrated in Figure 1. For example, the top half of the image does not stay the same. Looking at the Figure, we see that a part of the image stays the same just in case it does not overlap the circle (where two parts overlap just in case they have a part in common).

Let us assume we have a partial order $(S, \leq)$ where the elements of S represent parts of the world at a moment in time, and $\leq$ represents parthood. We assume that every state is part of a maximal state (in Fine's 2017 terminology, our state spaces are *world-spaces*). We further assume that we have an *aboutness* relation between states and sentences.[8] For example, *The circle is a different colour* (A) is only about the circle, and not, say, about the top half of the image (our aboutness relation represents 'whole' aboutness). We define that a state s is in the *background* of sentence A just in case s does not overlap any state A is about. For any sentence A and maximal states t and t', let us call t' an A-*variant* of t just in case every part of t in the background of A is part of t'. This is illustrated in Figure 2. Informally, t's A-variants result from removing the parts of t that A is about; they agree with t on everything A is not about. Put another way, *ceteris paribus* means having the *ceteris* – the background states – as parts.

To illustrate, images I–III are A-variants of the original image, but IV and V are not. And A is false at III. So restricting to the A-variants of the original image where the circle is indeed a different colour allows I and II but rules out III–V, as desired. This is depicted below, where the grey squares represent the absence of a state (rather than the presence of grey squares).

While this example involves parthood in space, our analysis also applies to parthood broadly construed. For example, when we imagine a red ball blue, we intuitively keep its shape. We

[7] A 'foreground'/'background' distinction has also been used by Ciardelli, Zhang, and Champollion (2018).

[8] Some recent work on aboutness is Yablo (2014), Fine (2017b), Berto (2018), Hawke (2018) and much more.

can predict this on the present approach if an object's shape and colour are non-overlapping parts of it. Given that the *The ball is blue* is not about its shape, its shape is in this sentence's background and therefore part of every variant of the ball we consider when we imagine it blue.

We also reason hypothetically in a changing world. Suppose a light switch is up and the light connected to it is off. When we interpret *The light is off because the switch is up*, or *If the switch were down, the light would turn on*, the *because* clause and antecedent are only about the switch, but we imagine the light changing too. Intuitively, the sentence $A =$ *The switch is up/down* is about the state of the switch. This switch does not overlap the state of the light, mereologically speaking; see Figure 3(a). So the state of the light being off is in A's background, and is therefore part of the A-variants of the current state. To reach a scenario where the light turns on, we need to specify how things change through time. The simplest way to represent time, I believe, is via linear orders. The maximal states of our state space, called *moments*, represent how things stand at a point in time. We take a world to be a linear order of moments. Finally, our models specify which worlds are nomically possible and which are not. Figure 3(b) illustrates the nomic possibilities for the light switch. In general, we define:

Definition 1 (Nomic aboutness model)**.** *Where S is a set and $\leq$ a binary relation on S, define:*

$$\begin{aligned} &\mathit{Sit} := S \times I, \text{ where } I \text{ is an arbitrary label set},\\ &M := \{t_i \in \mathit{Sit} : t \leq u \text{ implies } t = u \text{ for all } u \in S\},\\ &W := \{(M', \preceq) : M' \subseteq M, \ \preceq \text{ is a linear order}\}.\end{aligned}$$

Given a set of sentences $\mathcal{L}$, a nomic aboutness model is a tuple $(S, \leq, \mathcal{A}, P, |\cdot|)$ where $(S, \leq)$ is a partial order such that every state is part of a moment, $\mathcal{A} \subseteq \mathcal{L} \times S$, $P \subseteq W$, and $|\cdot| : \mathcal{L} \to W$.

Sit represents the set of situations, where a situation is a particular instance of a state. (We need situations since the same state may repeat at a world.) M represents the set of moments (maximal situations) and W the set of logically possible worlds. $\mathcal{A}(A, s)$ says that sentence A is about state s, $w \in P$ that world w is nomically possible, and $w \in |A|$ that A is true at w. In these terms, for any moments t, t' and sentence A, t' is an A-variant of t just in case $\forall s \leq t\big((\forall u \in S : \mathcal{A}(A, u) \Rightarrow s \not\circ u) \Rightarrow s \leq t'\big)$, where $s \not\circ u$ denotes that s and u do not overlap.

Following recent work in tense-modal interaction (e.g. Condoravdi 2002), we assume a historical modal base: all worlds in $mh(w, A)$ share w's past. We also assume that we access hypothetical alternatives a point in time, what we call *intervention time*.[9] We propose that the modal horizon contains the possible futures of each A-variant at the intervention time, while leaving the past unchanged. Formally, for any world w and moment t on w, let $w_{\prec t}$ be the segment of w up to but not including t, let $w_{\succeq t}$ be the sequence of w from t on, including t, and let $\frown$ denote concatenation.[10] We define the modal horizon as follows, illustrated in Figure 4.

Definition 2 (The modal horizon)**.** *For any sentence A, moment $t \in M$ and world $w \in W$,*

$$mh_t(w, A) := \{w_{\prec t} \frown w'_{\succeq t'} : t' \text{ is an } A\text{-variant of } t, t' \in w' \text{ and } w' \in P\}.$$

Informally, the modal horizon results from (i) making a sudden change by allowing everything A is about at intervention time to vary – determined by the parthood and aboutness relations – (ii) taking the nomically possible futures after this change, and (iii) gluing on the actual past.

[9] Condoravdi (2002) calls this the *temporal perspective*, Arregui (2005) and Ippolito (2013) call it the *accessibility time*, Khoo (2015) calls it the *modal time* and Khoo (2017) calls it the *counterfactual time*.

[10] Concatenation is defined by: $(X, \preceq) \frown (X', \preceq') = (X \uplus Y, \preceq\frown\preceq')$, where $X \uplus Y$ is the disjoint union of X and Y, and $x \preceq\frown\preceq' y$ just in case (i) $x, y \in X$ and $x \preceq y$, or (ii) $x, y \in Y$ and $x \preceq' y$, or (iii) $x \in X$ and $y \in Y$.

Appendix: Comparison with alternative frameworks

Similarity approaches are too restrictive

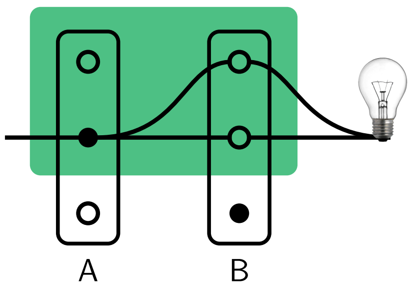
As we saw in Section 2, given strong centering (i.e. that $w <_w w'$ for all distinct worlds w, w'), if we took the modal horizon $mh(w, A)$ to consist of all the most similar worlds to w where A is true, we would undesirably predict that whenever A and C are true, A is sufficient for C.

In contrast, our construction of the modal horizon blocks this entailment, and can therefore account for the sufficiency violations in (1)–(4), both those due to the openness of the future and those due to the various ways for sentences to be true. For example, where *First* = *the robot took First Street*, and t is any moment before the robot took First Street, the only *First*-variant of t is t itself (that is, there is only one way for the robot to take First Street), but there is a nomically possible future after t where it does not take Road B. We therefore predict taking First Street was not sufficient for the robot to take Road B, as desired. Turning to (2), for example, we assume *Blue* = *The paint is blue* is about the state of the paint's colour (more specifically in the case, the state representing that the paint is blue). It is natural to suppose that this state is the same as – or at least overlaps – the state of the paint being ultramarine. Thus the *Blue*-variants allow the state of the paint being ultramarine to vary. We then restrict to those worlds containing the *Blue*-variants where the paint is indeed blue. We therefore correctly account for the fact that we consider various shades of blue when we interpret (2).

Nonetheless, on our approach $A \wedge C$ entails $A > C$ since every world is in its own modal horizon: $w \in mh_t(w, A)$ for every moment t, world w and sentence A. This holds since every moment is an A-variant of itself, every world is the concatenation of its past, present and future ($w = w_{\prec t} \frown w_{\succeq t}$), and the world of evaluation is itself nomically possible ($w \in P$). Then given the selection function's centering requirement, if A is true at w then $s\big(w, mh_t(w, A) \cap |A|\big) = w$.

There is independent evidence from *would*-conditionals that the modal horizon given by similarity approaches is too narrow. Consider the setup below: there are two switches, A and B, connected to a light. Part of the image is shaded. Each switch has three possible positions: up, in the middle, or down. As the wiring indicates, the light is on just in case A is in the middle and B is either up or in the middle. Currently, A is in the middle and B is down, so the light is off. Consider (9) in this context.

(9)
a. If switch B were in the shaded region, the light would be on.
b. If switch B were in the shaded region, both switches would be in the shaded region.
c. If both switches were in the shaded region, the light would be on.



(9a) and (9b) are clearly acceptable, but (9c) is dubious. Its interpretation is subtle and would certainly benefit from empirical testing. Nonetheless, one does not want to say that (9c) follows from (9a) and (9b) as a matter of logic. However, given the equivalence of (*both* $A \wedge B$) $\wedge B$ and (*both* $A \wedge B$), (9) is an instance of *cautious monotonicity*: the inference from $A > B$ and $A > C$ to $(A \wedge B) > C$. On similarity approaches (e.g. Lewis 1973b) this follows from reflexivity and transitivity of similarity, the bare minimum constraints to impose, without which the approach would be deeply unworkable. In contrast, the present approach can predict (9a) and (9b) to be true while (9c) is false. We simply say *switch B is in the shaded region* is about the state of switch B, while *both switches are in the shaded region* is about the state of both switches.

Kratzer's (2012) premise semantics is too restrictive

Kratzer's semantics of conditionals does not provide the range of scenarios we need to account for the sufficiency violations in (2)–(4). Kratzer (2012:132–33) works in a situation semantics, where situations are parts of possible worlds and each proposition is taken to be the set of situations where it is true. Kratzer (1989, 2012) defines that a proposition p *lumps* a proposition q at a world w just in case p is true at w, and every situation that is part of w where p is true, q is true. Kratzer then proposes the following semantics of *would*-conditionals. We begin with a set F_w of true propositions, called the *base set*, and a proposition p, expressed by the conditional antecedent. Let $F_{w,p}$ be the set of all consistent subsets of $F_w \cup \{p\}$ that (i) contain p and (ii) are closed under lumping. A *would*-conditional with antecedent p and consequent q is true at world w just in case every set in $F_{w,p}$ has a superset in $F_{w,p}$ that logically implies q.

Given modal uniformity, we would like this proposal to predict how causal claims raise hypothetical scenarios. Take (2). Let b and u be the propositions that the paint is blue and ultramarine, respectively. In a world w where the paint is ultramarine, b lumps u: the paint is blue in w, and every situation part of w where the paint is blue is a situation where it is ultramarine. Then for any base set F_w and subset A of $F_{w,b}$ whatsoever, by (i), A contains b, so by (ii), A contains u. So every element of $F_{w,b}$ entails that the paint is ultramarine. Kratzer's approach ignores the diverse shades of blue that we intuitively consider when we interpret (2).

Kratzer's premise semantics also validates cautious monotonicity, and therefore faces the problem in (9), predicting that (9a) and (9b) entail (9c). Recall that cautious monotonicity follows from reflexivity and transitivity of the similarity order. If we construct the order as Kratzer (1981:47) proposes, whereby $v \leq_w v'$ holds just in case every proposition in the ordering source at w that is true at v' is also true at v, then reflexivity and transitivity of the order follow, respectively, from reflexivity and transitivity of implication – bedrock principles of logic.

Fine's (2012) truthmaker semantics of conditionals is too permissive

Fine (2012) proposes a semantics of counterfactuals that takes into account the various ways for the antecedent to be true. His account has three primitives: a state space (i.e. states ordered by parthood), an exact verification relation between states and sentences, and a world-relative possible outcome relation between states. His clause is that $A > C$ is true at a world w just in case for every exact verifier t of A and possible outcome u of t at w, u contains an exact verifier of C. This semantics satisfies a principle Fine calls *Universal Realisability of the Antecedent*: if a counterfactual is true then it is true for any way in which its antecedent is true.

This semantics appears to be too permissive. Fine (2017c) proposes, quite plausibly, that every exact verifier of A is an exact verifier of $A \vee B$, and analogously, that every exact verifier of $A(c)$ is an exact verifier of $\exists x Ax$. Paired with Fine's semantics this validates simplification, the inference from $(A \vee B) > C$ to $(A > C) \wedge (B \wedge C)$, as well as the inference from $(\exists x Ax) > C$ to $\forall x(Ax > C)$. As is well-known, there are data challenging these inferences, such as the classic (10) adapted from McKay and Inwagen (1977), and (11) from Embry (2014).

(10) a. If Spain had joined the Allies or the Axis, they would have joined the Axis.
b. If Spain had joined the Allies, they would have joined the Axis.

(11) a. If it had snowed yesterday, I would have gone skiing.
b. If it had snowed 100 feet yesterday, I would have gone skiing.

Fine's semantics undesirably predicts that (10a) entails (10b). The problem is not unique to disjunction. In event semantics it is standardly assumed that declarative sentences existentially quantify over events (Davidson 1967, who traces the idea to Reichenbach 1947). For example, *It snowed yesterday* is interpreted as $\exists e(e \textit{ is a snowing event} \wedge \textit{runtime}(e) \subseteq \textit{yesterday})$. Since every snowing-100-feet event is a snowing event, Fine also predicts that (11a) entails (11b).

A prominent reply on behalf of simplification is that when we judge (10) true, we assume that Spain joining the Axis is in some sense not genuinely possible (Warmbrōd 1981, Fine 2012, Starr 2014, Willer 2018). However, Lassiter (2018) observes that simplification can fail even when we regard both disjuncts as possible. Consider (12), based on an example of Lassiter's.

(12) Ali: If Spain had joined the Allies or the Axis, they would have joined the Axis.
Bob: I think that's likely, but not certain.

Bob clearly considers both disjuncts possible. But given that entailment preserves likelihood (see Yalcin 2010:921), if simplification were valid his utterance would imply (10b) is also likely.

A second problem with this response comes from the (13), due to Nute (1975).

(13) If we had had good weather last summer or the sun had grown cold,
we would have had a bumper crop.

This sentence is unacceptable, intuitively because when we interpret it we consider scenarios where the sun grows cold, in which case we do not have a bumper crop. Now, if (10) is fine because we take Spain joining the Axis to be a counterfactual impossibility, the challenge is to explain why we cannot rescue (13) in the same way. Surely the sun growing cold last summer is far more of an impossibility than WWII Spain joining the Allies.

The present proposal does not face this problem, since it does not validate simplification. Consider (10a). What, intuitively, does it say? This is reasonably clear: it says that WWII Spain were disposed to join the Axis over the Allies. Let us include this preference in our model: our state space contains a state, AXIS PREFERENCE, such that in every nomically possible world containing this state where Spain fights, they join the Axis (see Figure 5 for such a state space). Simplificaton fails assuming that *Spain joins the Allies* is about AXIS PREFERENCE but *Spain joins the Allies or the Axis* is not.[11] For then we keep AXIS PREFERENCE when we interpret (10a) but not (10b), which allows (10a) to be true while (10b) is false.

It remains to say why (10a) is acceptable but (13) is not. We propose that the key difference between them is that, while WWII Spain was disposed to join the Axis over the Allies, there is no state disposing the world to have good weather last summer over the sun growing cold. It is easy to imagine WWII Spain harbouring Axis sympathy, but bizarre to imagine a part of the world manifesting a preference between good weather and the sun growing cold last summer. Since there is no such preference in our state space, our account of (10a)'s acceptability does not inadvertently extend to predict that (13) is also acceptable.

[11] It is natural to wonder whether we can find general principles ensuring that *Spain joins the Allies* is about AXIS PREFERENCE, but *Spain joins the Allies or the Axis* is not. It turns out there are. Let us say that state s is *nomically relevant* to sentence A just in case: A is true at every nomically possible world containing s, or A is false at every nomically possible world containing s, or A is true at every nomically possible world not containing s, or A is false at every nomically possible world not containing s. (This definition is inspired by the definition of orthogonality from Lewis 1988. Formally, world $w = (M', \preceq)$ *contains* state s iff $s \leq t$ for some $t_i \in M'$.) We propose that nomic relevance is necessary for aboutness, and minimal nomic relevance is sufficient:

(i) a. If s is minimally nomically relevant to A then A is about s.
b. If A is about s then s is nomically relevant to A.

AXIS PREFERENCE is nomically relevant to *Spain joins the Allies* – since every nomically possible world containing the state is one where the sentence is false – and assuming the state is atomic, it is minimally so. But AXIS PREFERENCE is not nomically relevant to *Spain joins the Allies or the Axis*. The principles in (i) therefore ensure that *Spain joins the Allies* is about AXIS PREFERENCE but *Spain joins the Allies or the Axis* is not.

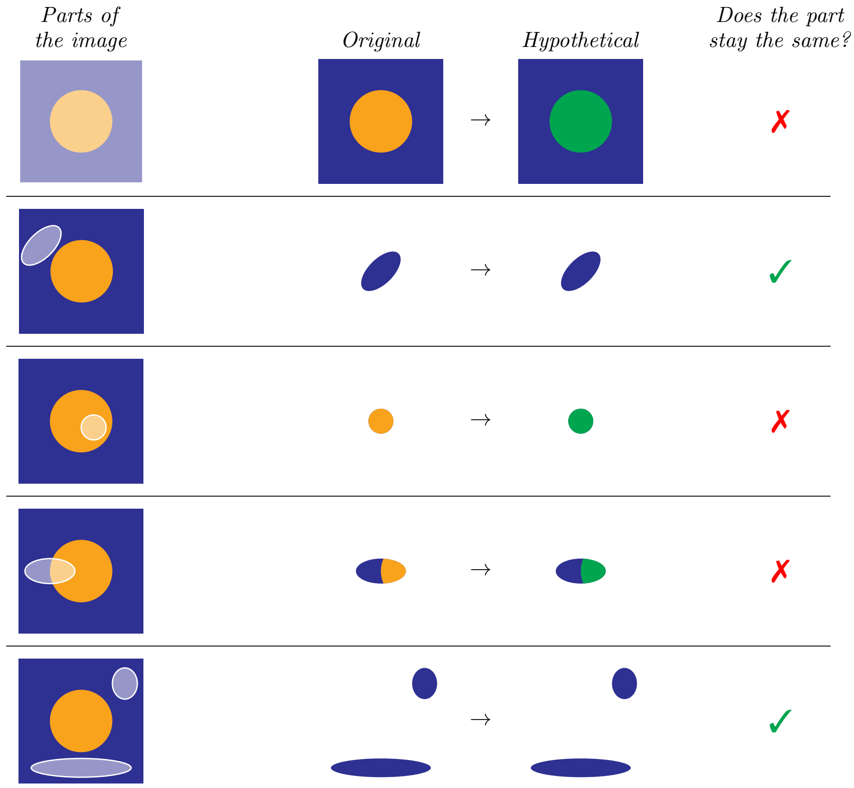


Figure 1: A part of the image stays the same just in case it does not overlap the circle.

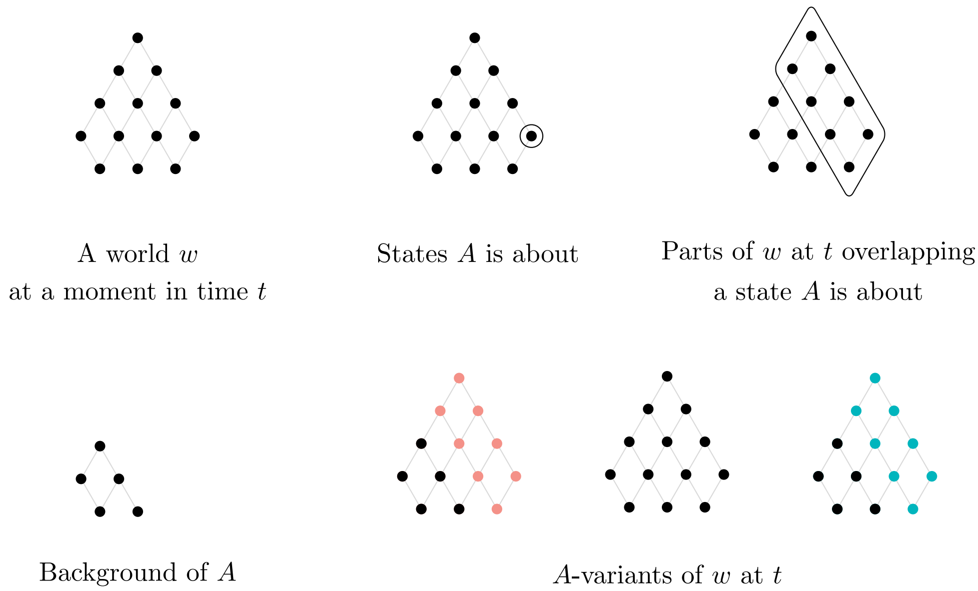
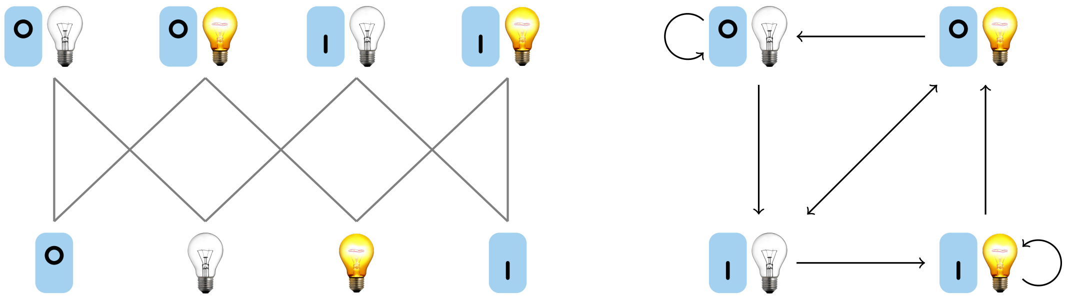


Figure 2: Steps to construct the A-variants of a world at a moment in time.



(a) Mereological structure. (b) Nomic possibilities.

Figure 3: Light switch example. Nomically possible worlds correspond to directed paths in (b).

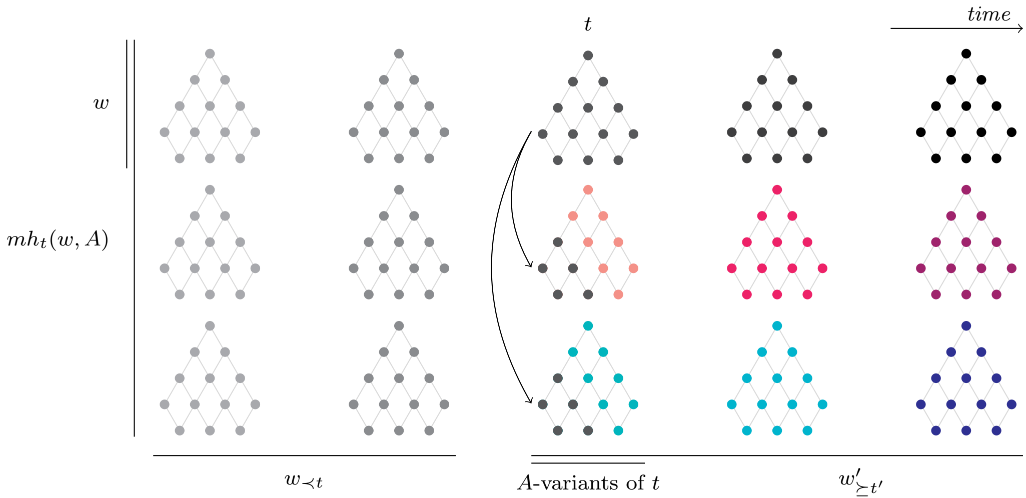


Figure 4: Constructing the modal horizon.

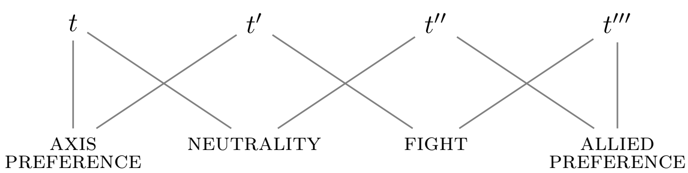


Figure 5: A toy state space for McKay and Inwagen's example. *Spain joins the Allies or Axis* is about NEUTRALITY, while *Spain joins the Axis* is about AXIS PREFERENCE and NEUTRALITY.

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