

ON INDICATIVE AND SUBJUNCTIVE CONDITIONALS

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It is common practice in the literature to divide the landscape of conditionals into two camps—the indicatives and subjunctives—and theorize about each camp separately. Unfortunately, it is often unclear exactly what the distinction amounts to. Take Ernest Adams' famous minimal pair (Adams [1970]):

(1) If Oswald didn't shoot Kennedy, someone else did.

Indicative

(2) If Oswald hadn't shot Kennedy, someone else would have.

Subjunctive

Without trying to guess what others may have had in mind, let's draw some distinctions and make some stipulations. First, we may distinguish (1) and (2) both grammatically and semantically. (1) is distinguished grammatically from (2) by the fact that the latter carries an extra layer of past tense (marked morphologically in English with the past perfect "had") and the modal auxiliary verb "would" in its consequent.¹ The relevant semantic difference between (1) and (2) is shown by the fact that, since we know that Kennedy was shot and that there was no backup shooter (since we're Warrenites), (1) is true while (2) is false—so, (1) and (2) have different truth conditions. Intuitively, (1) is about how the world was, given what we *now* know plus the supposition of its antecedent; (2) is about how the world would have been

1. Notice, though, that the extra layer of past tense in (2) doesn't shift the event time of the if-clause to past. To see this clearly, notice that "tomorrow" is felicitous in the if-clause of the following subjunctive, which is not the case when the same sentence occurs outside of the if-clause:

(i) The contest was held today . . .

- a. If Smith had entered tomorrow, he would have missed it.
- b. Lucky for Sue, she had (already) entered the contest last night.
- c. #Unfortunately for Smith, he had (already) entered the contest tomorrow.

This feature of subjunctive conditionals has been called "forward time shift" in the conditionals literature (cf. Gibbard [1981], Dudman [1983], Dudman [1984], Edgington [1995], Bennett [2003]).

(not what we know about it) were its antecedent to have held. In slogan form: the indicative conditional (1) is epistemic, while the subjunctive conditional (2) is metaphysical.² Let's stipulate that the indicative/subjunctive distinction is the grammatical one, and let "epistemic" and "metaphysical" label the different meanings of the two conditionals.

These observations immediately raise the question of why the grammatical difference between (1) and (2) gives rise to the corresponding semantic difference between them.³ This question is pressing in light of the work of Sabine Iatridou, who argues that this grammatical difference (a combination of past + future morphology) yields a similar semantic difference across a range of unrelated languages.⁴ We thus put the question as follows:

2. However we characterize it, this semantic distinction between epistemic and metaphysical modality is both intuitive and philosophically important. It's why, for instance, subjunctives, but not indicatives, figure into talk about causality (see Lewis [1986, 2000], Woodward [2003]) and bear an intimate connection to laws of nature (see Goodman [1947], Chisholm [1955], Maudlin [2007], Lange [2009]) and chance (Lewis [1979], Lewis [1980], Albert [2000]), and what drives causal decision theorists to insist that it's the probability of subjunctives (rather than indicatives) that ought to guide rational deliberation (see Gibbard & Harper [1981], Lewis [1981a, 1981b], Williamson [2007]).

3. This question cross-cuts another issue surrounding indicatives and subjunctives, namely, whether the two kinds of conditionals are semantically unified. Unifiers include Stalnaker (1975), Edgington (1995), Lycan (2001), while non-unifiers include Lewis (1973), Gibbard (1981), Bennett (2003). The question may seem to be of more interest to a unifier as answering it will presumably be part of her answer as to how indicatives and subjunctives can mean different things despite sharing some common semantic core. However, it is also a pressing question for non-unifiers, for even if indicatives and subjunctives involve distinct conditional operators, it's an open question how grammar mediates the selection of operator.

4. See Iatridou (2000), pp. 245, 263–266, von Stechow & Iatridou (2008), pp. 120–126, and also Steele (1975), James (1982). In addition to Romance and Germanic languages, Iatridou cites evidence from Modern Greek, Papago, Proto-Uto-Aztec, Japanese, Korean, Hebrew, Turkish, and Basque.

THE GRAMMATICAL QUESTION: why do the grammatical differences between indicatives and subjunctives (in particular the additional past + future morphology on the latter) result, at least for paradigm cases like (1) and (2), in indicatives being epistemic and subjunctives being metaphysical?⁵

For the most part, the philosophical literature on conditionals has neglected this question, perhaps leaving it as a project for linguists to figure out.⁶ However, philosophers thinking about conditionals ought to be interested in THE GRAMMATICAL QUESTION for at least two reasons. The first is that our answer to THE GRAMMATICAL QUESTION may guide our thinking not only about what indicatives and subjunctives like (1) and (2) mean, but also about the meanings of future directed conditionals like (3):

- (3) If Oswald doesn't shoot Kennedy, someone else will.

Thus, thinking about THE GRAMMATICAL QUESTION may provide a new way of tackling one of the major outstanding issues in the conditionals literature: the question of whether future indicative conditionals like

5. Although this is a robust generalization, as we will see below in §2, the interaction between indicative/subjunctive and epistemic/metaphysical is slightly more complicated. In particular, indicatives about the future seem to have both epistemic and metaphysical interpretations, and subjunctives about the past seem to have both epistemic and metaphysical interpretations. The correct generalization seems to be that conditionals with future outlooks (either from now, or the perspective of some past time) have both interpretations, while conditionals with non-future outlooks have only epistemic interpretations.

6. For instance, two philosophical treatises on conditionals, Lewis (1973) and Bennett (2003), are entirely devoted to characterizing a semantics for a formal operator that is intended to gloss a certain class of English sentences, but spend little time worrying about the relation between that operator and the English sentences it is intended to gloss. Gibbard (1981) devotes time to the discussion of the grammatical differences and their corresponding semantic differences (pp. 222–226), but offers no account of the relation between them. Even Lycan (2001), who is admirably sensitive to syntactic data (see especially pp. 1–15), says nothing illuminating about (ii) (pp. 143–148). Exceptions include Stalnaker (1975), Dudman (1983), Edgington (1995), Weatherston (2001).

(3) are metaphysical or epistemic.⁷ As we will see in §2, my answer to THE GRAMMATICAL QUESTION generates predictions about the meanings of future conditionals, predictions which I will argue are correct. The second reason to be interested in THE GRAMMATICAL QUESTION is that Iatridou's observation, which is that many unrelated languages use past tense to express metaphysical modality, seems to call for a nonconventional explanation (that is, one that does not merely appeal to what the relevant expressions in these languages mean)—more on what such an explanation might look like below.

Iatridou's own answer to THE GRAMMATICAL QUESTION is that the extra layer of past tense on a subjunctive conditional carries a modal distancing (rather than temporal distancing, as past tense usually does) effect. It signals that the speaker is talking about worlds potentially different from those compatible with what is presupposed; hence such theories may predict that subjunctive conditionals quantify over nearby metaphysically accessible worlds, while indicatives quantify over epistemically accessible worlds, thus capturing the relevant difference in meaning between them. Call this the MODAL PAST hypothesis, since it proposes that past tense has a modal meaning in certain environments.⁸

Although the MODAL PAST hypothesis promises a straightforward answer to THE GRAMMATICAL QUESTION, there are reasons for concern. As noted above, a nonconventional explanation of Iatridou's observation would be preferable, given that it encompasses a wide range of *unrelated* languages. On the MODAL PAST hypothesis, it remains unclear why these unrelated languages would all lexically en-

code 'modal/temporal distancing' in past tense morphology. Furthermore, the MODAL PAST hypothesis raises the question why past tense morphology lexically encodes temporal and modal distancing, but not spatial distancing. And finally, it remains mysterious on the MODAL PAST hypothesis why it is a combination of past + *future* morphology that we find on subjunctive conditionals cross-linguistically. Here, the MODAL PAST-theorist could just say that the future morphology *conventionally licenses* the modal reading of past tense, but this brings us back to issue of cross-linguistic robustness which remains unexplained.⁹

The goal of this paper is to defend a nonconventional answer to THE GRAMMATICAL QUESTION. My theory will comprise four main principles:

1. SIMPLE PAST: the extra layer of past tense on subjunctives shifts the evaluation time of the conditional to the past (cf. Tedeschi [1981], Dudman [1983, 1984, 1988], Edgington [1995], Ippolito [2003, 2006, 2013] [2013], Arregui [2005, 2007, 2009]).¹⁰
2. UNIFORMITY: modals and conditionals have a uniform modal semantics and what interpretation they have depends (in part) on what modal base they are assigned in context (cf. Kratzer [1977]).

9. See also Mackay (2015) for an empirical challenge to MODAL PAST theories.

10. Although some of these SIMPLE PAST theories address important related questions about the relationship between the grammatical differences of indicative and subjunctive conditionals and their semantic properties, none as far as I know aim to account for the philosophically intriguing generalization noted in THE GRAMMATICAL QUESTION. For instance, Ippolito (2003, 2006, 2013b) aims to account for differences in the implicatures and presupposition projection properties of indicative and subjunctive conditionals. Since she does not discuss past indicatives like (1), her theory is silent about the semantic difference between (1) and (2). Arregui (2007, 2009) proposes a unified theory of subjunctive conditionals about the past and the future, offering a SIMPLE PAST theory on which the past tense plays a role in fixing the similarity relation on counterfactuals. However, she notes (Arregui (2007), p. 245) that by building the meaning of subjunctive conditionals into the meaning of "would" her theory is not designed to make predictions regarding the semantic difference between conditionals like *If John left at noon, he will be sitting outside right now* and *If John had left at noon, he would have been sitting outside now*.

7. See for instance Davis (1979), Gibbard (1981), Ellis (1984), Dudman (1984, 1994, 2000), Bennett (1988, 1995, 2003), Jackson (1990, 1991), Edgington (1995), Cogan (1996), Barker (1998), Cross (2002), Morton (2004), Gauker (2006), DeRose (2010), Barnett (2012). Note that it is common in this part of the literature to find the labels "indicative" and "subjunctive" (or "counterfactual") used to mark the semantic distinction which I use "epistemic"/"metaphysical" for.

8. See Iatridou (2000), who draws on Isard (1974), Lyons (1977); recent defenders of this line include Starr (2013), Schulz (2014).

3. DUAL INTERPRETATIONS: there are two kinds of modal bases—metaphysical and epistemic—differing only in that present metaphysical possibilities all share the same past, while present epistemic possibilities may have different pasts (cf. Kratzer [1981, 1991]).
4. DIVERSITY: there is a constraint on the assignment of modal bases to modals and conditionals in context which ensures that conditionals are never interpreted such that their consequents are directly settled by their modal base (cf. Condoravdi [2002]).

I use these principles to derive the semantic contrast between indicative and subjunctive conditionals from their grammatical differences; the basic idea is that we use the past + future morphology on subjunctives to ‘access’ past metaphysical possibilities (ways the world *could have been*) which we otherwise could not quantify over given DIVERSITY.¹¹ As a result, my theory entails a version of the view that subjunctive conditionals quantify over alternative futures from some past branch from actuality.¹²

§1 comprises the statement of the main theory. In §2, I explore how the theory generalizes, and there I argue that two surprising predictions it makes—that past subjunctives and future indicatives can have both metaphysical and epistemic interpretations—are correct. Finally,

11. Such an explanation does not entail that metaphysical modality is expressed using past tense morphology in every language. Thus, it’s compatible with this explanation that some languages use other means (besides tense morphology) for making claims about the past (e.g., Chinese, Burmese, and Dyirbal—see Comrie [1985]). It entails only that some such means of identifying a past evaluation time will be involved in quantifying over metaphysical possibilities which differ from how things actually are or were. Interestingly, the question of whether Chinese has any consistent linguistic form for expressing metaphysical conditionals is controversial (see in particular Bloom [1981], Comrie [1986]), but recent work has suggested that even in Chinese past-markers play an important role in expressing metaphysical conditionals (Feng & Yi [2006], Liu [2013], Yong [2013]).

12. Cf. Jackson (1977), Thomason & Gupta (1980), Thomason (1985), Tedeschi (1981), Bennett (2003), Ippolito (2003, 2006, 2013b), Placek & Müller (2007), Arregui (2007, 2009).

in §3, I anticipate and respond to some pressing objections regarding my use of historical modality to capture the truth conditions of subjunctive conditionals. I conclude with a brief discussion about some remaining open issues.

1. Why Indicatives and Subjunctives Differ in Meaning

In this section, I motivate my answer to THE GRAMMATICAL QUESTION, focusing for now on the Oswald minimal pair:

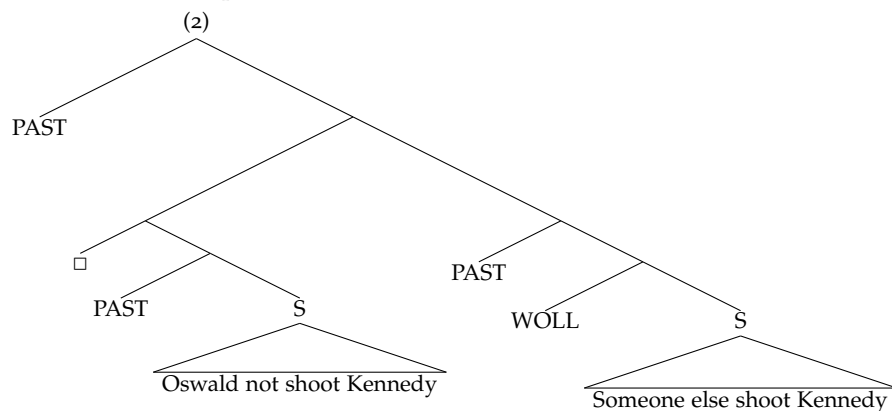
- (1) If Oswald didn’t shoot Kennedy, someone else did. Indicative
- (2) If Oswald hadn’t shot Kennedy, someone else would have. Subjunctive

Adopting the SIMPLE PAST hypothesis, I suppose that the extra layer of past tense on subjunctives is an ordinary past tense that shifts the evaluation time of the conditional to the past. Following Palmer (1986), Abusch (1997, 1998), Ogihara (1996), I’ll suppose that “would” is the past tense of “will” (following the usual convention to refer to untensed “will” using “WOLL”) and it shifts the event time of its clause to the future.¹³ Drawing on Kratzer (1986, 1991, 2012), I assume that the logical form of a conditional sentence involves its if-clause restricting the domain of a covert necessity modal, which has its consequent as its nuclear scope.¹⁴ Finally, following Ippolito (2003, 2006, 2013b), Arregui (2009), I assume that (at the relevant level of abstraction) the logical form of subjunctive conditionals like (2) has this restricted covert

13. This future-shifting effect of “will”/“would” is optional when combined with stative verbs. For instance, *John will be in his room* can mean either that John is now in his room or that John will be in his room at some salient future time. We’ll come back to this point in §3.

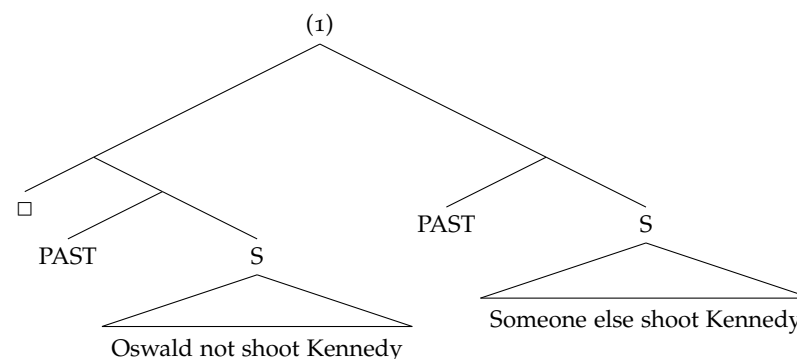
14. Nothing crucially hinges on this for our purposes; I do so only to emphasize the analogous behavior with other modal expressions. We could just as easily rewrite our semantics using a conditional operator in place of the covert modal. Furthermore, the choice of *necessity* modal is also unnecessary for our purposes—our aim here would be just as well served by letting the covert modal element be a selection function that takes the evaluation world into a *unique* world in which the if-clause is true (cf. Stalnaker [1975, 1980]).

modal embedded under a higher past tense operator (let '□' denote the covert modal operator):¹⁵



That the indicative (1) lacks an extra layer of past tense indicates that the conditional is not embedded under a higher past tense (even though both its antecedent and consequent are past-tensed). I'll assume that it is not embedded under any tense (although I'll leave it open whether it is in fact embedded under a present tense), and thus that it has the following structure (at the relevant level of abstraction):

On indicative and subjunctive conditionals



These are just our starting assumptions given the SIMPLE PAST hypothesis, but I want to show that they are not unmotivated. As a preliminary motivation for our starting point, consider the following pair of modals:

- (4) It is possible that John won the election. Epistemic
 (5) It was possible that John would win the election. Metaphysical

(4) and (5) differ semantically in a way that is analogous to (1) and (2). Suppose the election results are in but we haven't heard them yet, so we don't yet know whether John won—then we might say (4) to express that it is compatible with our knowledge or evidence that John won. Thus, its meaning is epistemic, just like the indicative (1). Suppose later we find out that John didn't win the election—now we might say (5) to express that the election wasn't rigged (that perhaps it was unsettled at some past time whether John would win). Thus, its meaning is metaphysical, just like the subjunctive (2).¹⁶ Furthermore,

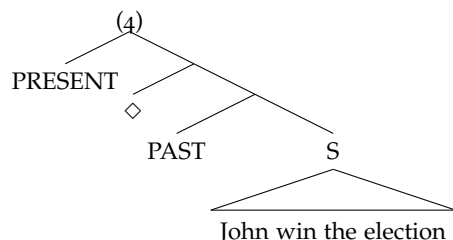
16. We find the same grammatical/semantic difference in modal auxiliaries. (i) is ambiguous:

- (i) John might have won the election.

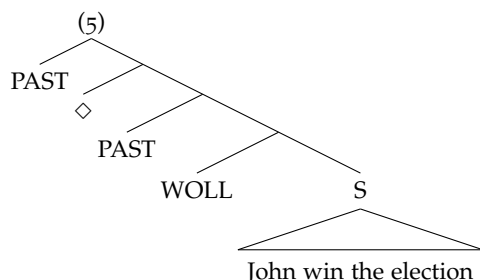
On one reading, it means something akin to (4) and on the other, something akin to (5). It also has a less prominent reading in which it reports a past time

15. Although Kratzer takes the covert modal to always be epistemic, on my proposal this need not be so, as we will see shortly. Furthermore, to streamline the presentation of the theory, I will be ignoring the past tense on the conditionals' antecedents and consequents. I go into more detail in the Appendix.

(4) and (5) wear their grammatical differences on their sleeves: (4) is a present-tensed possibility claim about the past, whereas (5) is a past-tensed possibility claim about the future (from that past time). That is, (4) very plausibly has the following structure:



while (5) very plausibly has the following structure:



The grammatical/semantic analogy between (4)/(5) and (1)/(2) is

at which it was epistemically possible that John won the election. I'll discuss this reading further in §2.1. This ambiguity is an instance of the pattern above if *John might have won the election* is structurally ambiguous between a reading in which "might" falls in the scope of past tense or not:

- | | | |
|------|------------------------------------|--------------|
| (ii) | John might have won the election. | |
| a. | Might[Past[John won the election]] | Epistemic |
| b. | Past[Might[John won the election]] | Metaphysical |

See Condoravdi (2002) for further discussion.

striking, and thus motivates a theory on which (1) and (4) (and (2) and (5)) have roughly analogous tense structures, which give rise to their analogous semantic differences. Explaining *why* this happens is the goal of the remainder of §1. I begin in the next section by sketching a baseline semantics which I use to state my theory of why indicatives and subjunctives mean different things.

1.1 A Baseline Semantics

Given my assumptions, conditionals are restricted necessity modals that may (in the case of subjunctive conditionals) take scope under past tense. The baseline semantic theory I'll be working with will be a slightly amended version of Kratzer's influential semantics for modals (see Kratzer [1977, 1981, 1991, 2012]). On this theory, modal and conditional domains are determined by two conversational backgrounds, a modal base f and an ordering source g , both functions from worlds and times to sets of propositions (trading perspicuity for precision, I'll use "modal base" and "ordering source" to refer both to the function delivering the set of propositions and the output of the function as evaluated at a particular world; it will be clear from the context which is intended).¹⁷ The set of propositions delivered by the ordering source, $g(w, t)$, orders the worlds in $\cap f(w, t)$ according to how closely they come to approximating the ideal given by $g(w, t)$, as follows:

Def 1 (Orderings). $\forall u, v \in \cap f(w, t) : u \leq_{g(w, t)} v$ iff
 $\{p \in g(w, t) : v \in p\} \subseteq \{p \in g(w, t) : u \in p\}$

Read ' $u \leq_{g(w, t)} v$ ' as saying that u is as good as v given ideal $g(w, t)$. In English, the above condition holds iff all of the $g(w, t)$ -propositions that are true at v are also true at u . Making the limit assumption, we

¹⁷ I am assuming throughout that propositions are simply sets of possible worlds. Since we're only concerned with the modal profile of sentences, this assumption is harmless for our purposes.

can then define the domain of a modal relative to f and g (at w, t) via the following function D :¹⁸

Def 2 (Domains). The *domain* of modal \mathcal{M} given f, g at w, t is
 $D(f, g, w, t) = \{u \in \cap f(w, t) : \forall v \in \cap f(w, t) : u \leq_{g(w, t)} v\}$

Basically, the domain of a modal is the set of worlds compatible with its modal base that are as good (given its ordering source) as any other in that modal base, hence the label ‘best.’ We then state our schematic semantics for modals by analyzing them as quantifiers over their domains, as follows:^{19,20}

MODAL SEMANTICS

$\Box(p)$ is true relative to f, g, w, t iff $\forall w' \in D(f, g, w, t) : w' \in p$
 $\Diamond(p)$ is true relative to f, g, w, t iff $\exists w' \in D(f, g, w, t) : w' \in p$

These conditions say roughly that $\Box(p)$ is true iff all the best worlds are p -worlds, and $\Diamond(p)$ is true iff some of the best worlds are p -worlds. Call the sentence p as it appears in the scope of the modal operator its *prejacent*. I’ll also use this term to refer to the proposition expressed by that sentence (the distinction won’t matter for our purposes). Here, I will follow Kratzer in holding that conditionals are just restricted necessity modals. We implement this view by assuming that an

18. This is not an ad hoc division of labor. Those familiar with ordering (cf. Stalnaker [1968], Lewis [1973]) semantics for counterfactuals can think of $g(w, t)$ as inducing an order and selecting only the “closest” worlds given that order in $\cap f(w, t)$. Kratzer’s own motivation for such a two-factor semantics is its treatment of comparative possibility claims (cf. Kratzer [1991, 2012]).

19. We’re assuming that it is the logical forms of sentences which are interpreted. We assume that ‘ $\Box(p)$ ’ is the logical form of a necessity modal sentence (that is, any instance of the sentence schema ‘It must be the case that p ’) and ‘ $\Diamond(p)$ ’ is the logical form of a possibility modal sentence (instances of the schema ‘it might be the case that p ’).

20. I will focus entirely on sentences containing at most a single modal/conditional for the scope of this paper to simplify the discussion. We could overcome this limitation by indexing conversational backgrounds to modals.

indicative conditional ‘if p , q ’ has as its logical form $[\Box p](q)$, and that its truth conditions are given by:

CONDITIONAL SEMANTICS

$[\Box p](q)$ is true relative to f, g, w, t iff $\Box(q)$ is true relative to $f^{[p]}, g, w, t$. (Where $\forall w, t : f^{[p]}(w, t) = f(w, t) \cup \{p\}$)

This says roughly that $[\Box p](q)$ is true iff all the best p -worlds are q -worlds.

Finally, we define the proposition expressed by a sentence in a context as follows (cf. Ninan [2011]):

Def 3 (Propositions). For any sentence p , the proposition expressed by p in context $c = \{w : p \text{ is true relative to } f_c, g_c, w, t_c\}$.

(Where p is the logical form of p , and f_c, g_c, t_c are the modal base, ordering source, and time that c determines the sentence to be evaluated relative to.)

Since the logical form of an indicative conditional has a modal which is not in the scope of any tense, we predict that the conversational backgrounds for indicatives are evaluated at t_c (which is the time of the context of utterance). Since subjunctive conditionals involve modals embedded under past tense, we predict that the conversational backgrounds for subjunctives are evaluated at the relevant past time rather than the evaluation time of the entire sentence (see the Appendix for a way of compositionally integrating tense into the semantics).

This concludes the sketch of our baseline semantic framework. It should be clear at this point that the framework will not by itself predict the difference in meaning between indicative and subjunctive conditionals, since it doesn’t predict what conversational backgrounds indicatives and subjunctives will be interpreted relative to in various contexts (indeed, this question is left open by Kratzer’s own work on modals and conditionals as well). My point in sketching this baseline semantics is to provide a framework within which we may precisely

state a theory that *does* explain why the combination of past + future morphology in subjunctive conditionals results in their meaning something different from their indicative counterparts. The rest of this section is devoted to articulating and motivating my answer to THE GRAMMATICAL QUESTION. In §1.2 I motivate the two key assumptions of my theory, which I will use to predict the semantic contrast between (1) and (2) in §1.3. I round out the section in §1.4 by highlighting how my theory generalizes beyond the Adams' minimal pair.

1.2 A Pragmatic Constraint

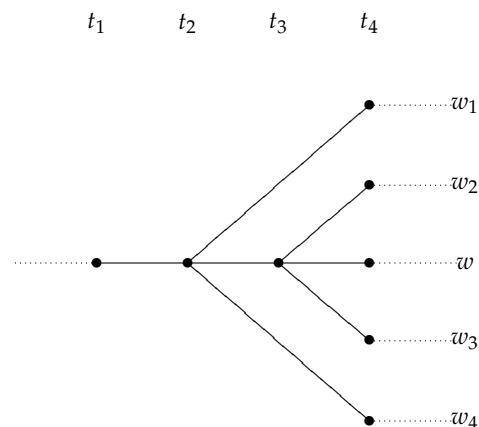
Given our semantic framework, the key to predicting the semantic contrast between conditionals like (1) and (2) is a suitable constraint on the assignment of modal bases and ordering sources to modals and conditionals in context. In what follows, I only discuss a constraint on the modal base assigned by context, and set aside ordering sources for now.²¹ My first assumption is that there are two distinct kinds of modal bases — informational and historical — and that a modal or conditional has an epistemic reading if interpreted relative to an informational modal base and a metaphysical reading if interpreted relative to a historical modal base.²² An informational modal base f_I takes a world and time into the set of true propositions that are the content of some particular body of information at that world and time (such as the what is known by a particular agent). A historical modal base

f_H takes a world w and time t into the set of propositions true at w that are about states or events that do not continue beyond t . Hence, historical modal bases may be defined as follows:²³

NECESSITY OF THE PAST:

For any world w , time t , and proposition p about an interval that doesn't extend beyond t : $p \in f_H(w, t)$ iff p is true at w .

$\cap f_H(w, t)$ is the set of historical possibilities at w, t : a set of worlds that are exactly intrinsically alike w at all times up until t while possibly differing thereafter, as in the following diagram:



21. However, keep in mind that the ordering source plays a crucial role in modal semantics — see the discussion in Kratzer (2012), pp. 32–37. I discuss ordering sources in §3.4.

22. See also Kratzer (1981)'s discussion of circumstantial and epistemic modal bases (p. 49–55; pagination from Kratzer (2012)), which she once thought might play a role in accounting for some of the syntactic and semantic differences between root and epistemic modals (cf. Hofmann [1966], Perlmutter [1971], Ross [1969], Jackendoff [1972], Groenendijk & Stokhof [1975], Iatridou [1990]). However she has since abandoned this project (cf. Kratzer [2012]: p. 23–24) since circumstantial and epistemic modal bases are not sufficiently different to account for the root/epistemic distinction. However, informational and historical modal bases might actually be what is needed here — although defending this claim is a project for another day.

23. I discuss the notion of a proposition being about an interval in more detail in §1.4 and in the Appendix (see also Lewis [1980, 1988a,b], Thomason [2002]). For now, hopefully the following intuitive understanding will suffice: the interval a proposition is about is the interval throughout which the event/state it describes takes place. Also, I recognize that some propositions may not be about any particular intervals — this is a point I will return to in §1.4.

Here, $w, w_1, w_2, w_3, w_4 \in f_H(w, t_1)$ but only $w, w_2, w_3 \in f_H(w, t_3)$. Hence, historical possibilities decrease as time goes on—what was once historically possible may not now be historically possible, and what is now historically possible was always historically possible.

Recall that we aim to predict the semantic contrast between (1) and (2) by way of a constraint on which modal base (informational or historical) a conditional will be interpreted relative to in a given context. Following Condoravdi (2002)’s explanation of a similar contrast in epistemic and metaphysical possibility modals, I propose the following constraint:^{24,25}

DIVERSITY:

In any context c , the modal base f_c for any modal \mathcal{M} with prejacent p and modal time t must be such that: $\exists w \in C : p \notin f_c(w, t)$ and $\neg p \notin f_c(w, t)$.

(where C is the context set of c , the set of worlds compatible with what is common ground among the participants of c ; cf. Stalnaker [1978, 2002])

24. See also von Fintel (1997a)’s principle of “consequent variety” (which also appears as a felicity condition in Kratzer [1978]), and Werner (2006)’s “disparity principle.” A similar principle is suggested in von Fintel & Heim (2012), in the context of a discussion of the “Paradox of the Good Samaritan” (pp. 62–63). Each of these constraints (including Condoravdi’s) demand that $\cap f(w, t)$ contain both p - and $\neg p$ -worlds. My DIVERSITY principle is stated at the level of propositions, and hence entails these.

25. One defensive remark about DIVERSITY. Since it is an intensional constraint, if the modal’s prejacent is a necessary truth, then, assuming that there are no impossible worlds, no modal base will satisfy DIVERSITY for that modal, and thus the theory would predict such sentences to be infelicitous. We can avoid this problem by positing impossible worlds (cf. Nolan [1997], Kment [2006a,b], Krakauer [2012], Brogaard & Salerno [2013]), or by reformulating DIVERSITY to be conditional on there being some possible worlds in which the nuclear scope of the modal is true and some possible worlds in which the nuclear scope is false. One reason to favor the latter strategy is that we predict the possibility of expressing eternal metaphysical necessities using simple, present tensed modal constructions, as in: *It is necessary that 2+2 = 4*. This sentence may have a metaphysical flavor, it seems, and assuming DIVERSITY is a conditional constraint as above would allow my theory to predict this fact.

Basically, DIVERSITY demands that neither a modal’s prejacent nor the negation of its prejacent be among the propositions in the modal base assigned to it by any context (remember, since we are treating conditionals as restricted modals, the prejacent of a conditional is its consequent). The reason it is stated in terms of the worlds in the context set rather than the actual world is that our intuitions about the relevant readings track what is presupposed in the conversation, not what in fact holds (cf. Condoravdi [2002] on differences between metaphysical and epistemic interpretations of future oriented *might*-claims on pp. 79–80). We’ll see in §1.3 how my theory uses NECESSITY OF THE PAST + DIVERSITY to predict the semantic contrast between (1) and (2). However, first I want to argue that DIVERSITY is independently motivated on both theoretical and empirical grounds.

Theoretical motivation for DIVERSITY

Start with the following natural thought:

CONTEXTUAL EQUIVALENCE BAN:

If possible, simple modal sentences will not express propositions that are contextually equivalent (true at all the same worlds in the context set) to their prejacent.

This principle seems correct, and may be an instance of a more general policy to aim to interpret strictly more complex sentences so that they are not contextually equivalent with their strictly less complex counterparts. The more general policy may itself be the motivated and explained by considerations of speech economy (see for instance Zipf [1949], Horn [1984, 1989, 1993], Clark [1987], Goldstein [2013]). Since CONTEXTUAL EQUIVALENCE BAN is reasonable, I won’t explore these further motivations for it at this time. Importantly for our purposes is the fact that CONTEXTUAL EQUIVALENCE BAN entails DIVERSITY, since DIVERSITY is a minimal condition for the CONTEXTUAL EQUIVALENCE BAN to hold (see Appendix for the proof). Therefore, we have an independent theoretical argument for DIVERSITY from general

considerations about considerations of speech economy.²⁶ We turn next to an independent empirical argument for DIVERSITY.

Empirical motivation for DIVERSITY

Karttunen (1972) observes that epistemic necessity modal claims seem to be weaker in some sense than their prejacent, in that the former seem acceptable only if it is clear in the context that the speaker intends to have inferred the prejacent from some other information (hence that the prejacent is not known “directly”). This is illustrated by the following minimal pair:

- (6) [Said while watching it rain]:
 - a. It’s raining.
 - b. #It must be raining.
- (7) [Said while watching people come inside with wet umbrellas]:
 - a. It’s raining.
 - b. It must be raining.

Kratzer (1991) proposes to model this weakness by holding that the domain of “must” may exclude the actual world if it receives a non-factive ordering source—hence $\lceil \text{must } p \rceil$ is weaker than p in that it does not entail p . von Fintel & Gillies (2010) argue, pace Kratzer, that “must” is strong—epistemic necessity claims entail their prejacent.²⁷

26. Condoravdi (2002) (p. 83) hints at such a motivation for her “Diversity” principle in her argument that without it, context could assign a historical modal base to (i-a), which, given NECESSITY OF THE PAST, would make it necessarily equivalent to (i-b):

- (i) a. John may be next door.
- b. John is next door.

27. von Fintel & Gillies (2010) offer several compelling arguments for this claim. One is that if $\lceil \text{must } p \rceil$ does not entail p , then the following sentences should be consistent, but they are intuitively not:

- (i) a. #It must be raining but perhaps it isn’t raining.
- b. #Perhaps it isn’t raining but it must be.

Their alternative explanation of the contrast between (6) and (7) is that “must” carries an evidential signal of indirect inference, so that even though $\lceil \text{must } p \rceil$ entails p , it also signals that p is not directly known. Hence, von Fintel & Gillies predict that (6) will be infelicitous, since in that case it is directly known that it is raining; but they predict that (7) will be felicitous because in that case it is only indirectly known (via inference) that it is raining.

But why do epistemic necessity modals signal indirect inference? von Fintel and Gillies predict this property of epistemic necessity modals by way of the following two assumptions (pp. 371–372): (i) epistemic modals lexically select for informational modal bases that contain only propositions that are directly known by the relevant party (von Fintel and Gillies’ terminology is slightly different: they talk about the *kernel* but this just is an epistemic modal base; see von Fintel & Gillies [2010], fn. 31),²⁸ and (ii) an epistemic necessity modal sentence is defined (in a context) only if neither its prejacent nor the negation of its prejacent is a member of its modal base (this follows von Fintel and Gillies’ first implementation of “directly settles,” see pp. 374–376; they officially remain neutral on choosing between this implementation and another). Together, (i) and (ii) entail that epistemic necessity modals signal that their prejacent is not directly known: given (i), the modal base of an epistemic necessity modal comprises the propositions that are directly known by the relevant party, but then from (ii) it follows that for the epistemic necessity modal claim to be defined (and hence

28. This claim is compatible with Kratzer (2012)’s examples of epistemic modal claims that are relativized to evidence whose content is unknown, such as the information contained in some document in a locked filing cabinet. We may handle such examples by letting the ordering source of the modal be constrained by the content of the document in the filing cabinet, similar to Kratzer (2012)’s suggestion on p. 34, fn. 6.

felicitous), it must be the case that neither its prejacent nor the negation of its prejacent is directly known.²⁹ However, both (i) and (ii) are strong lexical assumptions, and von Fintel and Gillies admit that they are not entirely satisfied with stipulating them (p. 368).

However, notice that (ii) follows from DIVERSITY. Thus, adopting DIVERSITY removes the need to stipulate (ii) lexically. Assuming a methodology on which deriving principles pragmatically rather than lexically stipulating them is generally preferred, then insofar as von Fintel and Gillies' theory is well-supported, the fact that (ii) follows from DIVERSITY provides some independent evidence in favor of DIVERSITY.³⁰

Thus, we've motivated DIVERSITY on both independent theoretical and empirical grounds—it is not an ad hoc assumption of the theory. In the next section, I will use DIVERSITY to predict the semantic contrast between (1) and (2).

1.3 Predicting the Observations

In this section, I show that, given NECESSITY OF THE PAST and DIVERSITY, my theory predicts that (1) is epistemic and that (2) may be metaphysical (though, also that it need not be).

- (1) If Oswald didn't shoot Kennedy, someone else did.

Indicative

- (2) If Oswald hadn't shot Kennedy, someone else would have.

Subjunctive

29. We need the constraint that both that the prejacent is not in $f(w, t)$ nor its negation in $f(w, t)$ since the same contrast arises for negated epistemic possibility claims, e.g., *It can't be raining*.

30. Given this methodology, it would also be preferred to have a general pragmatic motivation for (i)—especially, as von Fintel and Gillies note (p. 368), given that epistemic necessity modals signal indirect inference across a wide range of languages. I do not have any such general motivation in hand. However, it is not the aim of my paper to find a non-arbitrary implementation of von Fintel and Gillies' theory. Rather, my point in this section is merely to show how adopting DIVERSITY is a step in the right direction, lessening a plausible theory's commitment to lexical stipulations.

NECESSITY OF THE PAST:

For any world w , time t , and proposition p about an interval that doesn't extend beyond t : $p \in f_H(w, t)$ iff p is true at w .

DIVERSITY:

In any context c , the modal base f_c for any modal \mathcal{M} with prejacent p and modal time t must be such that: $\exists w \in C : p \notin f_c(w, t)$ and $\neg p \notin f_c(w, t)$.

Here is how we predict that (1) is epistemic. Since it is indicative, it is evaluated at the present time, t . But its consequent is about the past. Therefore, if (1) were to receive a historical modal base f_H , by NECESSITY OF THE PAST either its consequent proposition would be among $f_H(w, t)$ or the negation of its consequent proposition would be among $f_H(w, t)$. But either way would result in a violation of DIVERSITY. Since there is no principle analogous to NECESSITY OF THE PAST constraining informational modal bases, no such trouble arises there. Hence we predict that, if interpretable at all, (1) must be epistemic.

Here is how we predict that (2) may be metaphysical. Since it is subjunctive, it is evaluated at some relevant past time t' . But its consequent is about a time to the future of that past time. Thus, were it to receive a historical modal base f_H , it may still be the case (even in light of NECESSITY OF THE PAST) that neither its consequent proposition nor the negation of its consequent proposition is among $f_H(w, t')$. In such a case DIVERSITY would not be violated, and thus we predict that (2) may be metaphysical. But by the same reasoning as above, we also predict that (2) may be epistemic. We'll come back to this surprising prediction in §2.1. For now, let's set it aside.

We have now seen that adopting NECESSITY OF THE PAST + DIVERSITY is sufficient to predict a semantic contrast between (1) and (2), albeit perhaps not quite the contrast we expected. To get a sense of just how different the predicted meanings of (1) and (2) (at least on its metaphysical interpretation) are, consider the following intuitive

glosses on their predicted truth conditions:³¹

(1) is true iff all the presently epistemically accessible worlds in which Oswald didn't shoot Kennedy are worlds in which someone else did.

(2) is true (on its metaphysical interpretation) iff (where t' is the relevant past time) all the (best) historically accessible worlds from t' in which Oswald doesn't shoot Kennedy are worlds in which someone else shoots Kennedy.

Indeed, our predicted truth conditions match our intuition that (1) is true because we now know that someone shot Kennedy, and match our intuition that (2) is false because (assuming the Warren report is true) there were no reliable backup plans in place for someone else to step in were Oswald to fail (thus ensuring that some of the best past historically accessible worlds at which Oswald doesn't shoot Kennedy are ones in which no one does).

Let's recap what we've shown so far. Adopting the SIMPLE PAST hypothesis along with the assumption that there are just two modal bases (historical ones governed by NECESSITY OF THE PAST and informational ones which are not), along with DIVERSITY, leads us to predict that indicative conditionals whose consequents are about the past, such as (1), will be epistemic, while subjunctive conditionals whose consequents are about the future from some relevant past time, such as (2), can be metaphysical. Furthermore, our predicted interpretations allow for (1) to be true and (2) false, even in the same context. Thus, we predict the semantic contrast between (1) and (2).

However, the reader may have noticed that my theory generalizes beyond the Adams' minimal pair, and hence wonder what it predicts

31. Remember, we haven't yet seen the role played by the ordering source g in determining these truth conditions. For now I just want to emphasize that we can predict necessity modals to be true in light of DIVERSITY, since even though the modal's prejacent can never be among its modal base, this doesn't preclude its prejacent being true at every world in its domain $D(f, g, w, t)$.

for modals and conditionals generally. I turn to answer this question in the next section, showing that the theory makes two very surprising predictions: that subjunctive conditionals can actually have epistemic interpretations (as we've already seen) and that future directed indicative conditionals can have both epistemic and metaphysical interpretations.

1.4 Beyond the Adams Minimal Pair

Recall the notion of the time that a proposition is *about*. I intend this notion to track our intuitions about the interval throughout which the state or event described by the proposition takes place (for a definition of the time of a clause which connects up with the time of the proposition expressed by that clause, see the Appendix). Consider for instance:

- (8) a. John is upstairs.
- b. John was upstairs.

The time of the proposition expressed by (8-a) is intuitively the time at which the utterance takes place, t_c . The time of the proposition expressed by (8-b) is some interval that is entirely to the past of t_c . I assume that sentences like (8-a)/(8-b) express different propositions in different contexts, and hence exactly which intervals the propositions they express are about will also depend on context.³² Now,

32. Of course, there are sentences which express propositions that are not about any particular time, such as:

- (i) John was, is, or will be happy at some time or other.

This fact is compatible with my theory — I'll discuss this issue in §3.3. Furthermore, I should note that this understanding of times p is about predicts that the proposition expressed by:

- (ii) John came Sunday and Sue left Saturday.

is about Sunday and Saturday, as is its disjunctive counterpart:

- (iii) John came Sunday or Sue left Saturday.

take a particular modal sentence Φ (note that Φ may be a conditional—remember that on my theory conditionals are just restricted necessity modals and hence the prejacent of a conditional sentence is its consequent). Say that Φ 's *modal time* is the time at which its conversational backgrounds are evaluated, and its *prejacent time* is the time at which its prejacent is about. When Φ is a conditional, its prejacent time is the time at which the proposition expressed by its consequent is about. We assume that when a modal is not embedded under a past tense, its modal time is identical to t_c . Say that a modal sentence is *future directed* just if its prejacent time is to the future of its modal time, and that it is *non-future directed* otherwise. Thus, (1) is non-future directed and (2) is future directed:

- (1) If Oswald didn't shoot Kennedy, someone else did.
- (2) If Oswald hadn't shot Kennedy, someone else would have.

Now I can state the predictions of my theory with full generality:

Predictions

- (α) Non-future directed modals are invariably epistemic.
Examples: (1), (4)
- (β) Future directed modals may be metaphysical or epistemic.
Examples: (2), (5)

We already saw the reasoning that leads to these predictions in §1.3. For a more rigorous discussion, see the Appendix. What is important for our purposes here is that, given that it predicts (β), my theory predicts that subjunctives like (2) and future directed indicatives like (3) may be both metaphysical and epistemic.

I won't defend these additional predictions at this time, but I submit that they are plausible.

- (2) If Oswald hadn't shot Kennedy, someone else would have.
- (3) If Oswald doesn't shoot Kennedy, someone else will.

I will address these two predictions of the theory in §2, and argue that both predictions are in fact correct. Furthermore, I will argue that the default interpretation of subjunctive conditionals is metaphysical. Then, in §3, I will address three potential problems for my theory arising from its prediction that the metaphysical interpretation of subjunctive conditionals involves historical modality. In particular, I will look at problems stemming from backwards subjunctive conditionals, subjunctives with antecedents and consequents about no time in particular, and subjunctives in hindsight (cf. Tichý [1976], Slote [1978], Edgington [2004]).

2. Additional Predictions

For any conditional sentence whose consequent is about a time partly to the future of its modal time, as with subjunctive conditionals like (2) and indicative conditionals with future-oriented consequents like (3), my theory allows that context assign that conditional either an informational modal base or a historical modal base.

- (3) If Oswald doesn't shoot Kennedy, someone else will.

Hence, my theory predicts that such conditionals ought to have epistemic and metaphysical interpretations (in principle). In the next two sections, I motivate this prediction.

2.1 Epistemic Subjunctives

We predict that subjunctive conditionals like (2) are in principle ambiguous between a metaphysical reading and an epistemic reading. In this section, I argue that this is the right prediction. Furthermore, I argue that the default interpretation of subjunctives like (2) is metaphysical.

In fact, epistemic readings of subjunctives have already been no-

ticed, though dismissed as an oddity.³³ Edgington (2007) gives the following example (borrowed from Grice [1989]):

Treasure hunt. “There is a treasure hunt. The organizer tells me:

(9) I’ll give you a hint: it’s either in the attic or the garden.

Trusting the speaker, I think

(10) If it’s not in the attic, it’s in the garden.

We are competing in pairs: I go to the attic and tip off my partner to search the garden. I discover the treasure. ‘Why did you tell me to go to the garden?’ she asks.

(11) Because if it hadn’t been in the attic it would have been in the garden: that’s what I was told. (Or more pedantically: ‘that’s what I inferred from what I was told’)

That doesn’t sound wrong in the context.” Edgington (2007), p. 212.

Notice that, in this context, (11) seems to have an epistemic reading: the speaker infers it from (10)—thus, it’s an instance of the direct argument (*p* or *q*, therefore, if *not-p*, *q*).³⁴ The truth of (11) does not depend on any causal relation between the treasure not being hidden in the attic and its being hidden in the garden—for instance the intentions of the treasure-hider. Rather, its truth depends entirely on whether the disjunction (10) was known at the relevant past time. In other words, (11) would still be true even if the treasure-hider would not have hidden the treasure anywhere besides the attic. The epistemic reading

here may be paraphrased along the following lines: given what I knew *then* (after receiving the hint from the organizer but before finding the treasure), had the treasure not been in the attic, it had to have been in the garden. Notice that, after we’ve learned that the treasure is in the attic, we cannot felicitously assert (10)—hence, (10) is not a way of conveying this fact about our past epistemic state, though (11) is. This is no mere quirk, either. Edgington gives another example: “‘Why did you hold Smith for questioning?’ ‘Because we knew the crime was committed by either Jones or Smith—if it hadn’t been Jones, it would have been Smith.’” (Edgington [2007], p. 213). As with (11), here, we have a claim about past epistemic possibilities—at that time, all of the not-Jones possibilities were Smith-possibilities.

I’ll support the claim that there is a genuine *epistemic* reading of some subjunctive conditionals by arguing against an alternative account of the non-standard interpretations sketched above.³⁵ On this alternative account, the non-standard interpretations are still metaphysical, but, for some reason, we hold fixed more than usual in evaluating them. Thus, for instance, on what I’ve called its “epistemic” interpretation, when evaluating (11) we hold fixed that the treasure was hidden somewhere, while on what I’ve called its “metaphysical” reading we don’t hold fixed that the treasure was hidden somewhere. But what motivates this difference in what gets held fixed? A possible answer is that the non-standard interpretations are analogous to “hindsight” subjunctives (which I will discuss in more detail in §3). To illustrate a relevant hindsight subjunctive, consider the following situation: Sue bets that a random coin toss will land tails, and it in fact lands heads. We think:

(12) If Sue had bet on heads, she would have won.

33. For discussions of other purported epistemic readings of subjunctive conditionals, see Veltman (2005), Schulz (2007), Kratzer (2012). I’m not sure about the examples Schulz points to, for the reasons Kratzer gives.

34. The direct argument appears valid for paradigm epistemic conditionals like (1) but not for paradigm metaphysical conditionals like (2). See Stalnaker (1975), Jackson (1979) for further discussion.

35. Thanks to an anonymous reviewer for discussion here.

For this to be true, in evaluating it, we seem to hold fixed the outcome of the coin toss. On this first answer, the “epistemic” reading of (11) is like this. However, this proposal immediately has the following problem: we seem to hold fixed the outcome of the toss when evaluating (12) because the outcome of the toss is independent of its antecedent—this is confirmed by the fact that we think that (13) is false (in this same context):

(13) If someone else had flipped the coin, Sue would have lost.

This comes out false because we don’t hold fixed the outcome of the toss when evaluating it, since the outcome of the toss is not independent of (13)’s antecedent. If this is right, then the “epistemic” interpretation of (11) can’t be due to holding fixed hindsight facts that are independent of its antecedent, for the fact that the treasure was hidden somewhere is not independent of the fact that the treasure was in the attic; thus, hindsight subjunctives like (12) and (13) actually motivate thinking that we do not hold fixed that the treasure was hidden somewhere in evaluating (11). So, hindsight considerations do not support this alternative account of “epistemic” subjunctives.

Another possibility is that we hold fixed the extra fact because it is presupposed by the antecedents of these subjunctives. Edgington’s second example of Jones and Smith lends some plausibility to this proposal, since perhaps the antecedent of “if it hadn’t been Jones, it would have been Smith” presupposes that someone committed the crime (and this is exactly the fact that should be held fixed to predict its “epistemic” interpretation). However, this account is also problematic, for at least two reasons. The first is that (11) has an “epistemic” interpretation but its antecedent does not presuppose that the treasure was hidden somewhere. The second is that the Jones/Smith example may also be interpreted metaphysically (such that in evaluating it we do not hold fixed that someone committed the crime), so the presupposition does not guarantee an “epistemic” interpretation. It seems that at best the presupposition helps to strengthen the “epistemic” interpretation,

but by itself is neither necessary nor sufficient for it.

Here is one final remark. Recall that the epistemic interpretations admit of paraphrase using an epistemic necessity modal ((11) \approx “given what I knew, if the treasure hadn’t been in the attic, it had to have been in the garden”). This is extremely telling in favor of treating them as genuinely past-tensed epistemic necessity claims, and is not explained by alternative theories on which they are not genuinely epistemic.

Thus, we have evidence that at least some subjunctive conditionals are interpreted epistemically in at least some contexts. But you may still be wondering: is there a context in which even (2), the paradigm example of a subjunctive conditional, is interpreted epistemically?

(2) If Oswald hadn’t shot Kennedy, someone else would have.

I think there is such a context:

Investigation. Kennedy has been shot, but we don’t know whether he was shot on Monday or Tuesday. However, we are certain that if Kennedy was shot on Monday, Oswald did it, but if he was shot on Tuesday, Oswald couldn’t have done it. I send you to investigate some of the possible Tuesday-shooters, and arrest Oswald myself. Later, we discover that Oswald in fact shot Kennedy, so you ask, “Why did you send me to investigate those other suspects?” and I reply,

(14) Because if Oswald hadn’t shot Kennedy, someone else would have (on Tuesday).

In this context, just as in **Treasure Hunt**, by uttering (2) I seem to express something about my (our) past epistemic possibilities—thus, even (2) seems to have an epistemic reading in the right context, and my theory predicts this.³⁶

36. You may have a bit of trouble getting this reading, and you might wonder why I had to go to such lengths in describing the context to bring it out. This is related to the fact that when eventive verbs (like “shoot”) are combined with “will”/“would” the event time is obligatorily future-shifted, and in

So far, so good. Past epistemic readings of subjunctive conditionals are possible in the right contexts, and my theory predicts that they are possible. But these readings of subjunctives are not the default ones, and they seem to require a special context to bring them out. What features of the context are necessary to bring out such a reading, and why is the default interpretation of subjunctives metaphysical? First, notice that possibility modal claims like (15) admit of past epistemic readings:

- (15) The keys might have been in the car.

von Fintel & Gillies (2008) point out that the past epistemic reading of (15) arises in the following kind of context:

- (16) A: Where are the keys?
 B: They might be in the car.
 A: (after checking) They're not, why'd you say that?
 B: I didn't say they were in the car, just that they might be—and they might have been!

This gives us a clue as to what kinds of contexts permit epistemic readings of past modals and conditionals. The readings seem to arise only in contexts in which the speaker is explaining (or evaluating, see footnote 37) some past event—in **Treasure Hunt**, the speaker told her confidant to check the garden *because* given what she knew then, if it

hadn't been in the attic it would have been in the garden; in the questioning case the speaker held Smith for questioning *because* given what she knew then, if the crime hadn't been committed by Jones it would have been committed by Smith; in the keys case, the speaker said they might be in the car *because* given what she knew then they might have been in the car; and in the modified Oswald case, the speaker said what she did *because* given what she knew then, if Oswald hadn't shot Kennedy, someone else would have (been the shooter).³⁷

So, why is the metaphysical interpretation of a subjunctive conditional the default? We have seen that we get epistemic readings of subjunctives (or past modals) only in behavior-explaining/evaluating contexts. A possible explanation why we only get them in such contexts is that we typically don't care about past epistemic possibilities except in those contexts, whereas we typically care about past metaphysical possibilities.³⁸ The metaphysical possibilities at some time represent the "objective options" open given various features of the world in place at that time (for instance, the capabilities of individuals, given how they are constituted). Thinking about such possibilities is thus useful in planning, comparing courses of action, and so on. For instance, suppose we think that if we had played zone defense, we would have won last night's basketball game; then we take ourselves to have a reason to play zone defense in today's rematch. It's harder to think of why we might care about past epistemic possibilities which are no longer open

37. Such readings also arise in contexts in which we are evaluating some past behavior, as in the following example:

You close the door behind me, which automatically locks it. I rifle through my pocket for my keys, finding them there luckily, and say, "Still, that was stupid of you—the keys might have been inside!"

38. For a small sampling of the contexts in which we care about past metaphysical possibilities consider: in decision contexts we care about what would happen were we to do something (cf. Lewis [1981a,b], Stalnaker [1996]), in assessing whether someone was morally responsible we care about whether the person could have done otherwise (cf. Frankfurt [1969]), and in assessing whether X harmed Y we care about how Y would have been had X not acted as he or she did (cf. Feinberg [1992], Perry [2003]).

such conditionals we typically understand them as implying some kind of objective (perhaps causal) relation between the events described in the antecedent and consequent. Compare (14) with the following, which seems to more readily take the epistemic reading in the described context:

- (i) Because if Oswald hadn't been the one that shot Kennedy, someone else would have.

possibilities (having learned something new which rules them out). Since we know now that it didn't rain yesterday, what's the point of bringing up the fact that yesterday we thought it might have been raining? One reason to talk about such possibilities might be to explain our actions at that time—for instance, why we brought our umbrella with us to work. But it doesn't make sense to use such possibilities to plan for the future or compare possible courses of action—these were epistemic possibilities at the time only because of our ignorance, but past ignorance won't (in general) be the basis for future plans or useful in comparing courses of action. In other words, the information we have now (though didn't then), which rules out those past epistemic possibilities, is the information relevant to most ordinary activities (e.g., deciding where to go for dinner). Thus, a possible non-linguistic explanation why we don't usually get epistemic readings of subjunctive conditionals (or modals in the preajacent of past tense) is that there are only a few contexts (such as behavior-explaining/evaluating contexts) in which we care about past epistemic possibilities.³⁹

My theory predicts, correctly I have argued, that subjunctive conditionals can in principle receive epistemic interpretations. This is a further mark in its favor.⁴⁰ In the next section, I turn to the second

controversial prediction of my theory—that future-oriented indicative conditionals can have both metaphysical and epistemic interpretations.

2.2 Future Indicatives

Future directed indicative conditionals are ones whose consequents are about times to the future of their modal time (= t_c):⁴¹

- (3) If Oswald doesn't shoot Kennedy, someone else will.

To reiterate, my theory predicts that a future directed indicative conditional like (3) will have two distinct possible interpretations: one on which it is true iff all presently epistemically possible worlds where Oswald doesn't shoot Kennedy are ones in which someone else does later, and one on which it is true iff all presently historically possible worlds where Oswald doesn't shoot Kennedy are ones in which someone else does later. In this section, I'll argue that this prediction is correct.⁴²

My strategy will be to show that in some, but not all contexts, a future directed indicative will be equivalent to its past directed subjunctive counterpart (as uttered or evaluated at a relevant later time).⁴³ To simplify our terminology, shorten "future directed indicative conditional" to "future indicative" and "past directed subjunctive condi-

39. An alternative explanation is that there are two kinds of modals, ones which select for informational modal bases and others which select for historical modal bases (this division is intended to map on to the observed difference between so-called "epistemic" and "root" modals; see Coates [1983], Palmer [1986], Brennan [1993]), and these modals differ in their syntactic projection properties: epistemics tend to outscope quantifiers and tenses, while roots do not (cf. Cinque [1999], Drubig [2001], Hacquard [2006]). Then, we might account for the cases of epistemics in the scope of past tense as being in the scope of a deleted past-inflected attitude verb, as in:

(i) ~~I thought that~~ if it hadn't been Jones, it would have been Smith.

See Stephenson (2007) for a proposal of this kind for epistemic modals.

40. I should point out that MODAL PAST theories (like that of Iatridou [2000]) can make a similar prediction, so epistemic subjunctives are not a data point favoring my theory over sophisticated MODAL PAST theories. On the latter kind of theories, past tense morphology may be interpreted as modal in certain environments, but *need not* (cf. Iatridou [2000], p. 249).

41. Future-directed subjunctive conditionals come in single- and double-past forms:

(i) a. If John took the test tomorrow, he would pass.
b. If John had taken the test tomorrow, he would have passed.

For readers interested in these subjunctives and a promising way to predict some of their semantic differences with a SIMPLE PAST theory, I recommend Ippolito (2003, 2006, 2013b) (from whom I also draw the 'one-past', 'two-past' terminology). I will set aside future subjunctives for the sake of space—as we'll see, future indicatives already furnish us with quite a bit to talk about.

42. See Morton (2004) for additional arguments in favor of future indicatives have both epistemic and metaphysical interpretations.

43. Bennett (2003) uses the terminology of the future indicative "standing or falling" with its past subjunctive counterpart. For expressions of similar ideas, see Edgington (2004), pp. 22–23, Ellis (1984) p. 54 and Dudman (1994) p. 114.

tional" to "past subjunctive." Given my theory, a context in which a future indicative is equivalent to its past subjunctive counterpart (as uttered or evaluated at a relevant later time) will be one in which it has a metaphysical reading, since only in that case will the two be equivalent (assuming they have the same conditional time and that the past subjunctive is interpreted metaphysically). Furthermore, a context in which a future indicative is not equivalent to its past subjunctive counterpart (as uttered or evaluated at a relevant later time) will be one in which it has an epistemic reading, since only in that case can the two not be equivalent (assuming they have the same conditional time and that the past subjunctive is interpreted metaphysically). Let's use as our target future indicative (17) and its subjunctive counterpart (18):

- (17) If Sue doesn't meet with the boss Monday, Ben will.
 (18) If Sue hadn't met with the boss Monday, Ben would have.

Here is the first context:

Meeting-1. It's Sunday and you glance quickly at Monday's schedule of meetings. You can't quite make out the name of the person scheduled to meet the boss, but you are sure it either says "Sue" or "Ben." You thus say, "I know that either Sue or Ben will meet the boss Monday, so if Sue doesn't meet the boss Monday, Ben will."

Suppose that in the world of **Meeting-1** Sue meets with the boss on Monday and there is no backup meeting scheduled. In that case, I submit that (17) is true as uttered in **Meeting-1**, even though (18) is false (as uttered or evaluated on Monday after the meeting). Therefore, in **Meeting-1**, whatever proposition is expressed by (17) by your utterance of it on Sunday must be different from that expressed by (18) as uttered or evaluated after Sue's meeting. In Edgington's terminology, in **Meeting-1**, (17) doesn't stand or fall with (18). Now consider the second context:

Meeting-2. On Sunday you check Monday's schedule of meetings.

You see that Sue is scheduled to meet with the boss. However, you think that Ben is lined up for a backup meeting with the boss in case Sue's meeting doesn't take place. You thus say, "Ben is scheduled as a backup meeting in case Sue doesn't show, so if Sue doesn't meet with the boss on Monday, Ben will."

Suppose that, in the world of **Meeting-2**, Sue meets with the boss on Monday, and that Ben is not scheduled for a backup meeting with the boss in the event that Sue's meeting doesn't take place. In that case, I submit that (17) is false as uttered in **Meeting-2**, and that (18) is also false (as uttered or evaluated on Monday after Sue's meeting). Suppose instead that the world of **Meeting-2** is one in which Ben is in fact scheduled for a backup meeting with the boss in the event that Sue's doesn't take place. In that case, I submit that both (17) (as uttered in **Meeting-2**) and (18) (as uttered or evaluated after the meeting) are true. Thus, it seems that in **Meeting-2**, (17) stands or falls with (18).⁴⁴

We thus have evidence that confirms my theory's prediction that future-directed indicatives can have both epistemic and metaphysical

44. A similar example, related to the distinction between evidential and causal decision theory (cf. Gibbard & Harper [1981], Lewis [1981a,b], Williamson [2007]):

- (i) a. If I choose both boxes, I will be poor.
 b. If I had chosen both boxes, I would have been poor.

In the ordinary Newcomb-style puzzle, (i-a) seems true to many people simply because the predictor is stipulated to be near-infallible. However, suppose you are motivated by this reasoning and hence choose one box and find one million dollars inside. Nonetheless, it seems absolutely wrong to say in such a situation that (i-b) is true — had you taken both boxes, you would have been even richer! Thus, in the standard Newcomb scenario, the fact that makes (i-a) true does not make (i-b) true.

But suppose we change the puzzle to make the contents of the box causally downstream of your choice, so that choosing one box generally yields a million in box B and choosing both boxes generally results in there being nothing in box B. In such a situation (i-a) still seems true. But unlike in the standard Newcomb scenario, the same fact that is sufficient for the truth of (i-a) (your choice determining the contents of box B) is also sufficient for the truth of (i-b).

interpretations. In **Meeting-1**, (17) has an epistemic interpretation—it is true iff all the worlds compatible with your knowledge in which Sue doesn't meet the boss are worlds in which Ben does. In **Meeting-2**, (17) has a metaphysical interpretation—it is true iff all metaphysically possible futures from some past branch point in which Sue doesn't meet the boss are ones in which Ben does. Given that (18) is interpreted metaphysically, we predict that it is equivalent to (17) uttered in **Meeting-2**, but not (17) uttered in **Meeting-1**.⁴⁵

This should be sufficient for us to conclude that my theory does not over-generate interpretations—it seems to predict exactly the behavior of future indicatives that we find. However, one may wonder whether the data here count as a point in favor of my SIMPLE PAST theory over some MODAL PAST-style theories. For instance Iatridou (2000)'s theory predicts that subjunctive conditionals have (or can get) metaphysical interpretations, but it predicts that future indicatives are only interpreted epistemically (since there is no extra layer of past tense to do the "modal distancing"). Nonetheless, one might think that such theories can still predict the variation in the "stand or fall" behavior of (17) in **Meeting-1** and **Meeting-2**, perhaps simply because even the epistemic interpretation of (17) is false in **Meeting-2**.

My objection to this strategy is that, if Ben is not scheduled for a backup meeting, then (17) is false as uttered in **Meeting-2**, *even if you in fact know that either Ben or Sue will meet the boss on Monday* (which is sufficient for the truth of (17) on its epistemic interpretation). To bring out this intuition clearly, consider the following third situation:

Meeting-3. On Sunday you hear from a reliable friend that either Sue or Ben will meet with the boss on Monday. You think it much more likely that Sue will be the one meeting the boss, and that Ben is lined up for a backup meeting with the boss in case Sue's meeting doesn't take place. You thus say, "Ben is scheduled as a backup meeting in case Sue doesn't show, so if Sue doesn't meet with the boss on Monday, Ben will."

Suppose that in the world of **Meeting-3**, Sue meets the boss on Monday and there is no backup meeting scheduled with Ben. In that case, I submit that (17) is false as uttered in **Meeting-3**. This is so, despite the fact that you know (from your friend's testimony) that either Sue or Ben will meet the boss. Thus, (17) is false as uttered in **Meeting-3** even though all of the worlds compatible with what you know in which Sue doesn't meet the boss are ones in which Ben does. But the latter condition is sufficient for the truth of (17) on its epistemic interpretation. Hence, there must be a distinct interpretation of (17) that it has in contexts like **Meeting-2** and **Meeting-3**. I conclude that the data here provide a point in favor of my theory over certain MODAL PAST theories.

3. Responses to Objections

3.1 Inescapable clashes

The first challenge to my theory targets the prediction that future indicatives have metaphysical interpretations. The challenge is to explain why future indicatives are invariably infelicitous when preceded by the negation of their antecedents, as in (19):⁴⁶

- (19) #Sue will meet the boss tomorrow, but if Sue doesn't meet him tomorrow, Ben will.

45. It is very plausible that (18) is interpreted metaphysically. Remember that subjunctives seem to receive epistemic interpretations only in contexts in which we are explaining or evaluating some past behavior (§2.1), and neither **Meeting-1** nor **Meeting-2** is such a context.

46. Of course, a speaker might utter "p, but if not-p, q" because she is aware that her audience likely won't accept her assertion of p, and she wants to indicate a backup position, q, in that event. Such utterances of (19) are felicitous. However, an ordinary assertive utterance of "p, but if not-p, q", where the asserter intends both conjuncts to be accepted, is infelicitous.

This is a challenge to the claim that future indicatives have metaphysical interpretations because it is not clear *why* sentences like (19) ought to be infelicitous if future indicatives have metaphysical interpretations.

Let us flesh out this challenge a bit more carefully. Notice that an indicative whose consequent is about the past, like (1), which only receives an epistemic interpretation, is generally infelicitous when preceded by an assertion of the negation of its antecedent:

- (20) #Sue met the boss yesterday, but if Sue didn't meet the boss yesterday, Ben did.

A natural explanation of the infelicity of (20) appeals to the following claims:

- (a) An epistemic conditional is appropriately uttered only if it is common ground that its antecedent is epistemically possible,⁴⁷ and
- (b) For any p , if p is common ground at t , then it is not common ground that $\neg p$ is epistemically possible at t .⁴⁸

Some independent evidence for (b) is that it correctly predicts that accepting an assertion of some epistemic possibility claim results in the negation of its prejacent not being common ground (cf. Stalnaker

47. This follows from the more general claim that conditionals presuppose that their domains are non-empty, together with the assumption that uttering a sentence p with presupposition π is appropriate only if π is common ground (at the time immediately after the utterance but before the assertion is accepted or rejected; cf. Stalnaker [2002], von Stechow [2008]).

48. "Expectational" uses of 'should' raise a challenge for (b):

- (i) Steve is not here, but he should be. Expectational

Unlike "Steve is not here, but he might/must be," (i) is felicitous. However, I think this is reason enough to hold that expectational 'should' is not epistemic (cf. Yalcin [2015]). Instead, we may model the behavior of expectational 'should' by assigning it an empty informational modal base and an ordering source that models the information provided by some schedule.

[1970], Swanson [2011], Yablo [2011], Yalcin [2007, 2011], Willer [2013], Khoo [2015]). Suppose 'might p ' is assertively uttered and accepted. Then, it will be common ground that p is epistemically possible. Then from (b) it follows that $\neg p$ is not common ground. Another piece of evidence for (b) is that it predicts the infelicity of Moore-paradoxical strings like 'p, but it might be that not- p ' (where 'might' has an epistemic interpretation; cf. DeRose [1991], Gillies [2000], Stanley [2005], Yalcin [2007], Dorr & Hawthorne [2013], Worsnip [2015]). Someone assertively uttering 'p, but it might be that not- p ' asserts p and *might* $\neg p$. From (b), it follows that an assertion of p is a proposal that p be common ground in the conversation, and also that it not be common ground that $\neg p$ is epistemically possible. But asserting *might* $\neg p$ just is to propose that it be common ground that $\neg p$ is epistemically possible. So, we expect such utterances to be self-frustrating and hence infelicitous.

The explanation of why sentences like (20) are infelicitous then goes like this. Assertions are proposals to make their contents common ground in the conversation. If my assertion of p is accepted, it will be common ground that p , and then by (b) it will not be common ground that $\neg p$ is epistemically possible. Hence, by (a) uttering the conditional 'if not- p , q ' will be inappropriate. Hence, uttering 'p, and if not- p , q ' is self-frustrating: if my assertion of p is accepted, uttering 'if not- p , q ' will be inappropriate.⁴⁹ The challenge is that, if future indicatives have metaphysical interpretations, we expect the future indicative in (19) to have a metaphysical interpretation; in that case, the above explanation will not apply and the sentence should have a felicitous reading.

It is important that to be clear about the dialectical situation here.

49. This line of reasoning assumes that this presupposition of 'if not- p , q ' is not accommodated when uttered just after assertively uttering p . But this is a very plausible assumption. That the sentence #I don't have a sister, and I have to pick up my sister at the airport is invariably odd is evidence that we don't generally accommodate in cases where the assertor commits herself to the negation of something she immediately goes on to presuppose.

I have already argued that future indicatives have both metaphysical and epistemic interpretations (§2.2). The challenge being raised now does not target my argument for that claim, but rather an apparent consequence of it—namely, that it (incorrectly) predicts that strings like (19) ought to be felicitous on one interpretation. Thus, my goal here will be show that this is not an inevitable consequence of my theory. Rather, my theory *can* reasonably predict the inevitable oddness of (19).

My defensive strategy here is to endorse two principles analogous to (a) and (b):

- (a') A metaphysical conditional is appropriately uttered only if it is common ground that its antecedent is metaphysically possible, and
- (b') For any p , if p is common ground at t , then it is not common ground that $\neg p$ is metaphysically possible at t .

With both (a)/(a') and (b)/(b'), we can give an explanation for why (19) is odd (regardless of whether it is interpreted epistemically or metaphysically) that is exactly analogous to our explanation why (20) is odd. But why accept (a) and (b)? Like (a), (a') follows from the general principle that conditionals presuppose that their domains are non-empty and that utterances of sentences with presupposition failures are infelicitous. However, (b') is less obvious and requires some argument and defense. I will first defend (b') against three challenges, and then provide three positive arguments in favor of it.

Challenge 1. If (b') were true, then we expect $\lceil p$, but it might have been that $\neg p$ (where 'might have' is interpreted metaphysically) to be infelicitous, for the same reason that (b) predicts that $\lceil p$, but it might be that $\neg p$ is infelicitous (as discussed above). However, we find a clear contrast between such sentences:

- (21) #Sue is in a meeting, but she might not be in a meeting.

- (22) Sue met the boss yesterday, but she might not have met him then.

So (b') is false.

Response. The second conjunct of (22) is past-tensed: it asserts that it was at some (relevant) time in the past metaphysically possible for Sue to have skipped the meeting, *not* that it is now metaphysically possible for Sue to have skipped the meeting. Thus, (b') doesn't incorrectly predict that $\lceil p$, but it could have been that $\neg p$ will be infelicitous; though it is not common ground that $\neg p$ is metaphysically possible at t , it may still be common ground that $\neg p$ is metaphysically possible at some earlier time t' .

Challenge 2. Sentences like the following are felicitous:

- (23) You didn't do your homework, but you should have!

Suppose 'should have' here quantifies over the deontically best metaphysically possible worlds at the time just after the assertion of the first conjunct of (23) is accepted (call this time t). By (b'), the acceptance of that assertion should lead to it being presupposed that there are no metaphysically possible worlds at t in which the addressee did her homework. It then follows that the second conjunct of (23) should be false, and hence that (23) should be incorrectly predicted to be infelicitous since it would be self-defeating to assert.

Response. 'Should' in the second conjunct is evaluated at a past time—it quantifies over the deontically best metaphysically possible worlds at some earlier time. Here is a quick argument for this claim. If 'should have' in "You should have done your homework" is evaluated at the present time, then it would mean that it is now the case that you should bring about some past event of your having done your homework. But it is clearly not true that you now should bring about some past event of having done your homework, since this is

something you cannot now do. Nonetheless, the second conjunct of (23) is *not* clearly not true. Therefore, 'should have' is not evaluated at the present time. Rather, it seems to mean that it was (at some relevant past time) the case that you should (then) do your homework. Thus, it is past-tensed.

Challenge 3. The trick of appealing to past-tensed modals will not work with "pie in the sky" uses of deontic 'should,' as in (24):

(24) There ought to be world peace, but there never will be.

So, what explains why such sentences are felicitous?

Response. It seems plausible that "pie in the sky" uses of deontic modals quantify over the deontically best worlds, not the deontically best metaphysically possible worlds. Thus, I propose that such uses of deontic modals are assigned an empty informational modal base and an ordering source that models the relevant deontic principles. The resulting domain of 'should' will be the deontically best possible worlds, including those which are now metaphysically and epistemically impossible. This correctly predicts the felicity of sentences like (24).

I turn now to offer three positive arguments in favor of (b'). The first is that it predicts that sentences like the following are infelicitous:

(25) #Sue will meet the boss tomorrow, though she might not.

If the first conjunct of (25) is accepted, then by (b)/(b'), it will not be common ground that it is epistemically or metaphysically possible that Sue will not meet the boss tomorrow. But asserting that Sue might not meet the boss tomorrow just is to propose that it be common ground that it is possible (epistemically or metaphysically) that Sue will not meet the boss tomorrow. Hence, we expect sentences like (25) to be infelicitous for the same reason the Moore-paradoxical $\lceil p$, but it might

be that not- p to be infelicitous (because assertively uttering them is self-frustrating).⁵⁰

The second argument for (b') is that it follows from (b) given the following reasonable assumption about the relationship between metaphysical and epistemic possibility:

M-E Link: If p metaphysically possible at t , then p is epistemically possible at t .

If **M-E Link** is a conceptual truth, then (b') follows from (b).⁵¹ Therefore, since (b) is plausible, (b') ought to be plausible as well. But is it plausible that **M-E Link** is a conceptual truth? I think this is a reasonable hypothesis. If **M-E Link** is a conceptual truth, we (correctly) predict that strings like the following will be invariably odd when 'has to' is interpreted epistemically:

(26) #It has to be the case that John will lose the election, though right now he is still able to win.

Interpreted epistemically, the first conjunct of (26) entails that it is epistemically necessary that John loses the election. The second conjunct entails that it is metaphysically possible that John wins the election. Thus, from **M-E Link** it follows that it is epistemically possible that

50. An alternative explanation of the oddity of (25) is that future-*might* claims are invariably epistemic—see DeRose (1998). I lack the space to discuss DeRose's alternative here, but I mention it to note that my aim in this section is primarily defensive, and hence not to provide arguments for (b') which would persuade my opponents, but merely to articulate plausible reasons in its favor.

51. Let ' $\Diamond_{M/E}^t p$ ' denote the proposition that p is metaphysically/epistemically possible at t , and ' $CG^t(p)$ ' denote the proposition that p is common ground at t . Quick proof: assume for reductio that (i) $CG^t(p)$ and (ii) $CG^t(\Diamond_M^t \neg p)$. From (i) and (b) it follows that $\neg CG^t(\Diamond_E^t \neg p)$. From (ii) and the conceptual truth **M-E Link** ($\Diamond_M^t p \supset \Diamond_E^t p$) it follows that $CG^t(\Diamond_E^t \neg p)$. But this is a contradiction, so we reject our reductio assumption. Hence, $\neg(CG^t(p) \wedge CG^t(\Diamond_M^t \neg p))$. And thus (b') follows, given that the conditional in (b') just is the material conditional.

John wins the election. But this is inconsistent with the first conjunct of (26), interpreted epistemically.

The third argument is that adopting (a)/(b) and (a')/(b') provides the ingredients for a plausible account of the counterfactuality implicature of subjunctive conditionals (cf. Anderson [1951], Stalnaker [1975], Karttunen & Peters [1979], Iatridou [2000], Ippolito [2003, 2006, 2013], von Stechow [1997], Leahy [2011]). The basic sketch of the account is this. Given (a)/(a') and (b)/(b'), for a present-evaluated (indicative) conditional to be uttered appropriately, its antecedent must be compatible with the context set (i.e., it must not be common ground that its antecedent is false). Therefore, any conditional whose domain is not compatible with the context set must be past-evaluated (subjunctive). But then competent users of the language should recognize that a speaker who utters a subjunctive conditional may be doing so (rather than uttering its indicative counterpart) *in order* to access possibilities outside of the context set, and a natural explanation for why the speaker would do so is because the speaker thinks the antecedent/consequent of the conditional are false. Hence, adopting (a)/(b) and (a')/(b') furnishes us with the resources to predict the counterfactuality implicature conveyed by the use of many subjunctive conditionals as a manner implicature.⁵² Although more needs to be said in favor of this account of the counterfactuality implicature, for reasons of space I must set aside such issues for another time.

Therefore, I think it is reasonable to accept both (a') and (b') (in

addition to (a) and (b)). But then given (a') and (b'), we have an explanation of why (19) is odd that is exactly analogous to our explanation why (20) is odd, even though we predict that future indicatives may have both epistemic and metaphysical interpretations. I turn now to consider some objections for my theory's treatment of subjunctive conditionals as involving historical modal bases.

3.2 Backwards subjunctives

So far, I have discussed the relationship between the time of the conditional and the time of its consequent. However, what about the relationship between the time of the conditional's antecedent and the time of its consequent? All of the conditionals we have considered have had consequents about times either overlapping or to the future of the times of their antecedents. But *some* subjunctives are backwards, in that the times of their consequents are before the times of their antecedents. Here is one:

- (27) If Oswald hadn't shot Kennedy, he would have been talked down by the CIA.

Lewis (1979) raises examples like these as a problem for a certain kind of historical-modality theory of subjunctive conditionals that is superficially similar to mine. On that theory, a subjunctive conditional is true iff its consequent is true at all antecedent-worlds exactly like the actual world up until just before the time at which its antecedent is hypothesized to take place (and the possibly diverging thereafter). Lewis correctly observes that such a theory would be forced to predict that a backwards subjunctive like (27) is false simply because its consequent is (since its consequent will be false at all of the relevant worlds in the subjunctive's domain).

However, my theory is emphatically *not* this one. DIVERSITY requires that subjunctives with metaphysical readings have *modal* times which precede the times their consequents are about. This means that the modal time of (27) must be some time prior to Oswald being talked

52. This is similar to Ippolito (2003)'s account. One crucial difference between her theory and mine is that I am not committed to the domain of subjunctive conditionals being the set of worlds compatible with what once was common ground (see Ippolito [2003], p. 66)—a feature of her view that I find quite implausible (what if we were not around back then, or not having a conversation at that time?). Ippolito herself recognizes this problem for her view and suggests a fix in footnote 14—that the domain is not the worlds compatible with an actual past incarnation of the common ground, but what a speaker would have presupposed at that time had she been alive and relevantly informed, etc. I take it as a point in favor of my view that it's not saddled with this implausible consequence.

down by the CIA, and hence that (27) is true iff holding fixed the past up until just before then, every g -best world in which Oswald doesn't shoot Kennedy are ones in which he is talked down by the CIA. My theory is compatible with backtracking subjunctives for exactly the same reason.⁵³

What about the relationship between modal time and the time of the conditional's antecedent? I do not have time to go into the details here, but I will follow Bennett (2003) in holding that modal time of a subjunctive conditional should be some late past time that precedes both the time of the antecedent (which will ensure the conditional is not vacuous) and the time of the consequent (see especially pp. 209–220). In Khoo (2015a), I offer independent motivations for and defend a more concrete version of this view.

3.3 Antecedents/Consequents About No Times in Particular

Lewis (1979) raises another problem for historical-modality approaches to subjunctives in general, which is that there appear to be subjunctives with antecedents and consequents that are not about any particular time.⁵⁴ Consider:

53. See Khoo (2015a) for a proposal about how to predict several interesting properties of backtracking subjunctives that makes use of the kind of SIMPLE PAST theory motivated here.

54. One of Lewis's examples, (i), doesn't really illustrate the point he intends to make:

- (i) If kangaroos had no tails, they would topple over.

Notice that the clauses "kangaroos have no tails" and "kangaroos topple over (when trying to stand)" are generic (or habitual) claims about some (past, possibly extending into the future) interval of time. Indeed, different choices for which the past interval the antecedent/consequent of (i) are about may lead to truth-conditionally different interpretations of (i). If the interval is a relatively recent one, then (i) is true iff all the (relevant) historically accessible worlds from that recent time in which kangaroos (suddenly) have no tails are worlds in which they topple over. This interpretation of (i) may be true — since kangaroos in fact use their tails to balance, if they were to lose them (some time in the near past), they would topple over. But if the interval is much more distant, perhaps prior to the evolution of kangaroos, then (i) seems false — if kangaroos evolved not to have tails then presumably they would have evolved some other

- (28) If time had been infinite, then time would have had no beginning.

(28)'s antecedent and consequent do not seem to be about any particular intervals of time. Lewis rightly took examples like this to raise trouble for a theory of subjunctives on which we hold fixed the past up until the time at which the antecedent is hypothesized to take place. (28) is trouble for such a theory because its antecedent is not about any particular interval of time, so there is no straightforward way to "hold history fixed up until the time at which (28)'s antecedent takes place," and so the semantics cannot evaluate (28).

It is tempting to think that a similar problem arises for my theory. After all, given DIVERSITY, for (28) to have a metaphysical interpretation, it must be the case that there is a time at which it is historically contingent whether (28)'s consequent holds. But this seems impossible given that (28)'s consequent is not about any particular time. However, this is in fact not a problem for my theory. Recall the definition of historical modal bases:

NECESSITY OF THE PAST:

For any world w , time t , and proposition p about an interval that doesn't extend beyond t : $p \in f_H(w, t)$ iff p is true at w .

Let '*infinite*' denote the proposition expressed by the consequent of (28), and suppose that *infinite* is not about any particular interval of time. It follows immediately that it is not about any interval that does not extend beyond t . Therefore, *infinite* $\notin f_H(w, t)$ and \neg *infinite* $\notin f_H(w, t)$ for any w, t . Therefore, (28) meets the DIVERSITY requirement for his-

mechanism for not toppling over. My theory predicts these two interpretations by the fact that they involve different modal times — the former involves a time just before the kangaroos lose their tails and the latter before kangaroos evolve. We see, then, that the interpretation of the antecedent and consequent (and in particular what time they are about) constrains the interpretation of the conditional, just as we would expect given the semantics sketched in §1.

torical modal base at all times, and hence can receive a metaphysical interpretation.⁵⁵

But now notice that my view faces a slightly different problem regarding (28), for it follows that the indicative version of (28) ought to also have a metaphysical interpretation! Is this prediction correct?

(29) If time is infinite, then time has no beginning.

I think it is. It seems possible to interpret (29) metaphysically — that is, as saying something about the nature of the world, rather than what we know about it.⁵⁶ A possible context that might favor a metaphysical interpretation of (29) is one in which two metaphysicians are discussing characteristics of temporal unboundedness. Certainly, in such a context, the metaphysicians don't intend to make claims about what they know about temporal unboundedness, but rather directly about time and infinity itself.⁵⁷ Therefore, subjunctives with antecedents and con-

55. You may alternatively think that *infinite* is about an interval that overlaps every time. Then *infinite* is about an interval that extends partly beyond t , so in that case NECESSITY OF THE PAST will still entail that *infinite* $\notin f_H(w, t)$ and $\neg \text{infinite} \notin f_H(w, t)$, for any w and t .

56. Consider also “ESPN” conditionals (cf. von Fintel [2005]), which have a metaphysical interpretation despite being clearly indicative:

- (i) If Ramirez doesn't catch that, it's a double and the tying run is in scoring position.

A possible way of handling such conditionals within my semantics is that they are an instance of “historical present tense” in which context fixes the time of the conditional to be some relevant past time, and then the consequent is interpreted as about a time to the future of that time.

57. However, the metaphysical interpretation of (29) is clearly not the default one, whereas the opposite is the case for its subjunctive counterpart:

- (i) If time were infinite, then time would have no beginning.

An explanation of this might go as follows. Since we've come to conventionally express metaphysical modal claims by way of past-tensed modals/conditionals, we expect that the default interpretation of *non* past-tensed modals/conditionals would be epistemic. This would also explain why the metaphysical interpretation on (29) is hard to get without sufficient background context.

sequents about no times in particular pose no trouble for my theory.

Another challenge for my theory in this area arises from subjunctives whose antecedents are entirely about the first moment of time:

- (30) If the initial state of the universe had been different, everything would have been different at all times.

Let ‘*initial*’ and ‘*different*’ denote the propositions expressed by (30)'s antecedent/consequent, respectively. Suppose also that *initial* is about w in that it states that the initial state of the universe is different from w (and likewise for *different*). The problem (30) raises for my theory is that, on its metaphysical interpretation, it is true iff $\forall w' \in D(f_H^{[initial]}, g, w, t') : w' \in \text{different}$, for the relevant past time t' . But since *initial* is entirely about the first moment of time, then given NECESSITY OF THE PAST, since $\neg \text{initial}$ is true at w , $\neg \text{initial} \in f_H(w, t)$, for all t . Therefore, for any time $t : \cap f_H^{[initial]}(w, t) = \emptyset$, and thus for any time $t : D(f_H^{[initial]}, g, w, t) = \emptyset$. Hence, my theory predicts there can be no nontrivially true metaphysical interpretation of (30), yet it seems nontrivial; it lacks the characteristic infelicity of a quantifier with an empty domain, and furthermore it is not the case that both (30) and (31) are true simply because *initial* is false:

- (31) If the initial state of the universe had been different, everything would have been the same at all times.

I admit that this is a sore spot for my theory. There are fixes nonetheless, although I am not sure which is the best to endorse. I list three here:

- Deny that *initial* is entirely about the first moment of time.

If time is dense, then no proposition is about a single moment of time, for there are none. Then for any proposition p about interval i , there will always be a conditional time t such that i extends partly to the future of t .

- Redefine NECESSITY OF THE PAST as follows:

NECESSITY OF THE PAST:

Let t_w^* be the first moment of time of w , if there is one. For any world w , time $t \neq t_w^*$, and proposition p about an interval that doesn't extend beyond t : $p \in f_H(w, t)$ iff p is true at w . Define $f_H(w, t_w^*) = \emptyset$.

This strategy would allow us to model the natural intuition that the metaphysical possibilities at the first moment of time are all those worlds compatible with any setting of the initial conditions compatible with the laws of nature.

- Accept that, strictly speaking, (30) is trivially true, but that ordinary speakers tend not to hear it as such because they interpret it by engaging in a bit of pretense, pretending that time is embedded in a fictional super time. According to the fiction of super-time, there is a conditional super time at which it is historically contingent what the initial state of the universe is.

This strategy is motivated by the fact that we seem to engage in this kind of pretense when evaluating claims for the sake of argument or in reductio reasoning. For example:

- (32) Suppose every prime is greater than 2. Then 2 would be divisible by something other than 1 and itself. But it isn't. So it's not the case that every prime is greater than 2.

I conclude that subjunctives with antecedents/consequents about no particular times (such as (28)) raise no problems for my theory, and although subjunctives with antecedents about the first moment of time (such as (30)) do raise trouble, there are several reasonable responses available on behalf of my theory.

3.4 The Problem of Hindsight

Consider the following situation (cf. Tichý [1976], Slote [1978], Barker

[1998], Bennett [2003], Edgington [2004], von Fintel [2012]):

Coin. Jones initiates an indeterministic coin toss. While the coin is in the air, Sue bets on tails. The coin in fact lands heads.

In this situation, the following subjunctive conditional seems true:

- (33) If Sue had bet on heads, she would have won.

Indeed, Sue might regret betting on tails, thinking that (33) is true. However, my theory faces a problem predicting that (33) is in fact true. Here's why. Suppose that (33)'s future indicative cousin, (34), is uttered just before Sue makes her bet:

- (34) If Sue bets on heads, she will win.

Intuitively, (34) is false as uttered in such a context, or at least not true (even on its metaphysical interpretation). This seems so because at no time prior to the coin actually landing heads was it determined to land heads (given that it was tossed in an indeterministic way). The simplest way to incorporate this observation into my semantics is to suppose that the ordering source g for metaphysical interpretations of subjunctive conditionals is **lawful** — that it takes a world w and time t into the set of propositions that state the laws of w after t .⁵⁸ Then, since at no time t prior to the time at which Sue wins/loses (this constraint

58. If we understand a law as an exceptionless regularity, these would be the propositions stating regularities that are true at w and are exceptionless after t . However, other theories of laws will be compatible with there being propositions that state a law of w after t . For instance, if worlds are four dimensional manifolds, and if there can be propositions describing things just like laws except that they are true of only part of a world (a partial law), then a proposition describing a law of w after t will be just that proposition which describes a partial law that's true of at least the temporal part of w after t . This bears similarity to Goodman's suggestion that a law-like statement is one that is a law except that it might not be true (cf. Yablo [2014] for discussion and a theory of aboutness that may be useful in characterizing partial laws). The proposal here is similar to Lange (2000)'s discussion of violations of laws that are "off stage" and still allow the law to be reliable even though false at that world (pp. 73–77).

is ensured by DIVERSITY) will it be the case that $\forall w' \in D(f^{[bet]}, g, w, t) : w' \in win$, in which case we predict that (34) will be false as uttered prior to Sue making her bet (let ‘bet’ denote the proposition that Sue bets on heads and ‘win’ the proposition that Sue wins). But now notice that this fact makes my theory unable to predict a true, nontrivial, metaphysical interpretation of (33).^{59,60} Following Edgington (2004), let’s call this the *problem of hindsight*.

Before considering my response to this problem, I should note at the outset that it is a deep problem with an extensive literature (in addition to the work cited above, see Schaffer [2004], Noordhof [2005], Kaufmann [2005a], Phillips [2007, 2011], Walters [2009], Won [2009], Ahmed [2010, 2011], Arregui [2009], Ippolito [2013a,b]). Hence, I cannot hope to address all the complexities of the problem here. There are at least two responses to this problem that are available to my theory. The first response is to reject the intuition that (33) is true in **Coin**.⁶¹ Since this response requires no additional modifications to my view, and is not entirely unreasonable (see the discussion in footnote 61), I won’t elaborate upon it here. The other response is to reject the

intuition that the future indicative (34) is false in this scenario. This response is endorsed by Edgington (2004), although in a framework very different from the one I’m now working within. In what follows, I will show how such a response is available to my theory, and is furthermore quite plausible. Thus, there are at least two reasonable solutions to the problem of hindsight available to my theory (though I won’t officially endorse a particular solution at this time).

Basically, the strategy of the second response is to predict that (33) and (34) are both true (as uttered in their respective contexts, on their metaphysical interpretations) in the scenario **Coin**. On my theory, this amounts to endorsing a commitment to (33) being assigned an ordering source g in the relevant context of **Coin** such that, for the relevant past time t : $\forall w' \in D(f^{[bet]}, g, w, t) : w' \in win$, which, given the plausible assumption that the rules of the bet continue to hold at worlds in the domain of (33), requires that $\forall w' \in D(f^{[bet]}, g, w, t) : w' \in heads$. Therefore, this strategy will involve adding additional true propositions to the ordering source beyond those propositions which state laws—we need additional matters of fact as well, among them that the coin lands heads. One way to do this is to define a notion of a hindsightful ordering source:

Def 4 (Hindsightfulness). g is a hindsightful ordering source iff for all w, t : $g(w, t)$ contains all and only propositions about times extending beyond t that are true at w .

And then suppose that metaphysical interpretations are constrained by **Hindsight**:

Hindsight: the metaphysical interpretation of any modal (conditional) will have a *hindsightful* ordering source g .

However, this won’t do as it stands, for it entails that (35) is also true (in **Coin**), yet intuitively (35) is false!

(35) If Smith (rather than Jones) had flipped the coin, Sue would

59. I say ‘nontrivial’ here because if w is a world in which Sue in fact didn’t bet on heads (as is the case in **Coin**) and t a time after which it is historically settled that Sue didn’t bet on heads, then $\forall w' \in D(f^{[bet]}, g, w, t) : w' \in win$ will hold trivially, since $D(f^{[bet]}, g, w, t) = \emptyset$. However, although we *could* save the theory by way of pointing out that it can predict a true interpretation of (33) on which it is true (though trivially so), I find such a response unsatisfying. After all, (33) doesn’t suffer from the kinds of problems (for instance, presupposition failure) that usually face universally quantified claims that are trivially true (e.g., #Every living US Civil War veteran attended last night’s gala).

60. (33) is arguably false on its epistemic interpretation as well, since at no earlier time (at which one had a nonzero credence in that Sue bet on heads) was one conditionally certain that Sue would win given that she bet on heads.

61. Phillips (2007, 2011) endorses this proposal, arguing that the intuition that (33) is true, or acceptable, in a situation like **Coin** arises from the “vestiges of a deterministic mindset” and is in fact incorrect. Thus, according to Phillips both (33) and (34) are false, or unacceptable (as uttered in their respective contexts), given **Coin**. I won’t rehearse Phillips’ argument here, though suffice to say the intuitions in this area are rather complex. See the discussion below for a sense of some of the complications.

have lost.

The reason is that Sue in fact bet tails and the coin in fact landed heads, so both of these propositions will be among $g(w, t)$ given **Hindsight**, and hence $\forall w' \in D(f^{[Smith]}, g, w, t) : w' \in lose$. But since (35) is intuitively false (in **Coin**), it seems what we need is a way to predict that (34) is true that doesn't thereby predict that (35) is also true. The natural fix is to constrain the "hindsight facts" that are added to $g(w, t)$ to those which are causally independent of the antecedent of the relevant conditional. Where $f(w, t)$ is the set of historical propositions at w, t , let $f_+(w, t)$ be the union of $f(w, t)$ with the set of propositions stating laws of w after t . Then, we define an *f-hindsightful* ordering source as follows:

Def 5 (F-Hindsightfulness). g is an *f-hindsightful* ordering source iff for any w, t : $g(w, t)$ contains all and only propositions p about matters of particular fact such that:

- i. p is true at w ,
- ii. p is about some time extending beyond t ,
- iii. p is compatible with $\cap f_+(w, t)$, and
- iv. For any p -world $w' \in \cap f_+(w, t)$: p is true at w' for the same reason p is true at w .⁶²

The *f-hindsightful* propositions in $g(w, t)$ will be those true propositions of w about times extending beyond t which are true at worlds in the lawfully-constrained modal base for the same reason they are true at w . Then, we endorse **Hindsight***:

Hindsight*: the metaphysical interpretation of any modal (conditional) which has f as its modal base will have an *f-hindsightful* ordering source g .

62. The notion here of *true for the same reason* is intended to be a placeholder for something more precise, perhaps *sharing the same cause*, *sharing the same explanation*, or *sharing the same ground* (cf. Kment [2006a]).

Since *heads* is true at worlds in $\cap f_+^{[bet]}(w, t)$ for the same reason it is true at w (because Jones initiated the flip), by **Hindsight***, it is included in $g(w, t)$. Hence, given **Hindsight***, my theory predicts that (33) is true in this context. But now notice that *heads* is not true at worlds in $\cap f_+^{[Smith]}(w, t)$ for the same reason it is true at w —this is because at every *heads*-world $w' \in \cap f_+^{[Smith]}(w, t)$, Smith initiated the flip at w' and is thus the cause of *heads* being true at w' . But at w Jones initiated the flip, and hence is the cause of *heads* being true at w . Thus, given **Hindsight***, *heads* is not included in $g(w, t)$. Hence, given **Hindsight***, my theory will predict that (35) is false. I won't defend this implementation of the strategy at this time, since my response to the problem here is independent of precisely how we secure this result on our semantics.⁶³ Notice for now that, in adopting this commitment, my theory thereby predicts that both (33) and (34) are true (as uttered in their respective contexts) in **Coin**.⁶⁴

63. For instance, see Kratzer (1989, 2012), Veltman (2005), Arregui (2009), Ippolito (2013b,a), Kaufmann (2013) for more discussion and some alternative ways to predict these contrasts. I want to note that I am not committed here to **Hindsight*** over these alternative proposals. In other work, I explore how **Hindsight*** compares with Kratzer's "lumping" theory and Veltman's appeal to dependent and independent propositions. Of particular interest here are "Goodman pairs" (Goodman [1947], Lewis [1973]):

- (i) a. If New York City were in Georgia, New York City would be in the South.
- b. If Georgia included New York City, Georgia would not be entirely in the South.

64. Ippolito (2013b,a) raises a challenge for views like the one sketched above about hindsight subjunctives, which goes as follows:

Peter and Susan are taking turns flipping coins and betting. Part of the rules of their game is that whoever flips pays \$10 if they lose the bet that round, while the non-flipper pays \$0 if they lose that bet. Just now, it's Peter's turn, and he bets on heads, while Susan bets on tails. Peter flips the coin and it lands heads. Susan pays Peter nothing.

- (i) If it had been Susan's turn, she would have lost \$10.

Ippolito proposes that (i) is true in this scenario. However, my theory given **Hindsight*** predicts the wrong result. This is because on my theory, in eval-

Now, admittedly, this prediction may seem implausible in light of our intuition that (34) is false (or not true). But consider the following situation (cf. Edgington [2004]): Ben, a friend of Sue's, has a powerful hunch that the coin will land heads; thus, he says (34). Of course, prior to the flip, knowing what we do about **Coin**, we would be inclined to reject his assertion, or think that what he said is false (or at least not true). However, after Sue in fact bets on tails and the coin in fact lands heads, it seems reasonable for you to say to Ben, "Oh, you were right after all! If Sue had bet on heads, she would have won!". This is just another instance of the future indicative (34) standing or falling with its past subjunctive cousin (33), and hence is evidence that they are intuitively equivalent. Thus, there is some reason to think that (34) is in fact true, contra our intuition that (34) is false as uttered prior to the flip. But then what explains the latter intuition?

uating (i) we hold fixed the history up until the last turn change and add to it that it is Susan's turn (so, basically Susan goes twice in a row), as well as any facts after that which are true at any worlds compatible with that alternative history for the same reason as they are actually true. But since the coin's landing heads at those worlds will be due to Susan's flipping the coin and *not* Peter's flipping the coin, *heads* will not be held fixed. Hence, there will be worlds among $D(f^{[Susan]}, g, w, t)$ at which Susan doesn't lose any money, and hence (i) will be false.

Ippolito proposes an alternative theory which does predict her intuition about (i) as well the other kinds of cases discussed above. I will make two brief remarks in response. First, if I were convinced that (i) is true, I would be happy to adopt a version of her proposal — nothing in my theory depends crucially on the approach to hindsight subjunctives sketched above being true (just as long as the right solution is compatible with my semantics, which Ippolito's is). The second is that I'm not convinced that (i) is actually true. It seems equivalent to:

(ii) If Susan had flipped the coin, she would have lost \$10.

And this seems straightforwardly false — just as (35) does. So why would someone mistakenly think (i) to be true? One possibility is that the extra complexity of the case makes it easy to forget that, given the rules, it is Susan's turn iff she flips the coin. Thus, when evaluating (i), perhaps we forget this and think of turns going with payouts and being independent of flips. Granted, much more can and should be said about this example and Ippolito's theory, though I must set aside these issues for the time being.

A plausible error theory about why we judge (34) to be false prior to the flip is that there was simply no way to know that (34) was in fact true prior to the coin landing heads. Supposing that the knowledge norm of assertion is correct, then even if (34) is in fact true (and furthermore true when uttered, prior to the flip), it won't be assertable.⁶⁵ This allows us to account for both the oddity of asserting (34) prior to the flip, and also predict that the hindsight judgment ("you were right!") is true. Therefore, I take there to be something to be said in favor of this second response to the problem of hindsight, which is itself compatible with my theory of conditionals.⁶⁶ Thus, I conclude that there are reasonable responses to problem of hindsight on behalf of my theory.

Before concluding, I pause to point out two more benefits of adopting **Hindsight***. The first is that adopting **Hindsight*** allows my theory to predict true backward counterfactuals with actually false consequents. Consider (36) for instance in the following context: Jim and Jack got along fine this morning and did not fight yesterday.

65. See DeRose (1996, 2002), Williamson (1996, 2000), Hawthorne (2004), Benton (2011, 2012), Blaauw (2012). We could also do with a weaker assumption, for instance that warranted assertability requires justified belief (cf. Lackey [2007]) or high rational credence (cf. Douven [2006, 2009]).

66. I should point out that, although this is Edgington's response to the problem, it's harder to motivate given her theory. This is because on her theory, indicative and subjunctive conditionals do not express propositions but rather conditional credences (which do not have truth values). Thus, Edgington cannot appeal to the *truth* of (34) to explain why the hindsight evaluation is correct. Rather, she is forced to adopt a sui generis rule of rational credences, holding that, "The value to be assigned to the hindsight counterfactual trumps the most rational value to be assigned to the forward looking indicative. The chance that *C* given *A*, beforehand, provides the best available opinion on whether *C* if *A* but it can be overturned by subsequent events, not predictable in advance." (Edgington [2004], p. 23). As far as I can tell, this is just a stipulation of her theory, one that we would prefer some independent evidence for. No such problem exists for my theory. For it, the truth of (33), along with its equivalence with (34), explains the hindsight judgment (Edgington concedes this on p. 22).

- (36) If Jim had been mean to Jack this morning, there would have been a quarrel yesterday.

We assume, given DIVERSITY, that (36)'s modal time is early enough to allow its consequent to be historically possible (say modal time is t). Without **Hindsight***, (36)'s domain will contain *quarrel*- and \neg *quarrel*-worlds and thus be false. Assuming **Hindsight*** provides a fix. Notice first that (36) seems true only if the background laws are incompatible with Jim and Jack not quarreling yesterday and Jim being mean to Jack today—that is, if the background laws entail \neg *quarrel* \supset \neg *mean*. In that case, \neg *quarrel* \supset \neg *mean* should hold at every world in $\cap f_+^{[mean]}(w, t)$ (which, recall, is the set of *mean*-worlds matching w up until t and then matching w 's laws after t). But given this, $\cap f_+^{[mean]}(w, t)$ entails *quarrel*. Hence, since by **Hindsight*** only post- t propositions compatible with $\cap f_+^{[mean]}(w, t)$ are among $g(w, t)$, we predict that (36) is true.

A second benefit of **Hindsight*** is that it helps my theory handle subjunctives with true consequents. Suppose Sue was scheduled to fly British Airways to London, but canceled at the last minute. It seems true that:

- (37) If Sue had been on that flight, it still would have been a British Airways plane.

Since DIVERSITY demands that (37)'s modal base not settle whether the plane belonged to British Airways, how does my theory predict the truth of (37)? Here, I appeal to **Hindsight***. Sue being on the flight does not disrupt the truth of the post- t fact that it was a British Airways plane. This is because that it is a British Airways plane is true at worlds in $\cap f_+^{[flight]}(w, t)$ for the same reason it is true at w (because it was bought by British Airways, e.g.). Therefore, by **Hindsight***, the ordering source $g(w, t)$ for (37) contains the proposition that it is a British Airways plane. Therefore, we predict that (37) is true. In general, we predict counterfactuals with true consequents are true whenever their antecedents do not disrupt the truth of their consequents. This seems

to be the correct prediction.

4. Concluding remarks

We began with the following question:

THE GRAMMATICAL QUESTION: why do the grammatical differences between indicatives and subjunctives (in particular the additional past + future morphology on the latter) result, at least for paradigm cases like (1) and (2), in indicatives being epistemic and subjunctives being metaphysical?

In this paper, I articulated and defended a non-conventional answer to this question.

Starting with the SIMPLE PAST hypothesis and adding two assumptions—one, that metaphysical interpretations (but not epistemic interpretations) of conditionals arise from a domain of historically accessible worlds which share the same past (but not the same futures), and two, the pragmatic constraint on interpretation DIVERSITY—I showed how we can derive the difference in the meanings of (1) and (2) from their grammatical differences. I defended my theory on the following grounds:

- (I) The key principles NECESSITY OF THE PAST and DIVERSITY are reasonable and independently plausible (§1.2).
- (II) The resulting theory predicts similar results for both conditionals *and* modals (§1.3–1.4).
- (III) The additional predictions that the theory makes about subjunctive conditionals (that they may have epistemic readings) and future indicative conditionals (that they may have metaphysical readings) are plausible (§2.1–2.2).
- (IV) Finally, I argued that there are reasonable responses to four of the most pressing objections to the theory (§3).

Of course, much more work remains. More needs to be said about the pragmatics of modal time, backtracking interpretations, and the use of **Hindsight*** to predict the hindsight data discussed in §3.4. In addition,

my aim here is not to settle the debate between the SIMPLE PAST and MODAL PAST hypotheses. Rather, the paper has been an extended motivation and defense of a particular non-conventional answer to THE GRAMMATICAL QUESTION. I hope that seeing the costs and benefits of the proposal gives us a better sense of what's at stake in deciding between various answers to the question why indicative and subjunctive conditionals differ in meaning, and ultimately, what indicative and subjunctive conditionals mean. Finally, my discussion of the compositional semantics of indicative and subjunctive conditionals was left mostly at an intuitive level (I flesh things out slightly more in the Appendix). There is a great deal of interesting work happening on the compositional semantics of tense and aspect on conditionals (e.g., Ippolito [2003, 2004, 2006, 2013], Kaufmann [2005b], Arregui [2005, 2007, 2009], Schulz [2007, 2008, 2014], Iatridou [2014]), and I hope that future developments of my theory can interface more robustly with that work.⁶⁷

67. This paper has benefited greatly from the helpful comments and suggestions of many individuals. I'd like to thank two reviewers for *Philosophers' Imprint*, audiences at Yale and NYU, and in particular Alex Anthony, Laura Beavers, Phil Bricker, Keith DeRose, Cian Dorr, Kai von Fintel, Ben George, Dan Greco, Dan Harris, Irene Heim, Larry Horn, Matt Mandelkern, Aaron Norby, Jim Pryor, Daniel Rothschild, Sun-Joo Shin, Jack Spencer, Bob Stalnaker, John Symons, Steve Yablo, and Bruno Whittle. Finally, I am especially indebted to the tireless feedback and encouragement of Zoltán Szabó through countless earlier drafts. As always, any mistakes are entirely my own.

Appendix

Formal semantics

Here, I offer a more formal implementation of the semantic framework sketched in §1.1. We state the semantics in two steps. The first involves a translation of the English sentence to be analyzed into a sentence of a formal language \mathcal{L} that represents its logical form (at the relevant level of abstraction). Then, we define an interpretation function $\llbracket \cdot \rrbracket$ which maps the corresponding sentence of \mathcal{L} to its extension (a truth value) relative to a context c and index i .⁶⁸ I assume for now that modal bases, ordering sources, worlds, and times are the only parameters in our indices. Our preliminary semantics for modals may be stated as follows:⁶⁹

MODALS

$$\llbracket \Box(p) \rrbracket^{c,f,g,w,t} = 1 \text{ iff } \forall w' \in D(f,g,w,t): \llbracket p \rrbracket^{c,f,g,w',t} = 1$$

$$\llbracket \Diamond(p) \rrbracket^{c,f,g,w,t} = 1 \text{ iff } \exists w' \in D(f,g,w,t): \llbracket p \rrbracket^{c,f,g,w',t} = 1$$

I pause here to make a brief remark about the theory. Let the *semantic value* of an expression of \mathcal{L} be a function that takes a context c , modal base f , ordering source g , world w , and time t into its extension. Given our theory, $\llbracket \cdot \rrbracket$ assigns semantic values to expressions of \mathcal{L} . However, notice that this commitment about semantic values is compatible with holding that the *content* of a declarative sentence in a context is a proposition, understood as a set of possible worlds. Importing Def 3 from §1 yields:

Def 6 (Content). For any sentence p , the content of p in c is $\{w : \llbracket p \rrbracket^{c,f_c,g_c,w,t_c} = 1\}$.

68. Since our translation and interpretation procedures will be compositional, \mathcal{L} will translate substantential expressions of English as well. I won't go into these details at this time.

69. Where ' $\Box(p)$ ' denotes the \mathcal{L} translation of sentences involving necessity modals such as 'It must be the case that p ' and ' $\Diamond(p)$ ' denotes the \mathcal{L} translation of sentences involving possibility modals such as 'it is possible that p '.

I adopt a semantics for tenses and tense auxiliaries on which *past*, *press*, and *woll* (the \mathcal{L} translations of past and present tense morphemes and the tense auxiliary “will” of English, respectively) denote operators on the time parameter of evaluation:⁷⁰

TENSE

$$\begin{aligned} \llbracket \text{past}(p) \rrbracket^{c,f,g,w,t} &= 1 \text{ iff } \exists t' < t: \llbracket p \rrbracket^{c,f,g,w,t'} = 1 \\ \llbracket \text{pres}(p) \rrbracket^{c,f,g,w,t} &= 1 \text{ iff } \exists t' \geq t: \llbracket p \rrbracket^{c,f,g,w,t'} = 1 \\ \llbracket \text{woll}(p) \rrbracket^{c,f,g,w,t} &= 1 \text{ iff } \exists t' \geq t: \llbracket p \rrbracket^{c,f,g,w,t'} = 1 \end{aligned}$$

Two remarks on this semantics for tense.⁷¹ The first is that our time variables here range over intervals, not moments, of time. The second is that, compositionally, we are treating bare clauses like *p* as the

70. Most likely the domains of these operators will need to be restricted in some way, to account for the fact that some tensed clauses seem to express propositions about specific intervals, as in Partee (1973)’s famous example of uttering *I left the stove on* while on my way to work. Alternatively, we could analyze tenses as referring expressions as in Partee (1973), Enç (1987), Heim (1994), Kratzer (1998). My choice to treat tenses as quantifiers rather than referring expressions is not crucial, and my theory of conditionals could be recast within a referential tense semantics without changing my main point.

71. For a preliminary motivation for the semantics for *pres* and *woll*, consider the following two data points. Unembedded, both can be used to express claims about the present or the future:

- (i) a. John is here now.
b. John will be here now.
- (ii) a. John is here tomorrow.
b. John will be here tomorrow.

However, only *woll* can be felicitously embedded under a past directed temporal adverbial:

- (iii) a. #Once, John makes a good mayoral candidate.
b. Once, John would have made a good mayoral candidate.

See Dowty (1979), Copley (2002), Ogihara (2007), Kaufmann (2005b) for further discussion about the distinction between present futurities like (ii-a) and futures like (ii-b).

logical form of an untensed sentence (or nonfinite clause). I extend MODALS to cover conditionals by assuming (as above) that conditionals are restricted necessity modals. Thus, the \mathcal{L} translation of an indicative conditional like (1) will be $\llbracket \Box \text{past}(p) \rrbracket(\text{past}(q))$.⁷² We then interpret $\llbracket \Box \text{past}(p) \rrbracket(\text{past}(q))$ schematically as follows:

INDICATIVE

$$\begin{aligned} \llbracket \llbracket \Box \text{past}(p) \rrbracket(\text{past}(q)) \rrbracket^{c,f,g,w,t} &= 1 \text{ iff} \\ &\quad \forall w' \in D(f^{[p]}, g, w, t): \llbracket \text{past}(q) \rrbracket^{c,f^{[p]},g,w',t} = 1 \\ \text{(Where } p &= \{w': \llbracket \text{past}(p) \rrbracket^{c,f,g,w',t} = 1\}.) \end{aligned}$$

Thus, an indicative conditional like (1) is true iff the proposition expressed by its consequent *past*(*q*) is true throughout the best worlds given *f* (restricted by *p*) and *g*. With subjunctive conditionals, I will assume that the past tense on their antecedents and consequents is not interpreted and merely there to mark agreement with the higher tense governing the entire counterfactual (cf. Arregui [2005, 2007, 2009]).⁷³ Hence, following Ogihara (1996, 2007), I’ll assume that the embedded tenses on the antecedent and consequent of subjunctive conditionals

72. I adopt the notation of brackets ‘[]’ to indicate the merging of \Box and *p* into a single constituent restricted modal at the level of logical form.

73. This move accounts for the “fake”-seeming quality of the past tense on subjunctive conditionals (recall the data discussed in footnote 1). The move is also a familiar one from the literature on sequence of tense, in which a sentence like (i) can be understood to mean either (a) that in the past John thought that Sue was (at that same time) in Cambridge, or (b) that in the past John thought that Sue was (at some earlier time) in Cambridge.

- (i) John thought that Sue was in Cambridge.

The (a)-reading is clearly the default here, and on it the past tense on the complement of the main verb is not itself interpreted but instead gets its interpretation from the higher past tense on the main verb. Hence, the past tense merely marks *agreement* with that higher tense. The (b)-reading is helped by adding a temporal adverbial like “the day before” in the complement clause.

are deleted at the level of logical form.⁷⁴ Thus, the \mathcal{L} translation of a subjunctive like (2) will be $\text{past}([\Box p](\text{woll}(q)))$. We then interpret $\text{past}([\Box p](\text{woll}(q)))$ as follows:⁷⁵

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$$\llbracket \text{past}([\Box p](\text{woll}(q))) \rrbracket^{c,f,g,w,t} = 1 \text{ iff} \\ \exists t' < t : \forall w' \in D(f^{[p]}, g, w, t') : \exists t'' \geq t' : \llbracket q \rrbracket^{c,f^{[p]}, g, w', t''} = 1$$

Thus, on my schematic semantics, a subjunctive like (2) is true iff the proposition expressed by its consequent $\text{woll}(q)$ (relative to the past time as shifted by the higher past tense) is true throughout the best worlds given f (restricted by p) and g , as evaluated at some past time.

Times of Clauses

We now define a notion of the *time of a bare clause* in a context. Say that the time of a bare clause p in c is the domain of its closest left-dominating tense operator, if any. When p doesn't fall in the scope of any tense, say that the time of p in c is t_c , the time of c . Thus, for instance, the time of the bare clause p as it occurs in $\text{past}(p)$ in c is (some subset of, given that the domain of past will be restricted) $\{t : t < t_c\}$. The time of q as it occurs in $\text{past}(\text{woll}(q))$ in c is $\{t' : t' \geq t, \text{ where } t < t_c\}$. Say that modal/conditional time is the time that is the input to its domain-determining function D for that particular modal/conditional.

74. This is another non-essential assumption. We might think the tenses are really present at the level of logical form, and then follow Enç (1987) and assume that the interpretations of embedded tenses are sometimes constrained by higher tenses, or perhaps follow Kratzer (1998) and suppose a sequence of tense rule of interpretation that nullifies the meaning of embedded tenses.

75. There is an important subtlety regarding the time at which the subjunctive's antecedent is evaluated. As stated, my semantics predicts that it is interpreted relative to the time of the context. However, this doesn't account for the "future-shifting" feature of conditional antecedents, in particular why we they felicitously combine with future adverbials like "tomorrow." Although I hope to address this matter in future work, since this problem is extremely complicated and ultimately orthogonal to my theory, I will set it aside for now. See Kaufmann (2005b) for a possible fix.

Say that a conditional's antecedent/consequent times are the times of the bare (untensed) sentences that occur embedded in the conditional's if-clause and consequent clause respectively.

Proof that CONTEXTUAL EQUIVALENCE BAN entails DIVERSITY

CONTEXTUAL EQUIVALENCE BAN:

Simple modal sentences do not express propositions that are contextually equivalent (true at all the same worlds in the context set) to their prejacent.

DIVERSITY:

In any context c , the modal base f_c for any modal \mathcal{M} with prejacent p and modal time t must be such that: $\exists w \in C : p \notin f_c(w, t)$ and $\neg p \notin f_c(w, t)$.

Proof. The proof proceeds by establishing that \neg DIVERSITY entails \neg CONTEXTUAL EQUIVALENCE BAN, from which it follows automatically by contraposition that CONTEXTUAL EQUIVALENCE BAN entails DIVERSITY. Suppose DIVERSITY is false. Then it is possible that there is some context c and modal sentence $\mathcal{M}(p)$ with prejacent p and modal time t such that $\forall w \in C : p \in f_c(w, t)$ or $\neg p \in f_c(w, t)$. Let ' Mp ' denote the proposition expressed by $\mathcal{M}(p)$ in c . We will prove that $\forall w \in C : Mp \leftrightarrow p$ is true at w , and hence that CONTEXTUAL EQUIVALENCE BAN is false.

To do so, suppose w is an arbitrary world in C . We prove that $Mp \leftrightarrow p$ is true at w .

- Suppose Mp is true at w . Then it can't be that $\neg p \in f_c(w, t)$.⁷⁶ Since $\forall w \in C : p \in f_c(w, t)$ or $\neg p \in f_c(w, t)$, it follows that $p \in f_c(w, t)$.

76. It follows from this that there are no p -worlds in $D(f_c, g, w, t)$. Now, either \mathcal{M} is a possibility or a necessity modal. If \mathcal{M} is a possibility modal, then Mp is false at w , contradicting our assumption. If \mathcal{M} is a necessity modal, then it may be that Mp is true at w , but only if $D(f_c, g, w, t)$ is empty. We suppose that this condition is ruled out by the fact that necessity modals presuppose that their domains are non-empty, and are hence never trivially true. So Mp is false at w , which contradicts our assumption. Therefore, it can't be that $\neg p \in f_c(w, t)$.

But since modal bases are factive, p is true at w .

- Suppose p is true at w . Then it can't be that $\neg p \in f_c(w, t)$ since modal bases are factive. Since $\forall w \in C : p \in f_c(w, t)$ or $\neg p \in f_c(w, t)$, it follows that $p \in f_c(w, t)$. But then every world in $D(f_c, g, w, t)$ is a p -world, for any g . Thus, Mp is true at w .

Since the choice of $w \in C$ was arbitrary, it follows that $\forall w \in C : Mp \leftrightarrow p$ is true at w , and hence that CONTEXTUAL EQUIVALENCE BAN is false. Thus, we conclude that CONTEXTUAL EQUIVALENCE BAN entails DIVERSITY by contraposition. \square

Generalizing our predictions

I show that NECESSITY OF THE PAST + DIVERSITY are sufficient to predict the following:

- (α) Non-future directed modals are invariably epistemic.
- (β) Future directed modals may be metaphysical or epistemic.

Predicting (α). Let Φ be an arbitrary non-future directed modal sentence, c be an arbitrary context, and w be an arbitrary world in C . Let p be Φ 's prejacent in c . Thus, p is about a time which does not extend to the future of t , Φ 's modal time. We have two options for the modal base for Φ in c : it is either historical or informational. Suppose f_c is historical. Then either p is true at w or false at w . Since the time of p does not extend beyond t , by NECESSITY OF THE PAST, if p is true at w then $p \in f_c(w, t)$, and if p is false at w then $\neg p \in f_c(w, t)$. Hence, it follows that either $p \in f_c(w, t)$ or $\neg p \in f_c(w, t)$. But either way DIVERSITY is violated. Hence f_c cannot be historical. But this holds for any context c and world in C , since the choice of context and world was arbitrary. Suppose instead f_c is informational. Then, as long as p is not directly known (by the c -relevant party), the same reasoning above will not show that DIVERSITY is violated. Hence, it is possible that f_c be informational. But since f_c cannot be historical and can be informational, if Φ is interpretable at all, we predict it must receive an epistemic interpretation. \square

Predicting (β). Let Ψ be an arbitrary future oriented modal sentence, c be an arbitrary context, and w be an arbitrary world in C . Let p be Ψ 's prejacent in c . We have two options for the modal base of Ψ in c : it is either historical or informational. Suppose f_c is historical. Either p is true at w or false at w . Since the time of p extends beyond t , it won't follow from this and NECESSITY OF THE PAST that either $p \in f_c(w, t)$ or $\neg p \in f_c(w, t)$. Hence, no violation of DIVERSITY is ensured, as was the case with the indicative conditional above. Therefore, as long as neither $p \notin f_c(w, t)$ nor $\neg p \notin f_c(w, t)$, DIVERSITY will not be violated, and it is possible that f_c be historical. Of course, analogous reasoning to that in the preceding paragraph shows that it is possible that f_c be informational as well. Therefore, Ψ may receive a metaphysical interpretation and that it may receive an epistemic interpretation. \square

References

- Abusch, Dorit (1997). Sequence of tense and temporal de re. *Linguistics and Philosophy*, 20, 1–50.
- (1998). Generalizing Tense Semantics for Future Contexts. *Pages 13–35 of: Rothstein, Susan (ed), Events and Grammar*. Dordrecht: Kluwer Academic Publishers.
- Adams, Ernest (1970). Subjunctive and Indicative Conditionals. *Foundations of Language*, 6(1), 89–94.
- Ahmed, Arif (2010). Out of the Closet. *Analysis*, 1–9.
- (2011). Walters on Conjunction Conditionalization. *Proceedings of the Aristotelian Society*, 115–122.
- Albert, David (2000). *Time and Chance*. Cambridge: Harvard University Press.
- Anderson, Alan Ross (1951). A Note on Subjunctive and Counterfactual Conditionals. *Analysis*, 11, 35–38.
- Arregui, Ana. 2005. *On the Accessibility of Possible Worlds: the Role of Tense and Aspect*. Ph.D. thesis, University of Massachusetts at Amherst.
- (2007). When Aspect Matters: The Case of *Would* Conditionals. *Nat-*

- ural Language Semantics, **15**, 221–264.
- (2009). On Similarity in Counterfactuals. *Linguistics and Philosophy*, **32**, 245–278.
- Barker, Stephen J. (1998). Predetermination and Tense Probabilism. *Analysis*, **58**(4), 290–296.
- Barnett, David (2012). Future Conditionals and DeRose's Thesis. *Mind*, **121**, 407–442.
- Bennett, Jonathan (1988). Farewell to the Phlogiston Theory of Conditionals. *Mind*, **97**, 509–527.
- (1995). Classifying Conditionals: the Traditional Way is Right. *Mind*, **104**(414), 331–354.
- (2003). *A Philosophical Guide to Conditionals*. Oxford: Oxford University Press.
- Benton, Matthew A. (2011). Two More for the Knowledge Account of Assertion. *Analysis*, **71**, 684–687.
- (2012). Assertion, Knowledge and Predictions. *Analysis*, **72**(1), 102–105.
- Blaauw, Martijn J. (2012). Reinforcing the Knowledge Account of Assertion. *Analysis*, **72**(1), 105–108.
- Bloom, Alfred (1981). *The Linguistic Shaping of Thought: A Study in the Impact of Language on Thinking in China and the West*. Hillsdale: Erlbaum.
- Brennan, Virginia. 1993. *Root and Epistemic Modal Auxiliary Verbs*. Ph.D. thesis, University of Massachusetts at Amherst.
- Brogaard, Berit, & Salerno, Joe (2013). Remarks on Counterpossibles. *Synthese*, **190**, 639–660.
- Chisholm, Roderick (1955). Law Statements and Counterfactual Inference. *Analysis*, **15**, 97–105.
- Cinque, Guglielmo (1999). *Adverbs and Functional Heads: a Cross-Linguistic Perspective*. Oxford: Oxford University Press.
- Clark, Eve (1987). The Principle of Contrast: a Constraint on Language Acquisition. *Pages 1–33 of: MacWhinney, Brian (ed), Mechanisms of Language Acquisition*. Hillsdale: Lawrence Erlbaum Associates.
- Coates, Jennifer (1983). *The Semantics of the Modal Auxiliaries*. London: Croom Helm.
- Cogan, Ross (1996). Opting Out: Bennett on Classifying Conditionals. *Analysis*, **56**(3), 142–145.
- Comrie, Bernard (1985). *Tense*. Cambridge Textbooks in Linguistics. Cambridge: Cambridge University Press.
- (1986). Conditionals: a Typology. *Chap. 4, pages 77–99 of: Traugott, Elizabeth Closs, ter Meulen, Alice, Reilly, Judy Snitzer, & Ferguson, Charles A. (eds), On Conditionals*. Cambridge: Cambridge University Press.
- Condoravdi, Cleo (2002). Temporal Interpretation of Modals: Modals for the Present and for the Past. *Pages 59–87 of: Beaver, David, Kaufmann, Stefan, Clark, Brady, & Casillas, Luis (eds), The Construction of Meaning*. Stanford: CSLI.
- Copley, Bridget. 2002. *The Semantics of the Future*. Ph.D. thesis, Massachusetts Institute of Technology, Cambridge.
- Cross, Charles (2002). Doesn't-Will and Didn't-Did. *Australasian Journal of Philosophy*, **80**(1), 101–106.
- Davis, Wayne (1979). Indicative and Subjunctive Conditionals. *The Philosophical Review*, **88**(4), 544–565.
- DeRose, Keith (1991). Epistemic Possibilities. *The Philosophical Review*, **100**(4), 581–605.
- (1996). Knowledge, Assertion, and Lotteries. *Australasian Journal of Philosophy*, **74**(4).
- (1998). Simple 'Might's, Indicative Possibilities and the Open Future. *The Philosophical Quarterly*, **48**(190), 67–82.
- (2002). Assertion, Knowledge, and Context. *The Philosophical Review*, **111**(2), 167–203.
- (2010). The Conditionals of Deliberation. *Mind*, **119**(473), 1–42.
- Dorr, Cian, & Hawthorne, John (2013). Embedding Epistemic Modals. *Mind*, **122**(488), 867–913.
- Douven, Igor (2006). Assertion, Knowledge, and Rational Credibility. *Philosophical Review*, **115**(4), 449–485.
- (2009). Assertion, Moore, and Bayes. *Philosophical Studies*, **144**, 361–375.

- Dowty, David R. (1979). *Word Meaning and Montague Grammar*. London: Springer.
- Drubig, Hans. 2001. *On the Syntactic Form of Epistemic Modality*. MS.
- Dudman, V. H. (1983). Tense and Time in English Verb Clusters of the Primary Pattern. *Australasian Journal of Linguistics*, 3, 25–44.
- (1984). Parsing 'If'-Sentences. *Analysis*, 44(4), 145–153.
- (1988). Indicative and Subjunctive. *Analysis*, 48(3), 113–122.
- (1994). On Conditionals. *The Journal of Philosophy*, 91(3), 113–128.
- (2000). Classifying 'Conditionals': the Traditional Way is Wrong. *Analysis*, 60(2), 146.
- Edgington, Dorothy (1995). On Conditionals. *Mind*, 104, 235–329.
- (2004). Counterfactuals and the Benefit of Hindsight. *Pages 12–28 of: Cause and Chance: Causation in an Indeterministic World*. New York: Routledge.
- (2007). On Conditionals. *Pages 127–221 of: Gabbay, D.M., & Guenther, F. (eds), Handbook of Philosophical Logic*, vol. 14. Springer.
- Ellis, Brian (1984). Two Theories of Indicative Conditionals. *Australasian Journal of Philosophy*, 62(1), 50–66.
- Enç, Mürvat (1987). Anchoring Conditions for Tense. *Linguistic Inquiry*, 18(4), 633–657.
- Feinberg, Joel (1992). Wrongful Life and the Counterfactual Element in Harming. *Freedom and Fulfillment*, 3.
- Feng, Gary, & Yi, Li. 2006. What if Chinese had Linguistic Markers for Counterfactual Conditionals? Language and Thought Revisited. *Pages 1281–1286 of: Sun, Ron (ed), The 28th Annual Conference of the Cognitive Science Society*.
- von Fintel, Kai (1997a). Bare Plurals, Bare Conditionals, and Only. *Journal of Semantics*, 14, 1–56.
- 1997b. The Presupposition of Subjunctive Conditionals. *In: Percus, Orin, & Sauerland, Uri (eds), MIT Working Papers in Linguistics*, vol. 25.
- 2005 (April). *Tense in Conditionals*. unpublished handout.
- (2008). What is Presupposition Accommodation, Again? *Philosophical Perspectives*, 22, 137–170.
- (2012). Subjunctive Conditionals. *Pages 466–477 of: Russell, Gillian, & Fara, Delia Graff (eds), The Routledge Companion to Philosophy of Language*. Routledge.
- von Fintel, Kai, & Gillies, Anthony (2008). CIA Leaks. *Philosophical Review*, 117(1), 77–98.
- (2010). Must ... Stay ... Strong! *Natural Language Semantics*, 18(4), 351–383.
- von Fintel, Kai, & Heim, Irene. 2012. *Intensional Semantics*. Lecture Notes.
- von Fintel, Kai, & Iatridou, Sabine (2008). How to Say Ought in Foreign: the Composition of Weak Necessity Modals. *Pages 115–141 of: Guéron, Jacqueline, & Lecarme, Jacqueline (eds), Time and Modality*. Springer.
- Frankfurt, Harry (1969). Alternate Possibilities and Moral Responsibility. *Journal of Philosophy*, 66(23), 829–839.
- Gauker, Christopher (2006). *Conditionals in Context*. Cambridge: MIT Press.
- Gibbard, Allan (1981). Two Recent Theories of Conditionals. *Pages 211–247 of: Harper, William L., Stalnaker, Robert, & Pearce, Glenn (eds), Ifs*. Dordrecht: Reidel.
- Gibbard, Allan, & Harper, William L. (1981). Counterfactuals and Two Kinds of Expected Utility. *Pages 153–190 of: Harper, William L., Stalnaker, Robert, & Pearce, Glenn (eds), Ifs*. Dordrecht: Reidel.
- Gillies, Anthony (2000). A New Solution to Moore's Paradox. *Philosophical Studies*, 105, 237–250.
- Goldstein, Laurence (ed) (2013). *Brevity*. Oxford: Oxford University Press.
- Goodman, Nelson (1947). The Problem of Counterfactual Conditionals. *Journal of Philosophy*, 44(5), 113–128.
- Grice, Paul (1989). *Studies in the Way of Words*. Cambridge: Harvard University Press.
- Groenendijk, Jeroen, & Stokhof, Martin J.B. (1975). Modality and Conversational Information. *Theoretical Linguistics*, 2, 61–112.
- Hacquard, Valentine. 2006. *Aspects of Modality*. Ph.D. thesis, Massachusetts Institute of Technology.

- setts Institute of Technology.
- Hawthorne, John (2004). *Knowledge and Lotteries*. Oxford: Oxford University Press.
- Heim, Irene (1994). Comments on Abusch's Theory of Tense. *Pages 141–170 of*: Kamp, Hans (ed), *Ellipsis, Tense, and Questions*. Amsterdam: University of Amsterdam.
- Hofmann, Thomas R. (1966). Past Tense Replacement and the Modal System. *Pages 85–100 of*: McCawley, James (ed), *Syntax and Semantics*, vol. 7. New York: Academic Press.
- Horn, Laurence (1984). Toward a New Taxonomy for Pragmatic Inference: Q-based and R-based Implicature. *Pages 11–42 of*: Schiffrin, Deborah (ed), *Meaning, Form, and Use in Context*. Washington: Georgetown University Press.
- (1989). *A Natural History of Negation*. CSLI Publications.
- (1993). Economy and Redundancy in a Dualistic Model of Natural Language. *Pages 33–72 of*: Shore, Susanna, & Vilks, Maria (eds), *Yearbook of the Linguistic Association of Finland*.
- Iatridou, Sabine (1990). The Past, the Possible, and the Evident. *Linguistic Inquiry*, **21**(1), 123–129.
- (2000). The Grammatical Features of Counterfactuality. *Linguistic Inquiry*, **31**, 231–270.
- (2014). Grammar Matters. *In*: Walters, Lee, & Hawthorne, John (eds), *Conditionals, Probability, and Paradox: Themes from the Philosophy of Dorothy Edgington*. Oxford: Oxford University Press.
- Ippolito, Michela (2003). Presuppositions and Implicatures in Counterfactuals. *Natural Language Semantics*, **11**, 145–186.
- (2006). Semantic Composition and Presupposition Projection in Subjunctive Conditionals. *Linguistics and Philosophy*, **29**, 631–672.
- 2013a. Counterfactuals and Conditional Questions Under Discussion. *Pages 194–211 of*: Snider, Todd (ed), *Proceedings of SALT 23*.
- (2013b). *Subjunctive Conditionals: a Linguistic Analysis*. Linguistic Inquiry Monograph Series. Cambridge: MIT Press.
- Isard, Steven (1974). What Would You Have Done If ... *Theoretical Linguistics*, **1**, 233–255.
- Jackendoff, Ray (1972). *Semantic Interpretation in Generative Grammar*. Cambridge: MIT Press.
- Jackson, Frank (1977). A Causal Theory of Counterfactuals. *Australasian Journal of Philosophy*, **55**, 3–21.
- (1979). On Assertion and Indicative Conditionals. *Philosophical Review*, **88**, 565–89.
- (1990). Classifying Conditionals. *Analysis*, **50**(2), 134–147.
- (1991). Classifying Conditionals II. *Analysis*, **51**(3), 137–143.
- James, Deborah (1982). Past Tense and the Hypothetical: a Cross-Linguistic Study. *Studies in Language*, **6**, 375–403.
- Karttunen, Lauri (1972). *Possible and Must*. *Pages 1–20 of*: Kimball, J. (ed), *Syntax and Semantics*, vol. 1. New York: Academic Press.
- Karttunen, Lauri, & Peters, Stanley (1979). Conventional Implicature. *In*: Oh, & Dineen (eds), *Syntax and Semantics Vol III: Presupposition*. New York: Academic Press.
- Kaufmann, Stefan (2005a). Conditional Predictions. *Linguistics and Philosophy*, **28**, 181–231.
- (2005b). Conditional Truth and Future Reference. *Journal of Semantics*, **22**, 231–280.
- (2013). Causal Premise Semantics. *Cognitive Science*, **37**(6), 1136–1170.
- Khoo, Justin. 2015a. *Backtracking Counterfactuals, Revisited*. MS.
- (2015b). Modal Disagreements. *Inquiry*, **58**(5), 511–534.
- Kment, Boris (2006a). Counterfactuals and Explanation. *Mind*, **115**(458), 261–309.
- (2006b). Counterfactuals and the Analysis of Necessity. *Philosophical Perspectives*, **20**, 237–302.
- Krakauer, Barak. 2012. *Counterpossibles*. Ph.D. thesis, University of Massachusetts at Amherst, Amherst.
- Kratzer, Angelika (1977). What 'Must' and 'Can' Must and Can Mean. *Linguistics and Philosophy*, **1**, 337–355.
- (1978). *Semantik der Rede: Kontexttheorie - Modalwörter - Konditionalsätze*. Königstein/Taunus: Scriptor.
- (1981). The Notional Category of Modality. *Pages 38–74 of*: Eikmeyer,

- H. J., & Rieser, H. (eds), *Words, Worlds, and Contexts. New Approaches in Words Semantics*. Berlin: de Gruyter.
- (1986). Conditionals. *Chicago Linguistics Society*, 22(2), 1–15.
- (1989). An Investigation of the Lumps of Thought. *Linguistics and Philosophy*, 12(5), 607–653.
- (1991). Modality. *Chap. 23, pages 639–650 of: von Stechow, Arnim, & Wunderlich, Dieter (eds), Handbuch Semantik*. Berlin and New York: de Gruyter.
- (1998). More Structural Analogies Between Pronouns and Tenses. *In: Strolavitch, D., & Lawson, A. (eds), Proceedings of SALT 8*. Ithaca: CLC Publications.
- (2012). *Collected Papers on Modals and Conditionals*. Oxford: Oxford University Press.
- Lackey, Jennifer (2007). Norms of Assertion. *Nous*, 41(4), 594–626.
- Lange, Marc (2000). *Natural Laws in Scientific Practice*. Oxford: Oxford University Press.
- (2009). *Laws and Lawmakers*. New York: Oxford University Press.
- Leahy, Brian (2011). Presuppositions and Antipresuppositions in Conditionals. *Pages 257–274 of: Ashton, Neil, Chereches, Anca, & Lutz, David (eds), Proceedings of SALT 21*. CLC Publications.
- Lewis, David (1973). *Counterfactuals*. Oxford: Blackwell.
- (1979). Counterfactual Dependence and Time's Arrow. *Nous*, 13, 455–476.
- (1980). A Subjectivist's Guide to Objective Chance. *In: Jeffrey, Richard (ed), Studies in Inductive Logic and Probability*. University of California Press.
- (1981a). Causal Decision Theory. *Australasian Journal of Philosophy*, 59, 5–30.
- (1981b). Why Ain'cha Rich? *Nous*, 15, 377–380.
- (1986). Causation. *Pages 159–172 of: Philosophical Papers Vol 1*. New York: Oxford University Press.
- (1988a). Relevant Implication. *Theoria*, 54, 161–174.
- (1988b). Statements Partly About Observation. *Philosophical Papers*, 17, 1–31.
- (2000). Causation as Influence. *Journal of Philosophy*, 97, 182–197.
- Liu, Linda (2013). Realis *le* and marked/unmarked aspectual categories in Chinese. *Linguistics*, 51(5), 893–927.
- Lycan, William (2001). *Real Conditionals*. Oxford: Oxford University Press.
- Lyons, John (1977). *Semantics*. Cambridge: Cambridge University Press.
- Mackay, John (2015). Actuality and Fake Tense in Conditionals. *Semantics & Pragmatics*, 8(12), 1–12.
- Maudlin, Tim (2007). *The Metaphysics Within Physics*. New York: Oxford University Press.
- Morton, Adam (2004). Indicative Versus Subjunctive in Future Conditionals. *Analysis*, 64(4), 289–293.
- Ninan, Dilip (2011). Semantics and the Objects of Assertion. *Linguistics and Philosophy*, 33(5), 355–380.
- Nolan, Daniel (1997). Impossible Worlds: A Modest Approach. *Notre Dame Journal of Formal Logic*, 38(4), 535–571.
- Noordhof, Paul (2005). Morgenbesser's Coin, Counterfactuals, and Independence. *Analysis*, 65(3), 261–263.
- Ogihara, Toshiyuki (1996). *Tense, Attitudes, and Scope*. Dordrecht: Kluwer Academic Publishers.
- (2007). Tense and Aspect in Truth-Conditional Semantics. *Lingua*, 117(2), 392–418.
- Palmer, Frank (1986). *Mood and Modality*. Cambridge: Cambridge University Press.
- Partee, Barbara (1973). Some Structural Analogies between Tenses and Pronouns in English. *Journal of Philosophy*, 601–9.
- Perlmutter, David (1971). *Deep and Surface Structure Constraints in Syntax*. New York: Holt, Rinehart, and Winston.
- Perry, Stephen (2003). Harm, History, and Counterfactuals. *San Diego Law Review*, 40.
- Phillips, Ian B. (2007). Morgenbesser Cases and Closet Determinism. *Analysis*, 67, 42–49.
- (2011). Stuck in the Closet: a Reply to Ahmed. *Analysis*, 71, 86–91.

- Placek, Tomasz, & Müller, Thomas (2007). Counterfactuals and Historical Possibility. *Synthese*, 154, 173–197.
- Ross, John R. (1969). Auxiliaries as Main Verbs. *Pages 77–102 of*: Todd, W. (ed), *Studies in Philosophical Linguistics*. Evanston, IL: Great Expectations Press.
- Schaffer, Jonathan (2004). Counterfactuals, Causal Independence, and Conceptual Circularity. *Analysis*, 64(4), 299–309.
- Schulz, Katrin. 2007. *Minimal Models in Semantics and Pragmatics: Free Choice, Exhaustivity, and Conditionals*. Ph.D. thesis, University of Amsterdam, Amsterdam.
- (2008). Non-Deictic Tenses in Conditionals. *Pages 694–710 of*: Friedman, T., & Ito, S. (eds), *Proceedings of SALT 18*. Ithaca: Cornell University Press.
- (2014). Fake Tense in Conditional Sentences: A Modal Approach. *Natural Language Semantics*.
- Slote, Michael (1978). Time in Counterfactuals. *The Philosophical Review*, 87(1), 3–27.
- Stalnaker, Robert (1968). A Theory of Conditionals. *Pages 98–112 of*: Rescher, N. (ed), *Studies in Logical Theory*. Oxford: Oxford University Press.
- (1970). Probability and Conditionals. *Philosophy of Science*, 37(1), 64–80.
- (1975). Indicative Conditionals. *Philosophia*, 5, 269–86.
- (1978). Assertion. *Pages 315–332 of*: Cole, P. (ed), *Syntax and Semantics 9: Pragmatics*. New York: Academic Press.
- (1980). A Defense of Conditional Excluded Middle. *In*: Harper, William L., Pearce, Glenn, & Stalnaker, Robert (eds), *Ifs*. Dordrecht: Reidel.
- (1996). Knowledge, Belief, and Counterfactual Reasoning in Games. *Economics and Philosophy*, 12(2), 133–163.
- (2002). Common Ground. *Linguistics and Philosophy*, 25, 701–721.
- Stanley, Jason (2005). *Knowledge and Practical Interests*. Oxford: Oxford University Press.
- Starr, William B. (2013). A Uniform Theory of Conditionals. *Journal of Philosophical Logic*.
- Steele, Susan (1975). Past and Irrealis: Just what does it all mean? *International Journal of American Linguistics*, 41(3), 200–217.
- Stephenson, Tamina (2007). Judge Dependence, Epistemic Modals, and Predicates of Personal Taste. *Linguistics and Philosophy*, 30(4), 487–525.
- Swanson, Eric (2011). Conditional Excluded Middle Without the Limit Assumption. *Philosophy and Phenomenological Research*.
- Tedeschi, Philip (1981). Some Evidence for a Branching-Futures Semantic Model. *Pages 239–269 of*: Tedeschi, P., & Zaenen, A. (eds), *Syntax and Semantics: Tense and Aspect*, vol. 14. New York: Academic Press.
- Thomason, Richmond (1985). Note on Tense and Subjunctive Conditionals. *Philosophy of Science*, 52(1), 151–153.
- (2002). Combinations of Tense and Modality. *Pages 135–165 of*: Gabbay, D., & Guenther, F. (eds), *Handbook of Philosophical Logic: Extensions of Classical Logic*. Dordrecht: Reidel.
- Thomason, Richmond, & Gupta, Anil (1980). A Theory of Conditionals in the Context of Branching Time. *The Philosophical Review*, 89(1), 65–90.
- Tichý, Pavel (1976). A Counterexample to the Stalnaker-Lewis Analysis of Counterfactuals. *Philosophical Studies*, 29, 271–273.
- Veltman, Frank (2005). Making Counterfactual Assumptions. *Journal of Semantics*, 22, 159–180.
- Walters, Lee (2009). Morgenbesser's Coin and Counterfactuals with True Components. *Proceedings of the Aristotelian Society*, 109(3), 365–379.
- Weatherston, Brian (2001). Indicative and Subjunctive Conditionals. *The Philosophical Quarterly*, 51(203), 200–216.
- Werner, Tom (2006). Future and Non-Future Modal Sentences. *Natural Language Semantics*, 14(3), 235–255.
- Willer, Malte (2013). New Dynamics for Epistemic Modality. *Philosophical Review*, 122(1), 45–92.
- Williamson, Timothy (1996). Knowing and Asserting. *The Philosophical Review*, 105(4), 489–523.

- (2000). *Knowledge and its Limits*. Oxford: Oxford University Press.
- (2007). *The Philosophy of Philosophy*. Oxford: Blackwell.
- Won, Chiwook (2009). Morgenbesser's Coin, Counterfactuals, and Causal Versus Probabilistic Independence. *Erkenntnis*, **71**, 345–354.
- Woodward, James (2003). *Making Things Happen: A Theory of Causal Explanation*. Oxford: Oxford University Press.
- Worsnip, Alex (2015). Possibly False Knowledge. *Journal of Philosophy*.
- Yablo, Stephen (2011). A Problem About Permission and Possibility. *Pages 270–294 of: Egan, Andy, & Weatherson, Brian (eds), Epistemic Modality*. Oxford: Oxford University Press.
- (2014). *Aboutness*. Princeton University Press.
- Yalcin, Seth (2007). Epistemic Modals. *Mind*, **116**(464), 983–1026.
- (2011). Nonfactualism About Epistemic Modality. *Pages 295–332 of: Egan, Andy, & Weatherson, Brian (eds), Epistemic Modals*. Oxford: Oxford University Press.
- (2015). Modalities of Normality. *In: Charlow, Nate, & Chrisman, Matthew (eds), Deontic Modals*. Oxford: Oxford University Press.
- Yong, Qian. 2013. Typological Stage of Counterfactuals in Chinese. *Pages 329–338 of: 27th Pacific Asia Conference on Language, Information, and Computation*.
- Zipf, George Kingsley (1949). *Human Behavior and the Principle of Least Effort*. Cambridge: Addison-Wesley.