# 'Might' Counterfactuals[1]

Ginger Schultheis

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## 1 Introduction

Consider the following 'might' counterfactual.

(1) If Matt had gone to the parade, David might have gone to the parade.

The *epistemic thesis* is the thesis that a 'might' counterfactual like (1) has the same meaning as (2).[2]

(2) Maybe, if Matt had gone to the parade, David would have gone to the parade.

The epistemic thesis seems plausible. If I assert (1), I am committed to leaving open the possibility that David would have gone to the parade if Matt had. Consider:

(3) #If Matt had gone to the parade, David might have gone to the parade. But if Matt had gone to the parade, David would not have gone.

(3) is unacceptable, and the epistemic thesis provides a simple, natural explanation of this fact. It says that (3) is equivalent to the Moorean (4).

(4) #Maybe, if Matt had gone to the parade, David would have gone to the parade. But if Matt had gone to the parade, David would not have gone.

Despite its plausibility, the epistemic thesis has not gained widespread support. Why not? One possible explanation is that we have not had a principled compositional semantics for 'might' counterfactuals—free of ad hoc syntactic assumptions—that predicts the epistemic thesis. For example, in his defense of the epistemic thesis, Stalnaker (1980) assumes that the logical form of a 'might' counterfactual does not match its surface form: at the level of logical form, Stalnaker says, the 'might' takes wide scope over the conditional, rather than narrow scope over its consequent.

[1]I am indebted to David Boylan for feedback on two drafts and many helpful conversations.

[2]This name comes from DeRose (1994). Note that DeRose does not characterize the epistemic thesis using the modal 'maybe' as I do in this paper. He defines the epistemic thesis as follows, where '$\diamond\!\!\rightarrow$' stands for the 'might' counterfactual, '$\Box\!\!\rightarrow$' for the 'would' counterfactual, and '$\diamond_e$' stands for epistemic possibility: $A \diamond\!\!\rightarrow B =_{df} \diamond_e(A \Box\!\!\rightarrow B)$. See DeRose (1999) and Stalnaker (1980) for defenses of the epistemic thesis. See also Mandelkern (2018) for discussion.

My aim in this paper is to give such a compositional semantics. I offer a new theory of the counterfactual interpretation of the modal 'might'—the interpretation it receives in (1)—on which 'might' has the same meaning as 'maybe would'. And I will show that, when coupled with a plausible semantics for 'if' clauses, my theory validates the epistemic thesis. Importantly, I will make no revisionary syntactic assumptions: I will assume that 'would' and 'might' counterfactuals have the logical forms that they appear to have.

The paper opens in §2 with a new account of the epistemic and temporal interpretation of 'may'. I defend a *referential selection semantics* on which 'may' has roughly the same meaning as 'maybe will'. In §3, I combine this referential selection semantics for 'may' with a semantics for the past tense. The result is a semantics for the counterfactual interpretation of 'might' on which it has the same meaning as 'maybe would'. In §4, I discuss the implications that my account has for a familiar thesis in the literature on conditionals: the Duality Thesis. §5 concludes.

## 2 'May'

I start by introducing two facts about 'may': first, that 'may' often has the same meaning as 'maybe will'; and second, that a 'may' conditional ⌜if A, may B⌝ often has the same meaning as ⌜maybe, if A, will B⌝.[3]

### 2.1 Two Facts About 'May'

Condoravdi (2002) introduces a distinction between the *temporal orientation* of a modal and the *temporal perspective* of a modal. Temporal orientation concerns the time at which the sentence that is the modal's scope—the modal's *prejacent*—is evaluated. Consider:

(9) Matt could lift his hand (yesterday).

(10) Matt may go to the wedding (tomorrow).

(9) has past orientation: the prejacent of 'could' is about past events—namely,

[3]Both observations also hold for the epistemic interpretation of 'might'. (5) has the same meaning as (6). And (7) has the same meaning as (8).

(5) Matt might go to the wedding.

(6) Maybe, Matt will go to the wedding.

(7) If Matt cancels his appointment, he might go to the wedding.

(8) Maybe, if Matt cancels his appointment, he will go to the wedding.

whether Matt lifted his hand yesterday. (10) has future orientation: the prejacent of 'may' is about future events—namely, whether Matt goes to the wedding tomorrow.

The temporal perspective of a modal concerns the time at which the modality is evaluated. (9) has past perspective: it says that Matt *was* able, yesterday, to lift his hand. (10) has present perspective: it says it is *now* possible that Matt will go to the wedding.

The first fact about 'may' is that 'may' claims often have *future orientation* and *present perspective*.[4] Consider:

(11) Matt may go to the wedding.

(12) John may miss his flight.

(11) is interpreted as saying that it is now epistemically possible that Matt will go to the wedding at some future time. That is to say, (11) is heard as equivalent to:

(13) Maybe, Matt will go to the wedding.

Likewise, (12) is interpreted as saying that it is now epistemically possible that John will miss his flight at some future time. That is to say, (12) is heard as equivalent to:

(14) Maybe, John will miss his flight.

In what follows, I will understand the observation that 'may' often has present perspective and future orientation as saying that 'may' often has the same meaning as 'maybe will.'

(Note that 'may' does not always have future orientation. Consider:

(15) Sarah may be sleeping in the other room.

(15) has present perspective and *present* orientation: it says that is possible, right now, that Sarah is sleeping, right now, in the other room. I will set 'may' claims with present orientation to one side for now. I will return to them in §2.5.)

The second fact about 'may' concerns 'may' conditionals. Consider:

(16) If Matt cancels his appointment, he may go to the wedding.

Notice that (16) seems to have the same meaning as both (17) and (18).

(17) If Matt cancels his appointment, maybe he will go to the wedding.

(18) Maybe, if Matt cancels his appointment, he will go to the wedding.

That (16) has the same meaning as (17) follows from the fact that 'may' means

[4]See Enc (1996), Condoravdi (2002), Arregui (2007), and Stowell (2004).

maybe will in (16). But that (16) has the same meaning as (18) does not follow from this fact: saying that 'may' means maybe will does not explain why 'maybe' can take wide scope over the conditional.

How might we explain this second fact—the fact that (16) has the same meaning as (18), and more generally, that ⌜if A, may B⌝ often has the same meaning as ⌜maybe, if A, will B⌝?

Here is one idea. Start with Kratzer's *restrictor semantics* on which 'if' clauses act as restrictors on modals in the consequents of conditionals.[5] Now, if 'may' means maybe will, then there are two parts to the meaning of 'may': the 'maybe' part and the 'will' part. Many linguists and philosophers say that 'will' is also a modal.[6] Let's suppose they're right. Then the consequent of (16) in effect contains two modals: 'maybe' and 'will'. Suppose we say the 'if' clause restricts 'will' but not 'maybe'. That will allow 'maybe' to take wide scope over the conditional without changing its meaning, and so we will predict that (16) says the same thing as (18).[7]

This is the idea I will pursue. In the next section, I introduce a *referential selection semantics* for 'will'. I model the modal part of the meaning of 'will' with Cariani & Santorio's (2018) *selection semantics* and the temporal part of the meaning of 'will' with a *referential semantics* that mimics referential theories of tense. I will then introduce a parallel referential selection semantics for 'may', and I will show that, when combined with a plausible restrictor semantics for 'if' clauses and a semantics for 'maybe', the theory captures our two observations.

### 2.2 Referential Selection Semantics

I begin with some preliminary remarks about syntax. When it is said that 'will' is a modal, what is usually meant is that 'will' contains a modal morpheme—often called 'woll'—that it shares with 'would': 'will' is composed of 'woll' under a present tense operator ('Pres') and 'would' is composed of 'woll' under a past tense operator ('Past').[8] Consider (19).

(19) Matt will go to the wedding.

I will assume that the logical form of (19) involves 'will' scoping over a tenseless phrase. Given our assumption that 'will' is composed of 'woll' under present

[5]Kratzer (1981, 1986).

[6]See Abusch (1997), Condoravdi (2002), Kaufman (2005), Copley (2009), Klecha (2014), Cariani & Santorio (2018), and Cariani (2021).

[7]I do not claim that this is the only way to explain our two observations. But it is one natural way to do so, and, as we will in §3, it works especially well for predicting the epistemic thesis.

[8]Abusch (1997) and Condoravdi (2002).

tense, this gives us the following logical form for (19).

(20) Pres [ Woll [ Matt go to the wedding]]

If 'woll' is a modal, what kind of modal is it? In contemporary semantic theories, ordinary modals like 'must' and 'may' are *quantificational*: 'must' is a universal quantifier over possible worlds and 'may' is an existential quantifier over possible worlds. I have been persuaded by Cariani & Santorio that 'woll' is unlike these ordinary modals. It is not a quantificational modal. Instead, it is what they call a *selection modal*: 'woll' selects a world from the historically possible worlds and says that its prejacent is true in that world.

To make this more precise, we introduce two semantic parameters: a modal base $\mathsf{m}$ and a selection function $\mathsf{f}$. The modal base takes a world $w$ and a time $t$ and returns the set $\mathsf{m}(w, t)$ of *historical alternatives* to $w$ at $t$: the set of worlds that are exactly like $w$ up to $t$. The selection function $\mathsf{f}$ takes a world $w$ and a proposition A and returns the 'closest' world to $w$ where A is true.[9] $\mathsf{f}$ satisfies two constraints.

**Success**
$\mathsf{f}(\mathrm{A}, w) \in \mathrm{A}$

**Minimality**
If $w \in \mathrm{A}$, then $\mathsf{f}(\mathrm{A}, w) = w$

The selection semantics for 'woll' then says, roughly, that ⌜woll A⌝ is true, in a world $w$, if and only if A is true in the world that is selected from the set of historical alternatives to $w$.

I will use this selection semantics to model the modal meaning of 'woll'. What about its temporal meaning? 'woll' talks about the future: 'will' talks about the future of the present, and 'would' talks about the future of the past. For example:

(21) Later today I will make dinner.

(22) Later that day I would make dinner.

There are different ways to model the temporal meaning of 'woll'. I will propose a *referential* account on which 'woll' refers to a particular, contextually-determined time.[10] Formally, I will say that 'woll' is indexed to a free variable

[9] The selection function comes from Stalnaker's (1968) semantics for conditionals.

[10] A more standard account of the temporal meaning of 'woll' is the so-called *Ockhamist semantics* on which 'woll' is an existential quantifier over future times. The main reason to prefer a referential account is that 'will' is scopeless with respect to negation: (23) and (24) are true in exactly the same situations.

(23) It's not the case that it will rain.

whose value is supplied by a contextually-supplied assignment function $\mathsf{g}$, and $\ulcorner \text{woll}_j\ \text{A} \urcorner$ tells us that A is true at $\mathsf{g}(j)$. To capture the fact that 'woll' talks about the future, I will say that $\ulcorner \text{woll}_j\ \text{A} \urcorner$ presupposes that $\mathsf{g}(j)$ is no earlier than the time supplied by tense, and I will model this presupposition as a definedness condition.[11]

Before I introduce the referential selection semantics for 'woll', I need to introduce one last bit of terminology. I will say that a *temporal proposition* is a function from worlds to a function from times to truth values—or, equivalently, a set of world-time pairs. An *atemporal proposition* is a function from worlds to truth values—or, equivalently, a set of worlds. When I need to be clear about whether I am talking about a temporal or atemporal proposition—as in the semantic entries—I will indicate the type of the proposition in a subscript: $\langle s, t\rangle$ is the type of an atemporal proposition and $\langle i, st\rangle$ is the type of a temporal proposition.

Where $\mathsf{g}$ is an assignment function, $\mathsf{m}$ is a modal base, and $\mathsf{f}$ is a selection function, we have the following entry for 'woll'.

**Referential Selection Semantics for 'Woll'**

$$[\![\text{Woll}_j]\!]^{\mathsf{g},\mathsf{m},\mathsf{f}} = \lambda \text{A}_{\langle i,st\rangle} \underline{\lambda t : t \leq \mathsf{g}(j)} \lambda w. \text{A}(\mathsf{g}(j))(\mathsf{f}(\mathsf{m}(w,t),w))$$

This says that '$\text{woll}_j$' denotes a function that takes a temporal proposition A, a time $t$, and a world $w$ and returns true if and only if A is true at $\mathsf{g}(j)$—a time no earlier than $t$—in the world $u$ that is selected from the set $\mathsf{m}(w,t)$ of historical alternatives to $w$, at $t$. Importantly, $w$ is one of $w$'s historical alternatives: $w \in$

(24) It will not rain.

The Ockhamist semantics does not predict scopelessness. The referential account does. (For discussion of scopelessness, see Cariani & Santorio (2018) and Cariani (2021).) Another account that predicts scopelessness is the *extension semantics* given by Abusch (1997) and Condoravdi (2002) on which'woll' extends the time of evaluation into the future. Let $\mathsf{ext}(t) = \{t' : t' \geq t\}$. The extension semantics says that $\ulcorner \text{woll A} \urcorner$ is true at a time $t$ iff A is true in $\mathsf{ext}(t)$. The reason that I do not adopt this account is that I do not know how it can make sense of the future perfect:

(25) I will have finished dinner.

I assume that (25) has the following logical form.

(26) Will[Perfect[I finish dinner]]

On a standard semantics, $\ulcorner \text{Perfect A} \urcorner$ is true at $t$ iff A is true some time before $t$. If we combine this semantics for the Perfect with the extension semantics for 'will', we predict that (25) is true at $t$ iff I finish dinner at some time that precedes $\mathsf{ext}(t)$, and hence, iff I finish dinner before $t$. This is wrong. (A similar problem arises with 'may': see footnote 16.)

Note that my main arguments will not turn on my decision to use a referential account. The core of my theory would be preserved if I replaced the referential semantics with an Ockhamist or extension semantics.

[11]This referential theory of 'woll' parallels referential theories of tense. See Partee (1973) and Heim (1994).

$\mathsf{m}(w,t)$. So it follows from Minimality that the selected historical alternative to $w$ is $w$: $\mathsf{f}(\mathsf{m}(w,t),w) = w$. (The underlined part of the entry is the definedness condition: the time supplied by tense must be no later than $\mathsf{g}(j)$.[12])

Earlier I said that 'will' is composed of the modal 'woll' under a present tense operator, Pres. I will assume a referential theory of tense: tenses are indexed to free variables whose values are determined by our contextually-supplied variable assignment $\mathsf{g}$. $\ulcorner \text{Pres}_\text{i}\ \text{A} \urcorner$ says that A is true at $\mathsf{g}(i)$ and presupposes that $\mathsf{g}(i)$ overlaps with the time of the context.

We can now combine this semantics for tense with our semantics for 'woll' to give a semantics for 'will'. Where $\mathsf{g}$ is an assignment function, $\mathsf{m}$ is a modal base, $\mathsf{f}$ is a selection function, and $\mathsf{c}$ is a context, we have the following entry. (For simplicity I suppress the presupposition of tense.)

**Semantics for 'Will'**

$$\begin{aligned}
[\![\text{Will A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}} &= [\![\text{Pres}_\text{i}\ [\text{Woll}_\text{j}\ \text{A}]]\!]^{\mathsf{g},\mathsf{f},\mathsf{m},\mathsf{c}} \\
&= [\![\text{Woll}_\text{j}]\!]^{\mathsf{g},\mathsf{f},\mathsf{m},\mathsf{c}}([\![\text{A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}})([\![\text{Pres}_\text{i}]\!]^{\mathsf{g},\mathsf{f},\mathsf{m},\mathsf{c}}) \\
&= [\lambda \text{A}_{\langle i,st\rangle} \lambda t : t \leq g(j) \lambda w.\text{A}(\mathsf{g}(j))(\mathsf{f}(\mathsf{m}(w,t),w))](\mathsf{g}(i)) \\
&= [\lambda t : t \leq \mathsf{g}(j) \lambda w.[\![\text{A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}}(\mathsf{g}(j))(\mathsf{f}(\mathsf{m}(w,t),w))](\mathsf{g}(i)) \\
&= \lambda w.[\![\text{A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}}(\mathsf{g}(j))(\mathsf{f}(\mathsf{m}(w,\mathsf{g}(i)),w))
\end{aligned}$$

To see how this works, let's look an example. Consider:

(30) I will make dinner.

(30) has the following logical form.

(31) [$\text{Pres}_\text{i}$[$\text{Woll}_\text{j}$[I make dinner]]

To determine whether (31) is true, in a world $w$, we check whether (32) below is true, in $w$, at the time $\mathsf{g}(i)$ supplied by Pres.

[12] One might wonder why I do not say that '$\text{woll}_\text{j}$' presupposes that $\mathsf{g}(j)$ is *later* than the time supplied by tense. There are at least two reasons. One is that there are present-directed uses of 'will'. Here is one example due to Cariani (2021).

(27) The laundry will be done by now.

The second reason is that when 'woll' occurs under Past it can refer to a time that overlaps with the time supplied by Past.

(28) In those days, when I came home from work, he would be sleeping on the couch.

The same is true of counterfactual uses of 'would'.

(29) If I had come home from work, he would have been sleeping on the couch.

(32) $\text{Woll}_j$[I make dinner]

And to determine whether (32) is true in $w$ at $g(i)$, we find the world $u$ that is selected from the set of historical alternatives to $w$, at $g(i)$. Then we ask whether, in $u$, I make dinner at $g(j)$—the time introduced by 'woll'. Since $w$ is one of $w$'s historical alternatives, it follows from Minimality that $u = w$. And so we predict that (30) is true, in $w$, if and only if I make dinner in $w$ at $g(j)$.

That completes our referential selection semantics for 'will'. I will now introduce a parallel referential selection semantics for 'may'. I will say (roughly) 'may' means maybe will. Accordingly, there will be two parts to the meaning of 'may' on my theory. First, the 'maybe' part: 'may' quantifies over epistemic possibilities. Second, the 'will' part: ⌜may A⌝ says that ⌜will A⌝ is true in an epistemically possible world.

Let's make this more precise. To model the 'maybe' part of the meaning of 'may' I adopt a standard quantificational treatment: 'may' existentially quantifies over epistemically possible worlds.

To model the 'will' part of the meaning of 'may' I assume that 'may', like 'will', is indexed to a free variable $j$ whose value is supplied by our variable assignment g: $g(j)$ will represent the temporal orientation of the 'may' claim—the time at which the prejacent of 'may' is evaluated. I will assume that '$\text{may}_j$', like '$\text{woll}_j$', presupposes that $g(j)$ is no earlier than the time supplied by tense.

I will also assume that temporal perspective—the time at which the modality is evaluated—is determined by tense: 'may' receives a present-perspective interpretation because it occurs under present tense.[13]

We are now ready to state the semantics for 'may'. Where $\mathsf{E}_c$ is a contextually-supplied epistemic accessibility relation, we have the following semantic entry. (Once again I suppress the presupposition of tense for simplicity.)

**Referential Selection Semantics for 'May'**

$[\![\text{Pres}_i[\text{May}_j\ \text{A}]]\!]^{g,f,m,c}$

$= [\![\text{May}_j]\!]^{g,f,m,c}([\![\text{A}]\!]^{g,m,f,c})([\![\text{Pres}_i]\!]^{g,f,m,c})$

$= [\lambda \text{A}_{\langle i,st\rangle} \lambda t : t \leq g(j) \lambda w. \exists v \in \mathsf{E}_c(w), \text{A}(g(j))(f(m(v,t),v))]([\![\text{A}]\!]^{g,m,f,c})([\![\text{Pres}_i]\!]^{g,f,m,c})$

$= [\lambda t : t \leq g(j) \lambda w. \exists v \in \mathsf{E}_c(w), [\![\text{A}]\!]^{g,m,f,c}(g(j))(f(m(v,t),v))](g(i))$

[13]This is a bit imprecise. What I should really say is that 'may' is composed of a modal morpheme—call it 'mo'—under the Present. In the next section, I will argue that, when 'might' receives a counterfactual interpretation, 'might' is composed of 'may' under Past. Strictly speaking, what I should say is that, in these instances, 'might' is composed of the modal morpheme 'mo' under Past.

$$= \lambda w.\exists v \in \mathsf{E}_c(w), [\![\mathrm{A}]\!]^{g,m,f,c}(g(j))(f(m(v, g(i)), v))$$

This says ⌜may A⌝ is true, in a world $w$, if and only if, for some epistemically possible world $v$, A is true at $g(j)$—a time no earlier than the present time $g(i)$—in the world $u$ that is selected from the set $m(v, g(i))$ of historical alternatives to $v$ at $g(i)$.

Consider an example. Take (11), repeated below.

(11) Matt may go to the wedding.

I assume that (11) has the following logical form.

(33) $\mathrm{Pres}_i$ [$\mathrm{May}_j$[Matt go to the wedding]]

To determine whether (33) is true, in a world $w$, we check whether

(34) $\mathrm{May}_j$[Matt go to the wedding]

is true, in $w$, at $g(i)$—the time supplied by the Present. And to determine whether (34) is true at $g(i)$, in $w$, we check whether there's an epistemically possible world $v$ such that

(35) Matt goes to the wedding.

is true at $g(j)$—the time supplied by 'may'—in the world $u$ that is selected from $m(v, g(i))$, the set of historical alternatives to $v$, at the present time $g(i)$. Remember, $v$ is one of $v$'s historical alternatives. It follows from Minimality, then, that $u = v$. And so we predict that (11) is true, in $w$, if and only if there's an epistemically possible world $v$ where Matt goes to the wedding at a contextually-determined time $g(j)$, no earlier than $g(i)$.

### 2.3 'Maybe' and 'If' Clauses

I began this section with two observations about 'may'. The first was that 'may' often means maybe will. The second was about 'may' conditionals. Recall:

(16) If Matt cancels his appointment, he may go to the wedding.

We observed that (16) seems to have the same meaning as (18), repeated below.

(18) Maybe, if Matt cancels his appointment, he will go to the wedding.

To show how we can use the referential selection semantics to predict these observations, we need only introduce a standard semantics for 'maybe' and 'if' clauses.

I assume that 'maybe' denotes a function that takes an *atemporal proposition* A and returns another atemporal proposition—the proposition that there is an epistemically possible world where A is true. For example:

(13) Maybe, Matt will go to the wedding.

In (13), 'maybe' denotes a function that takes the atemporal proposition that Matt will go to the wedding, and returns the atemporal proposition that it is epistemically possible that Matt will go to the wedding.

Here is the semantic entry for 'maybe'.

**Semantics for 'Maybe'**

$$[\![\text{Maybe A}]\!]^{g,f,m,c} = [\lambda A_{\langle s,t\rangle} \lambda w. \exists v \in E_c(w), A(v)]([\![A]\!]^{g,m,f,c})$$

$$= \lambda w. \exists v \in E_c(w), [\![A]\!]^{g,m,f,c}(v)$$

Following Kratzer (1981, 1986)—and many others since—I will assume a restrictor semantics for 'if' clauses. On this view, the semantic role of an 'if'-clause is to update a modal base with the antecedent of the conditional. Where $m$ is any modal base, and $A_{\langle s,t\rangle}$ is any atemporal proposition, I will let $m + A_{\langle s,t\rangle}$ be the modal base updated with $A_{\langle s,t\rangle}$.

**Updated Modal Base**

$$m + A_{\langle s,t\rangle}(w,t) = m(w,t) \cap A_{\langle s,t\rangle}$$

Then we state the semantics for conditionals as follows.

**Semantics for 'If' Clauses**

$$[\![\text{If A, B}]\!]^{g,f,m,c} = [\![B]\!]^{g,f,m+A,c}$$

A conditional with antecedent A and consequent B is true relative to a modal base $m$ if and only if B is true relative to the updated modal base $m + A$.

## 2.4 Predictions

We can now show that our theory captures our two observations.

First we show that when 'may' and 'will' are co-indexed, 'may' has the same meaning as 'maybe will'. Consider (11) and (13), repeated below.

(11) Matt may go to the wedding.

(13) Maybe, Matt will go to the wedding.

We are assuming that (11) and (13) have the logical forms in (36) and (37), respectively.

(36) $\text{Pres}_i$ [$\text{May}_j$ [Matt go to the wedding]]

(37) Maybe[$\text{Pres}_i$ [$\text{Woll}_j$ [Matt go to the wedding]]]

We want to show that (36) is true if and only if (37) is true. First observe that (36) is true, in a world $w$, if and only if (38) below is true in $w$ at $g(i)$—the time introduced by the Present.

(38) $\text{May}_j$ [Matt go to the wedding]

And (38), in turn, is true in $w$ at $g(i)$ if and only if there's an epistemically possible world $v$ where Matt goes to the wedding at $g(j)$—the time introduced by 'may'. (This follows from our referential selection semantics for 'may'.) To say that there's an epistemically possible world $v$ where Matt goes to the wedding at $g(j)$—a time no earlier than $g(i)$—is just to say that there's an epistemically possible world $v$ where (39) below is true. (This follows from our referential selection semantics for 'will'.)

(39) $\text{Pres}_i$[$\text{Woll}_j$[I make dinner later today]]

And finally, to say that there's a world $v$ that is epistemically accessible from $w$ where (39) is true is just to say that the 'maybe' claim (37) is true in $w$. (This follows from our semantics for 'maybe'.)

Next we show that when 'may' and 'will' are co-indexed, ⌜if A, may B⌝ has the same meaning as ⌜maybe, if A, will B⌝. Recall:

(16) If Matt cancels his appointment, he may go to the wedding.

(18) Maybe, if Matt cancels his appointment, he will go to the wedding.

Ignoring the internal structure of the 'if' clauses, I assume that (16) and (18) have the logical forms in (40) and (41), respectively.

(40) If [Matt cancels his appointment] [$\text{Pres}_i$[$\text{May}_j$[Matt go to the wedding]]]

(41) Maybe [If [Matt cancels his appointment] [$\text{Pres}_i$[$\text{Woll}_j$[Matt go to the wedding]]]]

We want to show that (40) is true if and only if (41) is true. Let *Cancel* be the proposition that Matt cancels his appointment. By our semantics for 'if' clauses, (40) is true, in a world $w$, and relative to modal base $\mathsf{m}$, if and only if (42) below is true in $w$, relative to the updated modal base $\mathsf{m} + \textit{Cancel}$.

(42) $\text{Pres}_i$[$\text{May}_j$[Matt go to the wedding]]

Since 'may' means maybe will, (42) is true in $w$, relative to $\mathsf{m} + \textit{Cancel}$ if and only if (43) below is true in $w$, relative to $\mathsf{m} + \textit{Cancel}$.

(43) Maybe[$\text{Pres}_i$[$\text{Woll}_j$[Matt go to the wedding]]]

By our semantics for 'maybe', (43) is true in $w$, relative to $\mathsf{m} + \textit{Cancel}$ if and only if, for some epistemically possible world $v$, (44) is true in $v$, relative to $\mathsf{m} + \textit{Cancel}$.

(44) $\text{Pres}_i[\text{Woll}_j[\text{Matt go to the wedding}]]$

To say there's an epistemically possible world $v$ at which (44) is true relative to $\mathsf{m} + \textit{Cancel}$ is just to say that there's an epistemically possible world $v$ at which (45) below is true, relative to our original modal base $\mathsf{m}$. (This follows from another application of our restrictor semantics.)

(45) If [Matt cancels his appointment] $[\text{Pres}_i[\text{Woll}_j[\text{Matt go to the wedding}]]]$

And finally to say that there's a world $v$ epistemically accessible from $w$ where (45) is true is just to say that the 'maybe' claim (41) is true in $w$. (This follows from our semantics for 'maybe'.)

## 2.5 Present Orientation

Earlier I mentioned that 'may' does not always have future orientation. Recall:

(15) Sarah may be sleeping in the other room.

(15) has present present perspective and present orientation: it says that it is now possible that Sarah is now sleeping in the other room. To account for this, I will assume that the time supplied 'may' in (15) is a present time. With this assumption in place, we predict that (15) is true if and only if there's an epistemically possible world where, right now, Sarah is sleeping in the other room.[14]

I treat the present perfect 'may have' in a similar way. Consider:

(46) Sarah may have finished dinner.

I assume that (46) has the logical form in (47): 'may' scopes over a perfect operator ('Perfect'), which, in turn, scopes over a tenseless phrase.

(47) Pres[May[Perfect[Sarah finish dinner]]]

I assume the following semantics for the Perfect.[15]

**Semantics for Perfect**

$[\![\text{Perfect}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}} = \lambda \text{A}_{\langle i,st\rangle} \lambda t \lambda w. \exists t' < t, \text{A}(t')(w)$

Let's assume that the time introduced by 'may' in (46) is a present time. We will then predict that (46) is true if and only if there's an epistemically possible world where (48) below is true at $\mathsf{g}(i)$—the time supplied by the Present.

[14] As Condoravdi (2002) observes, the temporal interpretation of 'may' depends on whether its prejacent is eventive or stative. When 'may' combines with an eventive sentence, it always has future orientation; when it combines with a stative sentence, it usually has present orientation. The question of how temporal interpretation is determined by lexical aspect is important but falls beyond the scope of this essay.

[15] Condoravdi (2002).

(48) Perfect[Sarah finish dinner]

By our semantics for Perfect, (48) is true, at the present time $g(i)$, if and only if Sarah finishes dinner some time before $g(i)$. And so, putting everything together, we predict that (46) is true if and only if there's an epistemically possible world where Sarah finished dinner some time before the present time.[16]

## 3 'Might'

In the previous section, I introduced two facts about 'may': first, that 'may' often means maybe will; and second that ⌜if A, may B⌝ often has the same meaning as ⌜maybe, if A, will B⌝. In this section, I introduce two parallel observations about the counterfactual interpretation of 'might'.

### 3.1 Two Facts About Counterfactual 'Might'

First, counterfactual 'might' seems to have the same meaning as 'maybe would'. For example, (1) seems to have the same meaning as (51).

(1) If Matt had gone to the parade, David might have gone to the parade.

(51) If Matt had gone to the parade, maybe David would have gone to the parade.

Likewise, (52) seems to have the same meaning as (53).

(52) If John won the lottery tomorrow, he might quit philosophy.

(53) If John won the lottery tomorrow, maybe he would quit philosophy.

[16] Condoravdi (2002) offers an alternative account of the temporal interpretation of 'may'. She defends an extension semantics that parallels the extension semantics for 'will' discussed in footnote 9. On this view, ⌜may A⌝ is true at a time $t$ iff, roughly, it is epistemically possible that A is true in $\text{ext}(t)$. I noted that the extension semantics for 'will' appears to make the wrong predictions about 'will have'. The extension semantics for 'may' faces a parallel problem. Consider (46), repeated below.

(46) Sarah may have finished dinner.

The default interpretation of (46) is a present perfect interpretation. But that is not the only interpretation that (46) can receive. Consider:

(49) By the time David gets home, Sarah may have finished dinner.

(49) has a future perfect interpretation. It has the same meaning as (50).

(50) By the time David gets home, maybe Sarah will have finished dinner.

The extension semantics says that (46) has only one reading—a present perfect reading. By contrast, a referential semantics can account for both readings. (46) receives a present perfect interpretation when the time supplied by 'may' is the present time, and it receives a future perfect interpretation when the time supplied by 'may' is a future time.

We find the same thing when we look at unembedded occurrences of counterfactual 'might'. For example, (54) seems to say the same thing as (55).

(54) I'm sorry that we didn't try the tofu. Sarah might have loved it.

(55) I'm sorry that we didn't try the tofu. Maybe Sarah would have loved it.

Likewise, (56) seems to have the same meaning as (57).

(56) I didn't know Sarah dropped out of art school. She might have become a great photographer.

(57) I didn't know Sarah dropped out of art school. Maybe she would have become a great photographer.

Moreover, asserting the counterfactual 'might have' claim while denying the corresponding 'would have' claim sounds incoherent.

(58) #I'm sorry that we didn't try the tofu. Sarah might have loved it. But she wouldn't have.

(59) #I didn't know Sarah dropped out of art school. She might have become a great photographer. But she wouldn't have.

(58) and (59) are completely unacceptable.

The second fact about counterfactual 'might' is the epistemic thesis that I introduced at the start of the paper: a 'might' counterfactual like (1), repeated below, seems to have the same meaning as (2).

(1) If Matt had gone to the parade, David might have gone to the parade.

(2) Maybe, if Matt had gone to the parade, David would have gone to the parade.

Importantly, the fact that (1) has the same meaning as (2) does not follow from our first fact: saying that 'might' means maybe would does not explain why 'maybe' can take wide scope over the conditional.

How might we explain this second fact—that (1) has the same meaning as (2), and more generally, that ⌜if had been A, might have been B⌝ has the same meaning as ⌜Maybe, if had been A, would have been B⌝?

I think that we should explain it in the same way as we explained the parallel observation about 'may' conditionals. Assume that 'if' clauses act as restrictors on modals in the consequents of conditionals. If 'might' means maybe would, then the consequent of (1) in effect contains two modals: 'maybe' and 'would'. Suppose we say the 'if' clause restricts 'would' but not 'maybe'. That will allow 'maybe' to take wide scope over the conditional without changing its meaning,

and so we will predict the epistemic thesis—that (1) says the same thing as (2).

This is the idea I will pursue. In §3.2, I introduce a semantics for 'would' and 'might' on their counterfactual interpretations, building on the referential selection semantics for 'will' and 'may' introduced in §2. In §3.3 I will show that the theory captures our two observations.

### 3.2 Semantics for 'Would' and 'Might'

I assume that 'would' is composed of 'woll' under a past tense operator, Past. I also assume that, when 'might' receives a counterfactual interpretation, it is the past of 'may', and so, in these instances, 'might' is composed of 'may' under Past.[17] (I defend this assumption about 'might' in §3.3.) We already know what 'woll' and 'may' mean: $\ulcorner \text{woll}_j\ A \urcorner$ says that A is true at $g(j)$ in the selected historically possible world. And $\ulcorner \text{may}_j\ A \urcorner$ says that $\ulcorner \text{woll}_j\ A \urcorner$ is true in an epistemically possible world. The task that remains, then, is to say what Past means.

There are two theories about the meaning of the Past in counterfactual uses of 'would'. The first theory is the *temporal past* theory.[18] On this view, the Past has a purely temporal meaning: it shifts the time of evaluation to the past.[19] To see how this works, consider (61).

(61) If Matt had gone to the parade, David would have gone to the parade.

I assume that the consequent of (61) involves 'would' scoping over a Perfect operator, which, in turn, scopes over a tenseless phrase. Ignoring the internal structure of the antecedent, this means that (61) has the following logical form.

(62) If [Matt go to the parade] [Past [Woll [Perfect [David go to the parade]]]]

According to the temporal past theory, the Past takes us back to a time when it was still historically possible for Matt to go to the parade—some time shortly

[17] What about the epistemic interpretation of 'might'? As I see it, the relationship between 'might' and 'may' is similar to the relationship between 'can' and 'could'. Often 'could' is interpreted as the past of 'can', as in (10), repeated below.

(10) Matt could lift his hand yesterday.

Other times 'could' is not interpreted as the past of 'can'. In (60) 'could' receives an epistemic interpretation.

(60) The keys could be in the car.

As I understand it, there are two ways to understand this ambiguity. On one approach, the ambiguity is due to the fact that 'could' contains a past tense morpheme when it occurs in (10), but not when it occurs in (60). On the second approach, 'could' contains a past tense morpheme in both occurrences, but the past tense is not interpreted in the standard temporal way in (60). Both of these theories can be applied to 'might'. I will not take a stand on which is better.

[18] I borrow this name from Khoo (2022).

[19] See Ippolito (2013) and Khoo (2015) for defenses of the temporal past theory.

before the parade, let's suppose—and the counterfactual (62) is true, roughly, if and only if the 'woll' conditional,

(63) If [Matt go to the parade] [Woll [Perfect [David go to the parade]]]

is true at this past time.[20]

The second theory—the *modal past* theory—says that the Past in counterfactual uses of 'would' does not have its usual temporal meaning. It has a special modal interpretation: it shifts a modal parameter, such as a world or a modal base, and we evaluate (63) relative to this counterfactual world or counterfactual modal base.[21]

I will adopt the temporal past theory. I will assume a referential semantics for Past, paralleling our referential semantics for Present: ⌜$\text{Past}_i$ A⌝ says that A is true at $g(i)$ and presupposes that $g(i)$ precedes the time of utterance.

Note that I am adopting the temporal past hypothesis purely for ease of exposition. My central project is to defend a referential selection semantics for 'would' and 'might' that captures our two observations. To do this, I need to assume a particular semantics for the Past, and the temporal past theory is in some ways more straightforward. I believe it is possible to reconstruct my theory in a modal past framework, but I do not have the space to do so in this paper.

We can now put our semantics for Past together with our referential selection semantics for 'woll' and 'may' to give a semantics for 'would' and 'might'. We have the following entry for 'would'. (To simplify the entry, I suppress the presupposition of the Past.)

**Referential Selection Semantics for 'Would'**

$$
\begin{aligned}
[\![\text{Would A}]\!]^{g,m,f,c} &= [\![\text{Past}_i\ [\text{Woll}_j\ \text{A}]]\!]^{g,f,m,c} \\
&= [\![\text{Woll}_j]\!]^{g,f,m,c}([\![\text{A}]\!]^{g,m,f,c})([\![\text{Past}_i]\!]^{g,f,m,c}) \\
&= [\lambda \text{A}_{\langle i,st\rangle} \lambda t : t \leq g(j) \lambda w. \text{A}(g(j))(f(m(w,t),w))]([\![\text{A}]\!]^{g,m,f,c})(g(i)) \\
&= [\lambda t : t \leq g(j) \lambda w. [\![\text{A}]\!]^{g,m,f,c}(g(j))(f(m(w,t),w))](g(i)) \\
&= \lambda w. [\![\text{A}]\!]^{g,m,f,c}(g(j))(f(m(w,g(i)),w))
\end{aligned}
$$

To see how this works, let's walk through the predicted meaning of a 'would' counterfactual. Take (61), repeated below.

(61) If Matt had gone to the parade, David would have gone to the parade.

[20] This is a greatly simplified presentation of the temporal past theory. But it will suffice for my purposes. See Khoo (2022) for a much more detailed discussion.

[21] See Iatridou (2000) and Schulz (2014).

We are assuming that (61) has the logical form in (62), repeated below. (I continue to ignore the internal structure of the antecedent.)

(62) If [Matt go to the parade] [Past [Woll [Perfect [David go to the parade]]]]

Let *Parade* be the proposition that Matt goes to the parade. Remember, we are assuming a restrictor semantics: (62) is true relative to a modal base $\mathsf{m}$ if and only if

(64) [$\text{Past}_\text{i}$ [$\text{Woll}_\text{j}$ [Perfect [David go to the parade]]]]

is true relative to the updated modal base $\mathsf{m}+$*Parade*. It follows from our semantics for Past that (64) is true relative to $\mathsf{m}+$ *Parade*, if and only if

(65) $\text{Woll}_\text{j}$[Perfect[David go to the parade]]

is true, relative to $\mathsf{m}+$ *Parade*, at $\mathsf{g}(i)$—the time supplied by Past. Assume that $\mathsf{g}(i)$ is some time shortly before the parade. Importantly, shifting the time of evaluation to the past shifts the temporal input to the modal base. To determine whether (65) is true in a world $w$, relative to $\mathsf{m}+$ *Parade*, at the past time $\mathsf{g}(i)$, we find the world $u = \mathsf{f}(\mathsf{m}+\textit{Parade}(w, \mathsf{g}(i)), w)$ that is selected from $\mathsf{m}+$ $\textit{Parade}(w, g(i))$: the set of historical alternatives to $w$, *at the past time* $g(i)$, where I go to the parade. And we ask whether (66) below is true, in $u$, at $g(j)$—the time introduced by 'woll'.

(66) Perfect[David go to the parade]

Putting everything together, and simplifying, we predict that (61) is true, in a world $w$, if and only if David goes to the parade in the closest world to $w$ where I go to the parade, that was historically possible shortly before the parade.

That completes our semantics for 'would'. I turn now to 'might'. Putting our semantics for Past together with our referential selection semantics for 'may' gives us the following entry.

**Referential Selection Semantics for 'Might'**

$$
\begin{aligned}
[\![\text{Might A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}} &= [\![\text{Past}_\text{i}\ [\text{May}_\text{j}\ \text{A}]]\!]^{\mathsf{g},\mathsf{f},\mathsf{m},\mathsf{c}} \\
&= [\![\text{May}_\text{j}]\!]^{\mathsf{g},\mathsf{f},\mathsf{m},\mathsf{c}}([\![\text{A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}})([\![\text{Past}_\text{i}]\!]^{\mathsf{g},\mathsf{f},\mathsf{m},\mathsf{c}}) \\
&= [\lambda \text{A}_{\langle i,st\rangle} \lambda t : t \leq \mathsf{g}(j) \lambda w. \exists v \in \mathsf{E}_\mathsf{c}(w), \text{A}(\mathsf{g}(j))(\mathsf{f}(\mathsf{m}(v,t),v))]([\![\text{A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}})(\mathsf{g}(i)) \\
&= [\lambda t : t \leq \mathsf{g}(j) \lambda w. \exists v \in \mathsf{E}_\mathsf{c}(w), [\![\text{A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}}(\mathsf{g}(j))(\mathsf{f}(\mathsf{m}(v,t),v))](\mathsf{g}(i)) \\
&= \lambda w. \exists v \in \mathsf{E}_\mathsf{c}(w), [\![\text{A}]\!]^{\mathsf{g},\mathsf{m},\mathsf{f},\mathsf{c}}(\mathsf{g}(j))(\mathsf{f}(\mathsf{m}(v,\mathsf{g}(i)),v))
\end{aligned}
$$

This tells us that ⌜Might A⌝ is true if and only if ⌜may A⌝ is true at the time supplied by Past.

### 3.3 Predictions

We can now show that our theory captures our two observations.

First we show that when 'might' and 'would' are co-indexed, 'might' has the same meaning as 'maybe would'. Recall:

(54) I'm sorry we didn't try the tofu. Sarah might have loved it.

We want to show that the 'might' claim (67) has the same meaning as (68).

(67) Sarah might have loved it.

(68) Maybe, Sarah would have loved it.

I assume that (67) and (68) have the logical forms in (69) and (70), respectively.

(69) $\text{Past}_i[\text{May}_j[\text{Perfect}[\text{Sarah love it}]]]$

(70) $\text{Maybe}[\text{Past}_i[\text{Woll}_j[\text{Perfect}[\text{Sarah love it}]]]]$

We want to show that (69) is true if and only if (70) is true. To see that this is so, first observe that (69) is true, in a world $w$, if and only if

(71) $\text{May}_j$ [Perfect [Sarah love it]]

is true in $w$ at $g(i)$—the time supplied by Past. And (71), in turn, is true in $w$ at $g(i)$ if and only if there's an epistemically possible world $v$ where

(72) $\text{Woll}_j$[Perfect[Sarah love it]]

is true at $g(i)$. (That follows from our semantics for 'may' and 'woll'.) To say that there's an epistemically possible world $v$ where (72) is true at $g(i)$ is just to say that there's an epistemically possible world $v$ where

(73) $\text{Past}_i[\text{Woll}_j[\text{Perfect}[\text{Sarah love it}]]]$

is true. (That follows from our semantics for Past.) And finally, to say that there's an epistemically possible world $v$ where (73) is true is just to say that the 'maybe' claim (70) is true in $w$. (This follows from our semantics for 'maybe'.)

Next we establish the epistemic thesis. Specifically, we show that when 'might' and 'would' are co-indexed, (1) has the same meaning as (2).

(1) If Matt had gone to the parade, David might have have gone to the parade.

(2) Maybe, if Matt had gone to the parade, David would have gone to the parade.

I am assuming that (1) and (2) have the structures in (74) and (75), respectively.

(74) If [Matt had gone to the parade] $[\text{Past}_i[\text{May}_j[\text{Perfect}[\text{David go to the parade}]]]]$

(75) Maybe [If [Matt had gone to the parade] [$\text{Past}_i$[$\text{Woll}_j$[Perfect[David go to the parade]]]]]

We want to show that (74) is true if and only if (75) is true. I will leave the full proof to the appendix, but here is the basic explanation. Let *Parade* be the proposition that Matt goes the parade. By our restrictor semantics for 'if' clauses, we know that (74) is true, relative to a modal base m, if and only if

(76) $\text{Past}_i$[$\text{May}_j$[Perfect[David go to the parade]]]

is true relative to the updated modal base, m + *Parade*. It follows from our proof that 'might' means maybe would, that (76) is true, in a world *w*, and relative to the modal base m + *Parade* if and only if

(77) Maybe[$\text{Past}_i$[$\text{Woll}_j$[Perfect[David go to the parade]]]]

is true in *w*, relative to m + *Parade*. And by another application of our restrictor semantics, it follows that (77) is true in *w*, relative to m + *Parade*, if and only if the 'maybe' claim (75) is true in *w*, relative to our original modal base m.

### 3.4 'Might' as Past of 'May'

My account of counterfactual 'might' assumes that, in certain modern English uses, 'might' is the past tense form of the modal 'may'. Historically, 'might' did indeed serve as the past tense form of 'may', much like 'should', 'would', and 'could' were past tense forms of 'shall', 'will', and 'can', respectively.[22] While it is evident that 'would' and 'could' are still used today as past tense forms of 'will' and 'can', the question remains: does 'might' also persist as a past tense form of 'may' in certain grammatical constructions?

One powerful argument that it does is that, in certain environments in which the past tense form of a modal verb must be used, we find that 'might' can also be used. Take counterfactuals. If the consequent of a counterfactual is headed by a modal verb, the modal must be in its past tense form. For example, while (78) is acceptable, (79) is not.

(78) If I were a millionaire, I would buy a house in Hawaii.

(79) #If I were a millionaire, I will buy a house in Hawaii.

Likewise, (80) is fine, but (81) is not.

(80) If I had caught the train, I could have made it to the meeting.

(81) #If I had caught the train, I can have made it to the meeting.

Of course, the consequent of a counterfactual can be headed by 'might'.

[22] See Bybee (1995) and Stowell (2004).

(82) If I were a millionaire, I might buy a house in Hawaii.

(83) If I had caught the train, I might have made it to the meeting.

Importantly, 'may' cannot be used in place of 'might' in either of these sentences.

(84) #If I were a millionaire, I may buy a house in Hawaii.

(85) #If I had caught the train, I may have made it to the meeting.

For a second example, consider modals under past-marked attitude verbs. Suppose David believed in 2015 that Sarah would win the marathon the following year. We can use (86), but not (87), to describe David's beliefs.

(86) David believed in 2015 that Sarah would win the marathon in 2016.

(87) #David believed in 2015 that Sarah will win the marathon in 2016.

Likewise, if David believed that Sarah *could* win the marathon the following year, we can use (88), but not (89), to describe David's beliefs.

(88) David believed in 2015 that Sarah could win the marathon in 2016.

(89) # David believed in 2015 that Sarah can win the marathon in 2016.

Abusch (1997) observes that 'might' can also be used describe David's beliefs.[23]

(90) David believed in 2015 that Sarah might win the marathon in 2016.

Once again, we find that we cannot replace 'might' with 'may'.

(91) ? David believed in 2015 that Sarah may win the marathon in 2016.

We have seen that if a modal verb occurs in the counterfactual or under a past-marked attitude verb like 'believe', the modal must be in its past tense form. That 'might' can occur in both of these environments suggests that, in these instances, 'might' is also a past tense form—the past tense form of 'may'.[24]

There are other uses of 'might' in which it appears to be the past tense form of 'may'. Consider this example in which 'may' is used as a synonym for 'can'.[25]

[23]See Stowell (2004) for discussion of examples like this and for a defense of the idea that 'might' (in some instances) contains a past tense morpheme.

[24]Note that I have ignored certain complexities in my discussion of modals under past-marked attitudes. In so-called *double-access* sentences, a present-tensed clause can be embedded under a past-tensed attitude verb. Suppose I say to you:

(92) David said Matt is sick.

(92) conveys that Matt's being sick holds at the time of David's utterance and at the time of my utterance. This double-access interpretation is unavailable in (91). See Ogihara (1995) and Stowell (2008).

[25]Thanks to David Boylan for suggesting this non-archaic example of this abiilitative of 'may'.

(93) I always leave the dumpster unlocked so that it may be emptied.

To form the past of (93), we use 'might'.

(94) I always left the dumpster unlocked so that it might be emptied.

Or consider (95), in which 'will' and 'may' are used to talk about habitual actions.

(95) These days he will often show up late. He may send a few emails and take a few calls, and then he will take off early.

If we want to talk about past habitual actions, we use 'would' instead of 'will' and 'might' instead of 'may'.

(96) In those days, he would often show late up late. He might send a few emails and take a few calls, and then he would take off early.

## 4 Duality

I have offered a a compositional semantics for the counterfactual interpretation of 'might' on which 'might' means maybe would, and I have shown that, when coupled with a plausible semantics for 'if' clauses and a semantics for 'maybe', the theory secures the epistemic thesis. Before concluding, let us reflect on the consequences of my proposal for a familiar thesis in the literature on conditionals: Duality.

Duality says the 'might' counterfactual ⌜if had been A, might have been B⌝ and the 'would not' counterfactual ⌜if had been A, would not have been B⌝ are contradictories: exactly one is always true. Consider (1), repeated below.

(1) If I had gone to the parade, David might have gone to the parade.

According to Duality, (1) is true if and only, it's not the case that, if I had gone to the parade, David would *not* have gone to the parade.

Duality should be rejected. Given plausible background assumptions, it is inconsistent with the principle of Conditional Excluded Middle—the principle that ⌜if A, would B, or if A, would not B⌝ is always true. And the case for Conditional Excluded Middle is strong. Over the last several decades, a series of powerful arguments in favor of Conditional Excluded Middle have been put forward. These arguments show, among other things, that Conditional Excluded Middle plays an indispensable role in our best theories of the probabilities of conditionals, and in our best theories of the interaction between conditionals and other logical operators, such as negation and quantifiers.[26]

[26]For discussion of the role of Conditional Excluded Middle in accounting for the probabilities of conditionals, see van Fraassen (1976), Kaufmann (2009), Bacon (2015), and Mandelkern

But not everyone agrees that Duality should be rejected in favor of Conditional Excluded Middle. Perhaps the main obstacle to accepting this conclusion is that Duality immediately explains why speeches like (3) are invariably defective.

(3) #If Matt had gone to the parade, David might have gone to the parade. But if Matt had gone to the parade, David wouldn't have gone.

According to Duality, (3) is defective because it is inconsistent. If we reject Duality in favor of Conditional Excluded Middle, we must abandon this explanation.

Stalnaker (1981) and DeRose (1999) suggest the epistemic thesis as an alternative explanation. According to the epistemic thesis, (3) is defective because it is equivalent to the Moorean contradiction (4).

(4) # Maybe, if Matt had gone to the parade, David would have gone. But if Matt had gone to the parade, David wouldn't have gone.

But while there are principled, compositional accounts of 'might' counterfactuals that predict Duality, there are not, to my knowledge, principled, compositional accounts that predict the epistemic thesis.

My aim in this paper has been to fill this gap. I have defended a new theory of the counterfactual interpretation of the modal 'might' on which 'might' has roughly the same meaning as 'maybe would'. And I have shown that, when coupled with a plausible semantics for 'if' clauses, my theory validates the epistemic thesis. Importantly, I have made no revisionary syntactic assumptions: I assumed that 'might' counterfactuals and 'would' counterfactuals have the logical forms that they appear to have.

It is worth mentioning a second reason to prefer an explanation of the badness of (3) in terms of the epistemic thesis to an explanation in terms of Duality. According to the epistemic thesis, counterfactual 'might have' has a partly epistemic meaning: 'might have' means maybe would have. According to Duality, it has a purely metaphysical meaning—just as its dual 'would have' has a purely metaphysical meaning.

There is evidence to suggest that 'might have' does indeed have a partly epistemic meaning, as the epistemic thesis maintains. We can see this most clearly by contrasting 'might have' with the purely metaphysical modal 'could have'.

First observe that while 'could have' can be paired with 'wouldn't have', 'might have' cannot. Consider:

(2018). For the role of Conditional Excluded Middle in accounts of the interaction between conditionals and negation and quantifiers, see Higginbotham (1986), von Fintel and Iatridou (2002), and Klinedinst (2011).

(97) #David might have hidden the treasure in the attic. But he wouldn't have.

(98) David could have hidden the treasure in the attic. But he wouldn't have.

(97) is very bad, but (98) is acceptable.[27]

Notice that the contrast between (97) and (98) parallels the more familiar contrast between (99) and (100).

(99) #David may hide the treasure in the attic. But he won't.

(100) David could hide the treasure in the attic. But he won't.

The natural explanation of this difference is that while (99) is a Moorean contradiction, (100) is not—to say that David could hide the treasure in the attic is not to say that maybe he will. If counterfactual 'might' means maybe would, we can give a similar explanation of the contrast between (97) and (98). (97) is a Moorean contradiction: the speaker is saying David wouldn't have hidden the treasure in the attic, and, at the same time, saying that, maybe, he would have. But (98) is not—to say that David could have hidden the treasure in the kitchen is not to say that, maybe, he would have.

Second, observe that while 'could have' occurs naturally under epistemic 'maybe', 'might have' does not. Consider:

(101) If David had gone to the party, maybe he could have met Sarah.

(101) is a natural expression of uncertainty about what could have happened at the party. But now consider:

(102) ? If David had gone to the party, maybe he might have met Sarah.

(102) sounds considerably less natural to my ears. If counterfactual 'might' means maybe would, we can easily account for the oddness of (102): it is equivalent to the redundant (103).

(103) ? If David had gone to the party, maybe he would have maybe met Sarah.

## 5 Conclusion

I have offered a new theory of the counterfactual interpretation of the modal 'might' on which 'might' has roughly the same meaning as 'maybe, would'. And I showed that, when coupled with a plausible semantics for 'maybe' and for 'if' clauses, the theory secures the epistemic thesis.

[27]Thanks to David Boylan.

## Appendix

In this appendix, I prove the epistemic thesis.

(104) $[\![\text{Maybe, [if A, [Past}_i\ \text{[Woll}_j\text{B]]]]}]\!]^{g,m,f,c}(w) = [\![\text{If A, [Past}_i\ \text{[May}_j\text{B]]}]\!]^{g,m,f,c}(w)$

For readability, I let $\mathbf{A} = [\![\text{A}]\!]^{g,m,f,c}$ and $\mathbf{B} = [\![\text{B}]\!]^{g,m+\mathbf{A},f,c}$.

*Proof.*

$$
\begin{aligned}
&[\![\text{Maybe, [if A, [Past}_i\ \text{[Woll}_j\text{B]]]]}]\!]^{g,m,f,c}(w)\\
&= [\![\text{Maybe}]\!]^{g,m,f,c}([\![\text{If A, [Past}_i\text{[Woll}_j\text{B]]}]\!]^{g,m,f,c})(w)\\
&= [\![\text{Maybe}]\!]^{g,m,f,c}([\![\text{Past}_i\text{[Woll}_j\text{B]}]\!]^{g,m+\mathbf{A},f,c})(w)\\
&= [\lambda \text{A}_{\langle s,t\rangle}\lambda w.\exists v \in \mathsf{E}_c(w), \text{A}(v)]([\![\text{Past}_i\text{[Woll}_j\text{B]}]\!]^{g,m+\mathbf{A},f,c})(w)\\
&= [\lambda w.\exists v \in \mathsf{E}_c(w), [\![\text{Past}_i\text{[Woll}_j\text{B]}]\!]^{g,m+\mathbf{A},f,c}(v)](w)\\
&= [\lambda w.\exists v \in \mathsf{E}_c(w), [\![\text{Woll}_j]\!]^{g,m+\mathbf{A},f,c}(\mathbf{B})(g(i))(v)](w)\\
&= [\lambda w.\exists v \in \mathsf{E}_c(w), [\lambda \text{C}_{\langle i,st\rangle}\lambda t : t \leq g(j)\lambda u_s.\text{C}(\mathsf{f}(\mathsf{m}+\mathbf{A}(u,t),u))(g(j))](\mathbf{B})(g(i))(v)](w)\\
&= [\lambda w.\exists v \in \mathsf{E}_c(w), [\lambda t : t \leq g(j)\lambda u_s.\mathbf{B}(\mathsf{f}(\mathsf{m}+\mathbf{A}(u,t),u))(g(j)](g(i))(v)](w)\\
&= [\lambda w.\exists v \in \mathsf{E}_c(w), \mathbf{B}(\mathsf{f}(\mathsf{m}+\mathbf{A}(v,g(i)),v))(g(j))](w)\\
&= [\lambda t : t \leq g(j)\lambda w.\exists v \in \mathsf{E}_c(w), \mathbf{B}(\mathsf{f}(\mathsf{m}+\mathbf{A}(v,t),v))(g(j))](g(i))(w)\\
&= [\lambda \text{C}_{\langle i,st\rangle}\lambda t : t \leq g(j)\lambda w.\exists v \in \mathsf{E}_c(w), \text{C}(\mathsf{f}(\mathsf{m}+\mathbf{A}(v,t),v))(g(j))](\mathbf{B})(g(i))(w)\\
&= [\![\text{May}_j]\!]^{g,m+\mathbf{A},f,c}(\mathbf{B})(g(i))(w)\\
&= [\![\text{May}_j]\!]^{g,m+\mathbf{A},f,c}(\mathbf{B})([\![\text{Past}_i]\!]^{g,m+\mathbf{A},f,c})(w)\\
&= [\![\text{Past}_i\ \text{[May}_j\text{B]}]\!]^{g,m+\mathbf{A},f,c}(w)\\
&= [\![\text{If A, [Past}_i\ \text{[May}_j\text{B]]}]\!]^{g,m,f,c}(w)
\end{aligned}
$$

□

## References


Abusch, Dorit (1997). "Sequence of Tense and Temporal De Re." *Linguistics and Philosophy*, 20 (1): 1-50.

Arregui, Ana (2007). "When Aspect Matters: The Case of Would-Conditionals." *Natural Language Semantics*, 15 (3):221-264.

Bacon, Andrew (2015). "Stalnaker's Thesis in Context." *Review of Symbolic Logic*, 8 (1):131-163.

Bybee, J. (1995). "The Semantic Development of Past Tense Modals in English." *Modality in grammar and discourse*, 503-517

Cariani, Fabrizio (2021). "The Modal Future: A Theory of Future-Directed Thought and Talk." Cambridge, UK: Cambridge University Press.

Cariani, Fabrizio & Santorio, Paolo (2018). "Will done Better: Selection Semantics, Future Credence, and Indeterminacy." *Mind*, 127 (505):129-165.

Condoravdi, Cleo (2002). "Temporal Interpretation of Modals: Modals for the Present and for the Past. In D. Beaver, L. Casillas, B. Clark & S. Kaufmann (eds.), *The Construction of Meaning*, Palo Alto, CA: CSLI Publications.

Copley, Bridget (2009). "The Semantics of the Future." Routledge.

DeRose, Keith. (1994). 'Lewis on 'Might' and 'Would' Counterfactual Conditionals." *Canadian Journal of Philosophy* 24(3): 413–418.

DeRose (1999). "Can it be that it would have been even though it might not have been?" *Philosophical Perspectives* 13: 385–413.

Enc, Murvet (1996). "Tense and Modality." In Shalom Lappin (ed.), *The Handbook of Contemporary Semantic Theory*. Blackwell: 345–358.

Heim, Irene (1994). "Comments on Abusch's Theory of Tense." In Hans Kamp (ed.), *Ellipses, Tense, and Questions*: 143-170

Higginbotham, James (1986). "Linguistic Theory and Davidson's Program in Semantics." In E. LePore (ed.) *Truth and Interpretation: Perspectives on the Philosophy of Donald Davidson*, Cambridge: Blackwell: 29–48.

Iatridou, Sabine (2000). "The Grammatical Ingredients of Counterfactuality." *Linguistic Inquiry* 31(2): 231–270.

Ippolito, Michela (2013). 'Subjunctive Conditionals: A Linguistic Analysis.' *Linguistic Inquiry Monograph* (Series 65), Cambridge: MIT Press.

Kaufman, Stefan (2005). "Conditional Truth and Future Reference." *Journal of semantics* 22 (3): 231-280.

Kaufmann, Stefan (2009). 'Conditionals right and left: Probabilities for the whole family.' *Journal of Philosophical Logic* 38, pp. 1-53.

Khoo, Justin (2015). 'On Indicative and Subjunctive Conditionals.' *Philosopher's Imprint* 15, pp. 1-40.

Khoo, Justin (2022). 'The meaning of *If*.' Oxford University Press.

Klecha, Peter (2013). "Diagnosing Modality in Predictive Expressions." *Journal of Semantics* 31(3): 443–455.

Klinedinst, Nathan. (2011). "Quantified Conditionals and Conditional Excluded Middle." *Journal of Semantics* 28: 149–170.

Kratzer, Angelika (1981). 'The notional category of modality.' In H. Eikmeyer and H. Rieser (eds.), Words, worlds, and contexts: New approaches in word semantics, 38–74. de Gruyter.

Kratzer, Angelika (1986). "Conditionals." *Chicago Linguistics Society* 22(2): 1–15.

Lewis, David (1973). *Counterfactuals*. Basil Blackwell Ltd., Malden, MA.

Mandelkern, Matthew (2018). "Talking about worlds." *Philosophical Perspectives*, 32 (1): 298-325.

Partee, Barbara (1973). "Some Structural Analogies Between Tenses and Pronouns in English. *Journal of Philosophy* 70 (18):601-609.

Schulz, Katrin (2014). 'Fake tense in conditional sentences: A modal approach." *Natural Language Semantics*

Stalnaker, Robert (1968). 'A Theory of Conditionals.' In Nicholas Rescher (ed.) *Studies in Logical Theory*(American Philosophical Quarterly Monographs 2), Oxford: Blackwell. pp. 98-112.

Stalnaker, Robert (1975). 'Indicative conditionals.' *Philosophia* 5, pp. 269-286.

Stalnaker, Robert (1980). "A Defense of Conditional Excluded Middle.' In William L. Harper, Robert Stalnaker and Glenn Pearce (eds.),*Ifs: Conditionals, beliefs,*

*decision, chance, and time*: 87–105.

Stowell, Tim (2004). "Tense and Modals." in J. Guéron & J. Lecarme (eds.) *The Syntax of Time*. Cambridge, MA: MIT Press.

Stowell, T. (2007). "The Syntactic Expression of Tense." *Lingua*, 117 (2): m437-463.

Todd, Patrick (2016). "Future Contingents Are All False! On Behalf of a Russellian Open Future." *Mind* 125(499): 775–98.

von Fintel, Kai, and Sabine Iatridou (2002). "If and When If -Clauses Can Restrict Quantifiers." Unpublished draft.

van Fraassen, Bas C. (1976). 'Probabilities of conditionals.' In *Foundations of probability theory, statistical inference, and statistical theories of science*, Springer, pp. 261 - 308.