Weak and Strong Necessity*

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Draft of May 2015

“‘Ought’ and ‘Must’ — they are contemptible auxiliaries.”

George Eliot†

Abstract

This paper develops an account of the meaning of ‘ought’, and of the distinction between weak necessity modals (‘ought’, ‘should’) and strong necessity modals (‘must’, ‘have to’). I argue that what makes weak necessity modals “weak” is that they suspend the assumption that the necessity of the modal’s complement holds in the actual world. ‘Ought ϕ’ can be accepted without presupposing that certain considerations (norms, values, goals, expectations, etc.) relevant to the necessity of ϕ actually apply, and hence without accepting that ϕ is necessary in the actual world. The proposed account captures a wide range of semantic and pragmatic phenomena — e.g., concerning the relative felicity of weak and strong necessity modals in context, the relation between weak and strong necessity modals and standing contextual assumptions, the morphosyntactic properties of expressions of weak necessity cross-linguistically, and the contrasting performative properties of weak and strong necessity modals. These phenomena have previously resisted systematic explanation. Several ways of formally implementing the proposed account in static and dynamic semantic frameworks are also developed. The resulting discussion sheds light on more general issues concerning context-sensitivity, presupposition, counterfactuality, mood, assertion, and performativity.

*Thanks to Matthew Chrisman, Brendan Dill, Jan Dowell, Irene Heim, Ezra Keshet, Dan Lassiter, Paul Portner, Bernhard Salow, Robert Shanklin, Bob Stalnaker, Eric Swanson, and audiences at SALT 22, MIT, Northwestern, and USC for discussion. Preliminary versions of this paper, first posted Fall 2011, have been published in A. Chereches (Ed.), Semantics and Linguistic Theory 22 (2012), 43–64; and in SILK [2013], ch. 3.

†Mary Garth, in Middlemarch, Bk. 2, Ch. 14. Shamelessly modified from the original.
1 Introduction

A notion of 'ought' is central in many areas of philosophical discourse — normative and metanormative theory, deontic logic, and epistemology, among others. "A primitive ought," it has even been said, "is the basic conceptual atom that gives normative concepts their special character" (Gibbard 2006: 738). But there has been surprisingly little inquiry on the distinctive features of the meaning and use of 'ought'. 'Ought' is often treated as relevantly equivalent to a range of expressions of obligation and necessity. Richard Brandt observed as much half a century ago: "Philosophers often use the following expressions as approximate equivalents: 'It is X's duty to do A'; 'It is obligatory for X to do A'; 'It would be wrong for X not to do A'; and 'X ought to do A'" (1964: 374). Not much has changed. Here is Åqvist:

[D]eontic logic... is the logical study of the normative use of language and... its subject matter is a variety of normative concepts, notably those of obligation (prescription), prohibition (forbiddance), permission and commitment. The first one among these concepts is often expressed by such words as 'shall', 'ought' and 'must', the second by 'shall not', 'ought not' and 'must not', and the third one by 'may'; the fourth notion amounts to an idea of conditional obligation, expressible by 'if... then it shall (ought, must) be the case that _ _ _'. (Åqvist 2002: 148)

There is something to the assumption that (e.g.) deontic readings of 'Ought ϕ', 'Must ϕ', etc. uniformly express that ϕ is necessary in some sense related to obligation. But it is false.

There is a robust body of linguistic evidence supporting a distinction in strength among necessity modals, with so-called "weak" necessity modals ('ought', 'should', 'be supposed to'), on the one hand, and "strong" necessity modals ('must', 'have to', '(have) got to', 'be required to'), on the other. For instance, even holding the reading of the modals fixed, the former can be followed by the latter, but not vice versa, as reflected in (1).

(1) a. I ought to help the poor. In fact, I must.
   b. I must help the poor. #In fact, I ought to.

Similarly, (2a) is consistent in a way that (2b) is not.

(2)  a. I should help the poor, but I don't have to.
    b. #I must help the poor, but it's not as if I should.

Although ‘ought’ and ‘should’ are stronger than possibility modals like ‘may’ or ‘can’, they are weaker than ‘must’ and ‘have to’. (Additional data will be described in greater detail in due course.)

Despite the robust body of descriptive linguistic data on differences between weak and strong necessity modals, there has been little systematic theoretical investigation of how to capture them. Existing accounts are often developed piecemeal with an eye toward a narrow range of examples. Proceeding in this way runs the risk of producing a theory that is ill-equipped to capture the broader array of data. Theorists’ attention to different subsets of the relevant phenomena can make adjudicating among rival theories difficult, if not premature.

The aim of this paper is to provide a more comprehensive investigation into weak and strong necessity modals. Building on previous work (SILK 2012) I develop an account of the meaning of ‘ought’ and the distinction between weak and strong necessity. This account systematizes a wide range of semantic and pragmatic phenomena: it generalizes across flavors of modality; it elucidates a special role that weak necessity modals play in conversation, deliberation, and planning; it captures contrasting discourse properties of weak and strong necessity modals; and it sheds light on how weak necessity is expressed in other languages. These phenomena have resisted systematic explanation. My goal here isn’t to argue that no other theory can get the data right — although ways in which the proposed account improves upon its rivals will be indicated as points of contrast are made salient. The project is rather to motivate an account of weak necessity that improves in overall empirical coverage and explanatory power. The resulting discussion also sheds light on more general issues concerning context-sensitivity, counterfactuality, presupposition, mood, assertion, and performativity.

The structure of the paper is as follows. §2 presents core data concerning the relative felicity of weak and strong necessity modals in conversation. The sensitivity of weak and strong necessity modals to standing contextual assumptions has been

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2For reasons that will become evident I will focus primarily on ‘ought’ and ‘must’ (§3 n. 49). (Speakers who find using ‘should’ more natural than ‘ought’ may substitute ‘should’ for ‘ought’ in examples throughout the paper; analogous substitutions shouldn’t be made for examples with ‘must’, unless indicated otherwise.) I address certain differences among weak necessity modals and among strong necessity modals in §3.

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underappreciated in the literature. The examples provided in this section bring into relief what I take to be the crucial difference between weak and strong necessity modals. §3 presents the basics of my proposed account of weak and strong necessity modals, and uses it to provide a preliminary diagnosis of the examples from §2. §4 examines data concerning how weak necessity is expressed cross-linguistically to motivate several more formal implementations of the more-or-less informal account from §3. What unifies these implementations is the following idea: What makes weak necessity modals “weak” is that they suspend the standard indicative assumption that the possibilities being talked about are live possibilities in the conversation. ‘Ought $\phi$’ can be accepted without accepting that $\phi$ is a necessity in the actual world. The resulting account gives precise expression to the informal idea that ‘ought’ is weaker than ‘must’, and captures various ways in which ‘ought’, unlike ‘must’, patterns with past-marked modal forms. The account also improves on the prominent account of the cross-linguistic data in von Fintel & Iatridou 2008. §5 argues that the formal semantics given in §4 helps explain several puzzles concerning entailment and performativity with ‘ought’ and ‘must’. §6 considers an alternative account of the relevance of common ground assumptions to the weak/strong necessity distinction, developed in recent work by Aynat Rubinstein (2012). §7 concludes and raises directions for future research. A technical Appendix outlines an update semantics which formalizes the contrasting updates with weak and strong necessity modals.

2 ‘Ought’ and ‘must’ in context

This section presents a range of examples which highlight a crucial conversational difference between weak and strong necessity modals. I want to flag that judgments concerning some of the examples discussed in this section, as well as in the following sections, may be vague for some speakers and may vary given subtle changes in context. Indeed this context-sensitivity in speaker judgments will be part of what needs to be explained. The context-sensitivity of ‘ought’ and ‘must’ has been largely overlooked in theoretical discussions (though see nn. 4 38). Diagnosing its precise nature constitutes an important desideratum for a successful account.

A primary goal of conversation is to share and coordinate our expectations, values, goals, and plans. Sometimes we assert propositions outright. We commit to settling on their truth for the remainder of the conversation. But sometimes we

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$^3$As usual, I assume as an idealization a monotonic model of information gathering on which information is only added and, once added, isn't subject to further discussion.
don’t wish to impose such a strong restriction on the future course of the conversation. We may want to propose that someone is obligated to do something but be unsure about whether there might be competing norms at play that would outweigh or cancel her obligation. Or we may want to proceed as if some proposition is true because it follows from our evidence while remaining open to the possibility that our evidence is misleading. I suggest that the role of weak necessity modals is to allow us to carry out such goals, make such proposals, and express such states of mind.

Let’s start with the deontic case. Suppose I am considering whether to fight in the Resistance or take care of my ailing mother. I mention that the value of family, which supports my helping my mother over my fighting, is important, and you agree. But the issue is acknowledged to be complex, and it isn’t settled in the conversation whether there might be more important competing values. Sensitive to this, you may find it more appropriate to express your advice that I help my mother by using ‘ought’ than by using ‘must’, as in (3)

(3) Me: Family is very important.
You: I agree. You ought to (/should, ?/must, /?have to) tend to your mother.

But if we settle that family is of primary importance, as in (4), it can become more natural to use ‘must’ and for us to accept that I have to help my mother.

(4) Me: Family is most important — more important than country.
You: I agree. You must (/have to, /?ought to, /?should) tend to your mother.

This kind of case highlights a crucial difference between weak and strong necessity modals. In both (3) and (4), the value of family is accepted in the conversation. How you are to express your advice that I help my mother depends on the status in the context of the value of family vis-à-vis other potentially relevant values. My having an actual obligation to help my mother depends on the value of family being more important (or at least not less important) in my situation than any competing

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4See Woisetschläger 1977 ch. 5 and McNamara 1993 ch. 3 for related examples and prescient early discussion of the context-dependence of ’ought’ and ‘must’. See Rubinstein 2012 and Silk 2012 for important recent discussion. Rubinstein doesn’t consider epistemic examples, and she has an alternative take on the data; I return to her account in §9.

5I use ‘?’ to indicate that using the marked item is dispreferred. Thus ‘?’ marks a weaker infelicity than ‘#’.

6This is contrary to suggestions regarding similar examples in Rubinstein 2012 55–60 (see §8).

7For present purposes I will bracket potential complications concerning incomparabilities and genuine dilemmas (irresolvable conflicts of obligations). Note that the semantics proposed in the
value. Using ‘must’ is preferred if it is settled in the conversation that this condition obtains. What is illuminating is that you can felicitously express your advice that I help my mother using ‘ought’, advice which I may accept, even if it isn’t common ground that this precondition for my having a genuine obligation to help my mother is satisfied. Accepting your ‘ought’ claim needn’t require us to presuppose that the value of family is more important than other potentially competing values.

This conversational contrast between ‘ought’ and ‘must’ is perhaps even clearer in the case of epistemic readings of the modals. Suppose we are working on a class art project, and I ask you where the colored pencils are. Normally you put them in the drawer with the crayons, but sometimes you accidentally put them on the shelf. In this scenario it is more appropriate for you to use ‘ought’ in responding to my question, as in (5).

\[(5) \quad \text{Me: Do you know where the colored pencils are?} \]
\[\quad \text{You: They ought to (/? must) be in the drawer with the crayons.} \]

Suppose, alternatively, that we are looking for the colored pencils together, and you indicate that you have just seen something that leads you to conclude that they are in the drawer. Perhaps you noticed that they weren’t on the shelf, and this is the only other place you think they could be. In this scenario it is more natural for you to use ‘must’, as in (6).

\[(6) \quad \text{Me: Do you know where the colored pencils are?} \]
\[\quad \text{You: They must (/? ought to) be in the drawer with the crayons.} \]

How you express your attitude toward the proposition that the colored pencils are in the drawer depends on the (in)defeasibility of the relevant evidence. Its following from our knowledge (evidence, information) that the colored pencils are in the drawer depends on this not being one of the atypical days when you accidentally put the colored pencils on the shelf. Using the strong necessity modal ‘must’ is preferred if, and only if, you know that conditions are indeed normal in this way. Parallel to the deontic case, what is illuminating is that you can use ‘ought’ even if you aren’t in a position to judge that they are. Accepting your ‘ought’ claim doesn’t require us to presuppose that your evidence is indefeasible.

I want to emphasize three points from these examples. First, ‘Ought ϕ’ doesn’t conventionally communicate that ϕ is in fact necessary (in the relevant sense).\(^8\) We following sections allows dilemmas to be consistently expressed with ‘ought’ but not with ‘must’; see Swanson (2011), Silk (2013) and references therein, for relevant discussion.

\(^8\)I treat ‘ϕ’, ‘ψ’, etc. as schematic letters to be replaced with declarative sentences. For convenience
can accept your deontic ‘ought’ claim in (3) without settling that family is the most important relevant value, and thus without accepting that I have an actual obligation to help my mother. And we can accept your epistemic ‘ought’ claim in (5) without settling that conditions are normal in the relevant respects, and thus without accepting that our evidence (knowledge, information) actually entails that the colored pencils are in the drawer. It is typical — to a first approximation — to gloss deontic notions of necessity as concerning what is obligatory, and epistemic notions of necessity as concerning what follows from one’s evidence (knowledge, information).1 In this sense accepting deontic ‘Ought ϕ’ doesn’t commit one to accepting that ϕ is deontically necessary, and accepting epistemic ‘Ought ϕ’ doesn’t commit one to accepting that ϕ is epistemically necessary.

Second, whether ‘ought’ or ‘must’ is preferred depends on context, in the sense of depending on whether certain preconditions for the truth of the necessity claim (in the above sense) are accepted. If they are accepted, ‘must’ is preferred. But even if they aren’t, we can still use ‘ought’. These points haven’t been noticed in the literature.2

Third, these features of ‘ought’ and ‘must’ aren’t specific to any particular readings of the modals. An adequate account of the weak/strong necessity distinction must generalize across flavors of modality.

The next section develops a preliminary way of capturing these points which is then refined in §4. But first I would like to address one potential concern about the data. It is sometimes hard to know precisely what reading a modal is intended. How can we be sure that the uses of ‘ought’ and ‘must’ in (3)-(4) target (the same flavor of) deontic modality, and that the uses of ‘ought’ and ‘must’ in (5)-(6) target (the same flavor of) epistemic modality? If the modals were receiving different readings, this wouldn’t explain the contrasts in their relative felicity. In saying that the modals have the same type of reading I am not assuming that they receive precisely the same interpretation or are used with precisely the same force. Indeed part of what is to be

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1 Sometimes refer to the proposition expressed by dropping the quotes, and use ‘ϕ’ as short for ‘[[∀ϕ]]’.

2 Even the general point that the relative felicity of ‘ought’ and ‘must’ depends on context has been largely overlooked in previous accounts (though see n.3 for notable exceptions). The semantics for ‘ought’ in Finlay 2009, 2010, Lassiter 2011, and Swanson 2011 have no obvious mechanism for capturing the sort of context-dependence in these examples. Von Fintel & Iatridou 2008 briefly raise the possibility role for context in the interpretation of ‘ought’ claims (pp. 139–140), but the issue isn’t investigated (see §5 for discussion of their account). (See Rubinstein 2012: §2.2 for a similar critique of previous comparative and domain restriction approaches to weak necessity, along with extensive broader critical discussion.)
explained is how the interpretation and discourse properties of ‘ought’ and ‘must’ differ across contexts. For instance, in calling the uses of the modals in (3)–(4) both “deontic” I am not making such assumptions as (e.g.) that they are both “perfor- mative,” that they impose obligations, or that they have (the same) directive force. What is important about the uses of ‘ought’ and ‘must’ in these examples is that they both directly address the practical question of what I am to do. C’s utterance with ‘ought’ in (7) is an appropriate way to object to B’s utterance with ‘must’.

(7)  
A:  Family and country are both important. What’s the thing for me to do?  
B:  The war effort is more important. You must join the Resistance.  
C:  No, I disagree. Your mother needs you. You ought to stay and help her.

But C’s response would be irrelevant if ‘ought’ didn’t target (the same flavor of) deontic modality. Your utterance in (4) settles the practical question at hand: I am to help my mother. Your utterance in (3) doesn’t itself settle the question, but it does address it. The task is to develop a semantic+pragmatic theory that explains precisely how your use of ‘ought’ addresses my practical question of what to do, given that it doesn’t commit us to accepting that I actually have an obligation to help my mother.

Analogous points hold concerning epistemic readings (see also note 25). In calling the uses of the modals in (5)–(6) “epistemic” I am not making such assumptions as (e.g.) that they are factive, that they determine a reflexive accessibility relation, that they express the speakers’ unconditional beliefs or credences, or even that they express the same kind of doxastic attitude toward their prejacent propositions (that the colored pencils are in the drawer). What is important about the uses of ‘ought’ and ‘must’ in these examples is that they both directly address the question of where the colored pencils are. C’s utterance with ‘ought’ in (8) is an appropriate way to object to B’s utterance with ‘must’.

(8)  
A:  Where are the colored pencils?  
B:  They must be on the shelf.  
C:  No, they ought to be in the drawer. Check there first; that’s where I normally put them.

But C’s response would be irrelevant if ‘ought’ didn’t target (the same flavor of) epistemic modality. The task is to develop a semantic+pragmatic theory that explains precisely how your use of ‘ought’ in (5) addresses my question of where the colored pencils are, given that it doesn’t commit us to accepting that the colored pencils are in fact in the drawer.
3 The analysis: Preliminary

To preview, the core of my proposal is this: There is nothing special about the semantics of strong necessity modals. Strong necessity modals are to be given their usual semantics of necessity. 'Must $\phi$' says that $\phi$ is necessary (in the relevant sense, i.e. deontically, epistemically, teleologically, etc.), and predicates the necessity of $\phi$ of the actual world (or world of evaluation). The apparent weakness of weak necessity modals derives from their bracketing the assumption that the necessity of $\phi$ holds in the actual world (or world of evaluation). This informal preliminary characterization of the view raises many questions. The aim of this section is to begin to flesh out the proposal within a standard premise semantic framework for modals. 

\[\] then motivates several more precise implementations in the formal semantics and pragmatics. We will see that the proposed treatment of the weak/strong necessity distinction — as informally stated here, and technically implemented in what follows — captures a wide range of semantic and pragmatic phenomena concerning the meaning and use of weak and strong necessity modals ($\S\S$ 3–5).

Let’s start by examining the sorts of considerations that figure in the interpretation of modals. It is a commonplace that values, norms, preferences, expectations, etc. often come with conditions under which they apply. If I want to go for a run, my desire needn’t be that I go for a run, come what may. More plausibly it is that I go for a run given that it’s sunny, that I’m not injured, that I didn’t just eat a burrito, and so on. Our preferences are often conditional, preferences for certain circumstances. Similarly with moral norms. Suppose you promised Alice that you would help her move. A norm against breaking your promise might be something to the effect that you help Alice unless you made a conflicting promise to Bert, or keeping your promise would lead to some serious harm, and so on. Norms can thus be understood on the model of conditional imperatives, imperatives that enjoin an action or state of affairs given that certain circumstances obtain. Likewise for goals, probabilities, and so on. This captures the intuitive idea that depending on the circumstances, only certain norms, etc. apply, or are “in force.” Fixing terminology, I will call a conditional norm, preference, expectation, etc. a consideration. For a consideration $\phi$ if $C$, $C$ is the consideration’s condition, and $\phi$ is the consideration’s premise, or what the consideration enjoins given $C$. A consideration applies at a world $w$ if its condition is satisfied at $w$. (Categorical considerations can be treated as conditional

\[\] I will omit this parenthetical in what follows, but it should be understood. My general talk about “the necessity of $\phi$” or “$\phi$ being necessary” is neutral among deontic, epistemic, teleological, and other notions of necessity. These more specific notions may be understood in the manner suggested by the informal glosses from $\S\S$ 3–5 and throughout.
on the tautology, and hence apply at any world.)

These points about the considerations with respect to which modals are interpreted can be integrated into a standard premise semantic framework for modals. Following Angelika Kratzer (1977, 1981, 1991), I treat modal expressions as receiving their intended reading (deontic, epistemic, etc.) from a contextually determined set of premises. Since modals can occur in intensional contexts, it is standard to index premise sets to a world of evaluation. Which premise set is relevant for the evaluation of a modal sentence can depend on how things are in the actual world, or on how things could be or could have been. What Little Timmy’s parents command might change from one world to the next. This motivates treating the meaning of ‘what Timmy’s parents prescribe’ in (9) as a function that assigns to every possible world the set of propositions describing the house rules in that world.

(9) In light of what Little Timmy’s parents prescribe, he must be in bed by eight.

Likewise for the meanings of phrases like ‘the relevant circumstances’, ‘what U.S. law provides’, and so on. It is these functions from worlds to premise sets that context is said to supply for the interpretation of modals and which determines the modals’ intended readings. Following Kratzer, call these functions *conversational backgrounds* (written ‘P’). Call the value of a conversational background at a world of evaluation a *premise set* (written ‘P_w’).

Conversational backgrounds afford a natural way of representing the contents of bodies of considerations. Suppose we have a consideration which enjoins \( \phi \) given that conditions \( C \) obtain. We can represent the content of this consideration with a conversational background \( P \) that assigns to every relevant \( C \)-world a premise set that includes \( \phi \). For example, we can encode the content of your desire to go for a run, mentioned above, with a (bouletic) conversational background that assigns a premise set that includes the proposition that you go for a run to worlds in which the weather is nice (among other things). The premises in a premise set thus reflect what follows from a body of considerations — what is enjoined by a body of conditional norms, what is preferred in light of a body of conditional preferences, what is the case in light of a body of evidential relations, etc. — given the relevant circumstances in the evaluation world. An indexed premise set \( P_w \) represents the conclusions of the relevant considerations, given the facts in \( w \).

With this background at hand let’s turn to the semantics. I give strong neces-
sity modals like ‘must’ their usual semantics of necessity. Bracketing some complications that won’t be relevant here, ‘Must $\phi$’ says that the prejacent proposition $\phi$ follows from $P_w$ — where $P_w$ is the premise set that is the value of the given conversational background $P$ at the evaluation world $w$ (formal details to follow). What is important to note here is that the truth of ‘Must $\phi$’ depends on the value of $P$ at the world of evaluation. In order for ‘Must $\phi$’ to be true at $w$, given a conversational background $P$, the circumstances in $w$ must be such that the premise set $P_w$ entails $\phi$. Assuming the evaluation world is the actual world $w_\emptyset$ — or at least a world which, for all that is presupposed in the context, might be the actual world — this predicts that accepting ‘Must $\phi$’ commits one to accepting that $\phi$ is a necessity (in the relevant sense; n. 11) at $w_\emptyset$.

The same doesn’t hold for ‘ought’. As observed above, accepting ‘Ought $\phi$’ doesn’t require accepting that $\phi$ is in fact necessary (in the relevant sense). I suggest that what makes weak necessity modals “weak” is that they bracket whether the necessity of the prejacent holds in the actual world. ‘Ought’ expresses necessity only on the supposition that certain circumstances relevant to the necessity claim obtain and hence that certain relevant considerations apply (SILK 2012). It needn’t be presupposed that these considerations actually do apply. The set of worlds in which the necessity of the prejacent $\phi$ is said to hold — the worlds $w$ such that $P_w$ entails $\phi$ — needn’t be identified with the set of live possibilities in the conversation (the “context set,” the set of worlds compatible with what is mutually presupposed for the purposes of the conversation; STALNAKER 1978).

This certainly isn’t the only difference between weak and strong necessity modals, nor does it mark the only sense of “strength” along which modals can differ. Moreover there will be various ways of implementing it in the formal semantics and pragmatics. For the moment I simply want to highlight how this preliminary account already helps capture how weak necessity modals are well suited to play the sort of role in conversation and planning discussed in §5. Additional properties of weak and strong necessity modals, as well as details of technical implementation, will be

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14For simplicity I assume that our premise sets are consistent, and I don’t distinguish between Kratzer’s modal bases and ordering sources. Dropping these assumptions, the simplified talk in the main text about what follows from $P_w$ can be understood as short for talk about what follows from all maximally consistent subsets of $F_w \cup G_w$ that include $F_w$, where $F_w$ is a modal base that describes some set of relevant background facts and $G_w$ is an ordering source that represents the content of a relevant ideal at the evaluation world. (This still makes the limit assumption (LEWIS 1973: 19–20) that ordering consistent subsets of $F_w \cup G_w$ that include $F_w$ by set inclusion $\subseteq$ yields a set of subsets that are $\subseteq$-maximal. For semantics without the limit assumption, see LEWIS 1973; KRATZER 1981, 1991; SWANSON 2011.)
considered in the following sections.

Asserting ‘Must $\phi$’ commits one to accepting that $\phi$ follows from the considerations that actually apply. In accepting a ‘must’ claim, one must assume that the circumstances in the world verify the necessity of the prejacent, given the relevant considerations. But sometimes placing such a strong constraint on the future course of the conversation would be inapt. Weak necessity modals afford a means of coordinating on the implications of certain of our values, norms, expectations, etc. without having to decisively settle how they apply and weigh against one another in particular circumstances. In uttering ‘Ought $\phi$’ one needn’t assume that the actual circumstances are such that what the relevant considerations enjoin given those circumstances entails $\phi$; one needn’t commit to being in a world $w$ in which $P_w$ entails $\phi$. Accepting ‘Ought $\phi$’ allows us to proceed as if $\phi$ is necessary (in the relevant sense) without having to presuppose that there aren’t any more important competing considerations and while remaining open to new evidence.

The foregoing discussion has been at a fairly high level of abstraction. Let’s make these points more concrete by reconsidering our examples (3)–(6). Start with (3)–(4), reproduced below.

(3) Me: Family is very important.
You: I agree. You ought to (/should, /?must, /?have to) tend to your mother.

(4) Me: Family is most important — more important than country.
You: I agree. You must (/have to, /?ought to, /?should) tend to your mother.

The relevant deontic conversational background $P$ represents the content of the relevant norms and values (normative considerations), and encodes their relative priorities and under what conditions they apply. The value of $P$ at a world of evaluation $w$ — the indexed deontic premise set $P_w$ — represents what is ultimately enjoined by the normative considerations which apply in $w$ given the circumstances in $w$ (SILK 2012, 2013b). The deontic necessity of my helping my mother — my having an obligation to help her — depends on the value of family being more important in my situation than other potentially competing values. Hence in order for my helping my mother to follow from $P_w$, it must be the case that the value of family takes priority in my situation in $w$. Accepting the ‘must’ claim ‘You must tend to your mother’ thus requires committing for the future course of the conversation to being in a world $w$ in which this condition is satisfied and the applicable normative considerations $P_w$ entail that I help my mother. But in (3), unlike in (4), after my assertion is accepted it still isn’t settled whether the value of family does take priority in my situation. So, were you to use ‘must’ you would imply that you are foreclosing certain
possibilities that I have left open. Unless you are in a position to do so, your using ‘must’ is dispreferred. By using ‘ought’ you can leave open the possibility that the value of family might ultimately be outweighed or defeated. If I accept your ‘ought’ claim, we can provisionally proceed as if my helping my mother is required without needing to settle that the value of family is more important than other competing values we accept or may come to accept. (We will return to what exactly we would need to settle on in accepting your ‘ought’ claim in due course.)

I have said that ‘ought’ is preferred in (3), but it is worth noting that in certain contexts ‘must’ may be acceptable. If you can be presumed a normative authority on the issue in question, I will accommodate in response to your using ‘must’ by accepting the assumption required for your ‘must’ claim to be true — namely, that the value of family takes precedence. This isn’t an isolated phenomenon. Suppose Alice, a young teenager, is getting ready to go to a concert and is considering with her mother, Martha, whether to take the A train or the C train. The A train is quicker, but the C train is safer. Martha takes the safety of her child to be of paramount importance, though the primacy of safety isn’t common ground between them. Nevertheless Martha can felicitously say:

(10) You must take the C train, not the A train.

The teleological necessity of Alice’s taking the C train depends on the goal of traveling safely taking priority over the goal of traveling quickly. Given Martha’s authority in the context, she can expect Alice to accommodate the assumption of her utterance that this condition is satisfied. But such special contexts notwithstanding — contexts in which the speaker doesn’t have or doesn’t want to exercise the relevant authority — ‘ought’ will be preferred.

Like with norms and goals, our expectations given a body of evidence can be conditional, conditional on things being normal in the relevant respects. Reconsider (5)–(6), modified below as (11)–(12).

(11) Me: Where are the colored pencils?  
     You: They ought to be in the drawer with the crayons.

(12) Me: Where are the colored pencils?  
     You: They must be in the drawer with the crayons.

See KAUFMANN 2013 for further discussion of the notion of speaker authority concerning conversational backgrounds and its role in explaining performativity with modals and imperatives. I return to issues concerning performativity with ‘must’ in §6.
Let \( w_N \) be a world in which you put the colored pencils in the drawer, and let \( w_N^\neg \) be an abnormal world in which you don’t. \( w_N \) and \( w_N^\neg \) may be understood as representatives of relevant equivalence classes of worlds.) The import of the conditional expectations concerning the location of the colored pencils can be reflected with a conversational background \( P \) which assigns \( w_N \) a premise set that includes the proposition \( D \) that the colored pencils are in the drawer, and which assigns \( w_N^\neg \) a premise set that includes \( \neg D \). Given this conversational background, \( D \) is only an epistemic necessity at worlds like \( w_N \) where (e.g.) you didn't get distracted earlier before putting the colored pencils away, no one is playing a trick on us and moved them, etc. So in order for \( D \) to be accepted as epistemically necessary, the context set must be restricted to normal worlds like \( w_N \). As in the case of Martha and Alice, your reply in (12) is appropriate only if you have the epistemic authority to restrict the context set in this way. If I am unsure whether you are in a position to assume that nothing unusual happened leading you to place the colored pencils somewhere else, I may challenge your assumption and raise to salience certain live possibilities that are incompatible with the epistemic necessity of \( D \), as in (13).

(13)  
You: The colored pencils must be in the drawer with the crayons.  
Me: Really? I see that they aren’t on the shelf. But don’t you sometimes accidentally put them in the cabinet with the glue sticks?  
You: No, I never put them there. (/Oh, I forgot about that.)

But if you use ‘ought’, my mentioning such possibilities, as in (14), may be beside the point, for you are not committing to conditions being normal. You are making an implicitly conditional claim about what would be epistemically necessary were conditions to be as you would have expected. If I check the drawer and find no colored pencils, you can respond as in (15).

(14)  
You: The colored pencils ought to be in the drawer with the crayons.  
Me: #Really? I see that they aren’t on the shelf. But don’t you sometimes accidentally put them in the cabinet with the glue sticks?  
You: I know; that’s why I said ought!

(15)  
You: The colored pencils ought to be in the drawer with the crayons.  
Me: No, I checked and they aren’t there.  
You: Oh, then I’m not sure where they are. That’s where I normally put them. I would have expected them to be there.

Like in the deontic case, epistemic ‘Ought \( \phi \)’ can be accepted even if it isn’t settled that certain conditions relevant to the epistemic necessity of \( \phi \) are satisfied.
Previous accounts of weak necessity modals are often developed by considering a limited range of modal flavors; extensions to other readings, to the extent that they are discussed at all, are often strained.\textsuperscript{15} The preliminary account developed in this section provides a uniform explanation for the behavior of weak and strong necessity modals in their various interpretations (more on which in the next section). This is an important advantage.

In this section I have proposed that what makes a weak necessity modal weak is that it brackets the assumption that the necessity of the prejacent holds in the actual world (evaluation world). One can accept ‘Ought $\phi$’ without needing to accept that $\phi$ follows from $P_{w_{@}}$, what the relevant considerations $P$ enjoin given the circumstances in the actual world $w_{@}$. This preliminary analysis generalizes across flavors of modality (epistemic, deontic, teleological, etc.), and captures how the relative felicity of ‘ought’ and ‘must’ depends on standing assumptions in the context. But it raises a number of questions. Among them: What does accepting ‘Ought $\phi$’ require if not accepting that $\phi$ is in fact necessary? What possibilities does ‘ought’ make a claim about if not the candidates for the actual world? In what precise sense is ‘ought’ “weaker” than ‘must’? How exactly is this weakness represented in the formal semantics and pragmatics? I take up these questions in the following sections.

\section{Weak necessity and the modal past}

In this section I will suggest that examining how weak necessity is expressed cross-linguistically provides a natural way of implementing the account of the weak/strong necessity distinction proposed in §3. In the next section I will argue that the way in which the proposed account captures the cross-linguistic data also helps explain various seemingly unrelated semantic and pragmatic properties of ‘ought’ and ‘must’.

Past tense (preterite) forms of modals — in English, ‘would’ for ‘will’, ‘could’ for ‘can’, ‘might’ for ‘may’ — are often used not to indicate past time reference, but to express tentativeness or politeness and weaken the force of the modality, as in (16)--(17). They are also the forms that appear in the consequents of subjunctive conditionals, as in (18).

\begin{itemize}
  \item \begin{enumerate}
    \item Alice will (/may, /can't) be at home now.
    \item Alice would (/might, /couldn't) be at home now.
  \end{enumerate}
\end{itemize}

\begin{itemize}
  \item \begin{enumerate}
    \item May (/Can) I comment on your proposal?
    \item Might (/Could) I comment on your proposal?
  \end{enumerate}
\end{itemize}

\textsuperscript{16} E.g., \textsc{Coplen} 2008, \textsc{Charlow} 2011, \textsc{Swanson} 2011, \textsc{Rubinstein} 2012.
If you took the 2:00 flight tomorrow, you would (/could, /might) get there by 4:00.

PALMER[2001] dubs these uses of past tense “the modal past.”

Strikingly, ‘ought’ patterns with the past-marked modal forms. First, as we have seen, ‘ought’ weakens the necessity of ‘must’. Second, ‘ought’, unlike ‘must’, can appear in subjunctive conditional consequents, as in (19).

(19)  
  a. If Alice came to the party tomorrow, Bert ought to leave.  
  b. #If Alice came to the party tomorrow, Bert must(ed) leave.

Third, when used with nonpast time reference, ‘ought’ is non-entailing. For simple clauses ‘ϕ’, Ought ϕ, unlike ‘Must ϕ’, is compatible with ‘¬ϕ’. (We will return to this point in §3.)

(20)  
  I could give to Oxfam, but I won’t.

(21)  
  a. Alice ought to be here by now, but she isn’t.  
  b. #Alice must be here by now, but she isn’t.

Fourth, when used with the perfect, ‘ought’ implicates the negation of its prejacent.

(22)  
  I could have given to Oxfam.  
  (Implicates: I didn’t)

(23)  
  a. We ought to have given to Oxfam.  
  (Implicates: we didn’t)
  b. #We must have given to Oxfam (but we didn’t).

‘Must’ cannot even receive a deontic reading when used with past time reference. ‘Ought’, but not ‘must’, can be used to communicate that a certain obligation held in the past. This follows from the more general point that only past-marked forms can take scope under the perfect (CONDORAVDTI[2002]). That ‘ought’ can take scope under the perfect in [23a] is a fifth respect in which ‘ought’ patterns with past-marked modal forms.

In sum, although ‘must’ does not have a past tense form, ‘ought’ appears to function semantically as its modal past. This is surprising. But it becomes less surpris-

(i)  
  I wanted to ask you a question.  
  (BYBEE[1995] ex. 21)

(ii)  
  I thought/was thinking about asking you to dinner.  
  (FLEISCHMAN[1982]: 8)
ing when we examine other languages. As emphasized in von Fintel and Iatridou’s (2008) influential account of weak necessity modals, the cross-linguistic norm is to mark the semantic distinction between weak and strong necessity morphologically rather than lexically.23 Weak necessity is typically expressed not by using a different word — like ‘ought’ in English — but by using the modal past form of a strong necessity modal, i.e. the form of a strong necessity modal that is used in counterfactuals (e.g., a strong necessity modal with past-tense marking that receives a nonpast interpretation).

Von Fintel and Iatridou (2008) attempt to capture this cross-linguistic data in their domain restriction account of weak necessity. They treat weak necessity modals as quantifying over “the best of the best” worlds — very roughly, the relevant \( P_w \)-compatible worlds that are also compatible with an additional premise set which describes a secondary ideal (a secondary “ordering source”; see n. 14). (See SLOMAN 1976, WILLIAMS 1981, McNAMARA 1990 for informal precedents.) It is speculated that “the counterfactual marking is co-opted here in a somewhat meta-linguistic kind of way: ‘if we were in a context in which the secondary ordering source was promoted [to primary status], then it would be a strong necessity that…’” (2008: 139). The tentativeness associated with the counterfactual marking is attributed to the fact that the premises in the secondary ordering source need not apply: “The choice of whether to really promote the secondary ordering source is left open” (2008: 139).

I find this analysis unsatisfying. First, little is said about what makes a primary ordering source “primary” and a secondary ordering source “secondary” apart from the fact that the latter figures only in the interpretation of weak necessity modals. No story is given about how primary and secondary ordering sources are determined independently of the truth conditions of the relevant ‘ought’ and ‘must’ sentences. We should be able to say what the primary and secondary ordering sources are in various contexts without simply reverse engineering them from relevant truth value judgments. Second, absent an account of what makes it the case about a speaker that she is counterfactually promoting a secondary ordering source, the proposed story about the role of the counterfactual marking seems ad hoc. Third, one might worry that the proposed explanation for the tentativeness associated with the counterfactual morphology just redescribes what needs to be explained. The tentativeness is “explained” by positing a parameter consisting of premises that needn’t apply. Fourth, it is unclear how their explanation would generalize to explain the

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23 Cf. PALMER 2001, McGREGOR & WAGNER 2006, VAN LINDEN & VERSTRAETE 2008, MATTHEWSON 2010, a.o. As von Fintel and Iatridou note (2008: 126n.22), English ‘ought’ fits this pattern historically; it was formerly the past subjunctive of the verb ‘owe’. It is unclear how comparative probability approaches to ‘ought’ (FINLAY 2009, 2010, LASSITER 2011) would capture these data.
tentativeness associated with counterfactual morphology on other kinds of lexical items — e.g., possibility modals like ‘might’, or desire verbs like ‘wish’, which, as von Fintel and Iatridou themselves note, are expressed in many languages by placing counterfactual morphology on the word for ‘want’ (see n. 17, also IATRIDOU 2000).

The account in §3 suggests a more natural explanation. We can capture the cross-linguistic data by taking our cue from independent theories of the semantic and pragmatic role of counterfactual marking. It is generally agreed that counterfactual morphology signals that the worlds being talked about (the “topic worlds”) needn’t be candidates for actuality (STALNAKER 1975, VON FINTEL 1998, IATRIDOU 2000, SCHLENKER 2005, BITTNER 2011). There are various ways of formalizing this signal and implementing it in the grammar. One option is to say that counterfactual marking indicates a presupposition that the modal’s domain of quantification, or the set of topic worlds more generally, isn’t a subset of the context set. An alternative is to treat counterfactual markers as canceling a positive presupposition associated with the indicative that the set of topic worlds is a subset of the context set. To fix ideas I will assume this latter option: I assume that counterfactual markers fail to signal that the set of topic worlds is included in the context set, rather than positively signaling that some of the topic worlds aren’t in the context set.

This broader work on counterfactual marking suggests a natural strategy for implementing the informal idea from §§3–4 that ‘Ought $\phi$’ contrasts with ‘Must $\phi$’ in failing to commit the speaker to $\phi$’s being a necessity (in the relevant sense) in the actual world. There is nothing specially “strong” about strong necessity modals. They are just necessity modals with the usual general indicative presupposition that the worlds being talked about are included in the context set. One way of implementing this general indicative presupposition is to treat it as restricting the domain of the interpretation function to proper points of evaluation, i.e. to contexts $c$ and worlds $w$ such that $w \in c$. Applying this to the case of a necessity modal yields the following semantics for ‘must’.

**Definition 1.** \[ \text{[Must } \phi \text{]}^c = \lambda w : w \in c . \bigcap P_w \subseteq \text{[} \phi \text{]}^c \]

Uttering ‘Must $\phi$’ predicates the necessity of $\phi$ throughout the context set — no different from how uttering ‘May $\phi$’ predicates the possibility of $\phi$ throughout the context set, or how uttering an atomic sentence ‘$\phi$’ predicates $\phi$ throughout the context set. There is nothing special about the semantics of ‘must’.

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19Depending on the purposes at hand I sometimes treat the interpretation function $[\cdot]$ as a function from expressions, contexts, and indices (worlds) to extensions, and sometimes as a function from expressions and contexts to intensions; and I slide between equivalent set- and function-talk. For expository purposes I blur the distinction between contexts and the context sets they determine.
A natural thought is that what makes weak necessity modals “weak” is that they lack the assumption that (all) the relevant worlds at which the prejacent is necessary are in the context set. It is in this sense that one can accept ‘Ought ϕ’ without having to presuppose that all the preconditions for the necessity of ϕ are satisfied, and without having to accept that ϕ is in fact necessary.

These points can be formalized in various ways. In what follows I will briefly describe three possible formal implementations. I won’t attempt to adjudicate among them here. The aim is simply to introduce a range of formal semantics for weak necessity modals, and to begin to canvas their potential costs and benefits. I leave more thorough investigation for future work.

One option is to build a counterfactual element into the truth conditions of weak necessity modals. Consider Definition 1, where \( s \) is a selection function that selects a set of closest (maximally similar) relevant \( χ \)-worlds to the evaluation world \( w \), for some relevant condition \( χ \):\(^{29}\)

**Definition 1.** \( [\text{Ought } ϕ]_{w}^{c} = 1 \) iff \( \forall w' \in s(w, χ) \cap P_{w} \subseteq [ϕ]^{c} \)

The point that ‘Ought ϕ’ brackets whether ϕ is in fact necessary is captured in the selection function \( s \): there is no constraint that the evaluation world \( w \) be in the set of worlds \( s(w, χ) \) at which the necessity of ϕ is evaluated; \( s(w, χ) \) might include \( w \), but it might not.\(^{22}\) The truth of ‘Ought ϕ’, on this line, only requires that ϕ be a necessity at the closest worlds in which certain relevant considerations apply. Intuitively, the proposition \( χ \) describes the applicability conditions of these considerations. Saying this raises the question of what determines the value of \( χ \) in context. One possibility is to treat the semantics as explicitly specifying constraints on the value of \( χ \)—e.g., that \( χ \) be a condition relevant to the necessity of ϕ which is most “preferred” in some contextually relevant sense (most likely, desirable, normal, etc.; cf. \( \text{Silk 2012} \): \( \text{Starr 2010} \): \( \text{Makinson 1993} \), \( \text{Frank 1998} \)).\(^{21}\) Alternatively one might simply treat \( χ \) as directly supplied by context and attempt to derive such constraints on \( χ \) pragmatically. The semantics in Definition 2

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\(^{20}\)Pace \( \text{Arregui 2010} \), which treats ‘Should ϕ’ as presupposing that the modal’s domain of quantification in included in the context set (at least for non-stative ‘ϕ’). Though Arregui associates ‘should’ with a past morphology feature, which is frequently taken to be an important component of the interpretation of counterfactual constructions, she denies that this feature is interpreted. Given that English ‘ought’ fits the cross-linguistic pattern historically (n. \( \text{18} \)), it may be less surprising that this feature should have come to be interpreted in the way described in the main text.

\(^{21}\)In Definitions 2 and 3 I leave open whether the evaluation world \( w \) is presupposed to be in the context set \( c \).

\(^{22}\)It is interesting to compare such an account with semantics for ‘ought’ which invoke a notion of “normality,” e.g. by evaluating the necessity of the prejacent at the most normal accessible worlds (see, e.g. \( \text{Makinson 1993} \), \( \text{Frank 1998} \)).
also raises the question of what distinguishes ‘Ought \( \phi \)' from (explicit or implicit) counterfactual necessity claims of the form ‘If \( \chi \), it would have to be that \( \phi \).

An alternative, second way of building a counterfactual element into the truth conditions of weak necessity modals may avoid these questions. Consider Definition 5, where \( \prec \) is a partial order on propositions along a relevant dimension (likelihood, normality, desirability, etc.).

**Definition 3.** \([\text{Ought } \phi]_{c,w} = 1 \text{ iff } \{ u: u \in s(w, \cap P_u \subseteq [\phi]^c) \} \prec_w \{ v: v \in s(w, \cap P_v \notin [\phi]^c) \}\) (v2)

Very roughly, this treats ‘Ought \( \phi \)’ as saying that it would be better (in a relevant sense) if \( \phi \) was necessary (in a relevant sense). One could refine this definition in various ways depending on one’s views about the semantics of claims about comparative possibility [Lassiter 2011, Kratzer 2012], but the basic idea should be clear enough. Like the semantics in Definition 3, the semantics in Definition 5 fails to treat the truth of ‘Ought \( \phi \)’ at a world \( w \) as requiring that \( \phi \) be a necessity at \( w \). Uttering ‘Ought \( \phi \)’ expresses an attitude toward the possibility that \( \phi \) is necessary, but this attitude needn’t be belief. Indeed none of the closest worlds \( u \) at which \( \phi \) is necessary need be in the context set. Even so, the semantics reflects how uses of weak necessity modals may bear on interlocutors’ views about what is necessary. ‘Ought \( \phi \)’ introduces the possibility that \( \phi \) is necessary and then comments on it. The primary attitudinal comment is that the worlds in which \( \phi \) is necessary are in some sense “preferred” — more desirable, normal, expected, etc., depending on the context. Accepting ‘Ought \( \phi \)’ can thus push the conversation toward accepting that \( \phi \) is necessary without requiring a present commitment that it is. However, these features of the semantics in Definition 5 introduce a potential worry. ‘Ought \( \phi \)’ introduces a necessity claim, but it has the content of a comparative. This raises the question of why the semantics for ‘ought’ and ‘must’ are so dissimilar. Work will need to be done to explain the precise sense in which ‘ought’ is (logically, conversationally) weaker than ‘must’, and the apparent logical relations between ‘ought’, on the one hand, and ‘must’ and ‘may’, on the other.

A third, elegant option is to treat weak and strong necessity modals equivalently at the level of truth conditions, and to distinguish them in their presuppositions. This is reflected in Definition 4.

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31Compare the comparative probability semantics for ‘ought’ in Finlay 2009, 2010, Lassiter 2011. Very roughly, these accounts treat ‘Ought \( \phi \)’ as saying that \( \phi \) is more likely than any relevant alternative to \( \phi \). The semantics in Definition 3, by contrast, treats ‘Ought \( \phi \)’ as making a comparative claim about the necessity of \( \phi \), rather than about \( \phi \), and generalizes the relevant notion of comparative possibility via the context-sensitive parameter \( \prec \).
Definition 4. \([\text{Ought } \phi]^c = \lambda w . \cap P_w \subseteq [\phi]^c\)  \hspace{1cm} (v3)

What distinguishes 'ought' from 'must', on this line, is that 'ought' allows "improper" points of evaluation; 'ought' lacks the presupposition associated with ordinary indicative sentences that (all) the worlds being talked about are live possibilities. Weak necessity modals are given an ordinary semantics of necessity, but without the presupposition that the relevant worlds at which the prejacent is necessary are in the context set. 'Ought' is thus treated straightforwardly as the semantic modal past of 'must'. Formalizing the analysis in this way raises the question of how to model the effects of assertions of 'Ought \phi' on the context. An assertion, on the familiar Stalnakerian theory of conversation, is modeled as restricting the context set to those worlds in which the asserted content is true (Stalnaker 1978). But for any world \(w \in c\), 'Ought \phi' is true at \(w\) according to Definition 4 iff 'Must \phi' is true at \(w\) according to Definition 1. So, to avoid predicting that uttering 'Ought \phi' has the same effect as uttering 'Must \phi', one needs to allow that assertions of 'ought' claims may distinguish among worlds outside the context set. This raises the challenge of providing an account of how exactly this process works — whether within the Stalnakerian framework or within some alternative framework (see the Appendix for developments). If asserting 'Ought \phi' needn't involve talking about the worlds in the context set, then which worlds are being talked about? If 'ought' claims can be about non-live possibilities, one needs a story about how they seem to bear on what is necessary in the actual world.

I won’t attempt to adjudicate between these alternative technical implementations here. Detailed investigation of their predictions, as well as their connections with broader issues concerning (e.g.) presupposition, mood, and assertion, will be needed. However, it will be helpful in what follows to have a specific semantics at hand. To fix ideas I will adopt the analyses of 'must' and 'ought' in Definitions 1 and 4, respectively, although many of the features of the account (to be described) apply for the other implementations as well. I briefly return to the worries concerning counterfactuality and logical relations among 'ought', 'must', and 'may' later in this section. A technical Appendix provides an update semantics which formalizes more precisely certain of the contrasting contextual effects described here.

Treating 'ought' as the semantic modal past of 'must' explains why 'ought' should pattern with the past modal forms in (16)–(23). For instance, the analysis gives precise expression to the informal intuition that 'ought' is weaker and more tentative than 'must'. In uttering 'Ought φ' the speaker makes a claim about the neces-

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24 The right-to-left direction is obvious. For the left-to-right direction, if \([\text{Ought } \phi]^c(w) = 1\), then \(\cap P_w \subseteq [\phi]^c\); but then, \([\text{Must } \phi]^c(w) = 1\) since, by hypothesis, \(w \in c\).
sity of $\phi$ but fails to mark her utterance as being about worlds that are candidates for actuality. But, as Stalnaker notes, “normally a speaker is concerned only with possible worlds within the context set, since this set is defined as the set of possible worlds among which the speaker wishes to distinguish” (1975: 69). So, using ‘ought’ implicates that one isn’t in a position to make a claim about whether the prejacent is necessary throughout the set of live possibilities. This suggests that the basis of the scale between ‘ought’ and ‘must’ is not one of quantification but of epistemic strength. Since ‘ought’ is weaker than ‘must’ in this way, Grice’s first quantity maxim — “Make your contribution as informative as is required” (Grice 1989: 26) — can be exploited to generate a familiar upper-bounding implicature (Horn 1972, Gazdar 1979). Using ‘ought’ implicates that for all one knows — or, better, for all one is willing to presuppose in the conversation — ‘Must $\phi$’ is false. This implicature has the usual properties of implicatures. It is cancelable and reinforceable, as in (1a) and (2a), respectively, and it is suspendable, as in (24).

(1a) I ought to help the poor. In fact, I must.

(2a) I ought to help the poor, but I don't have to.

(24) I ought to help the poor. Maybe I have to.

In (1a), for example, the speaker first conveys that the worlds being talked about needn't be live possibilities, and then asserts that what holds in these worlds — the deontic necessity of the proposition that I help the poor — also holds in the actual world. The implicature data with ‘ought’ can thus be treated analogously to the implicature data with subjunctive conditionals.

(25) a. If you had the flu, you would have exactly the symptoms you have now.

(25) b. If you had the flu, you would have very different symptoms from the symptoms you have now.

(25) c. If you had the flu, you would be sick. Maybe you do have the flu; you are pretty congested.

Likewise we can assimilate the tentativeness of ‘ought’ to the tentativeness of past forms more generally, as in non-counterfactual subjunctive conditionals (“future less vivid” conditionals) like (18) and (26).

If you took the 2:00 flight tomorrow, you would get there by 4:00.

If you came to our party tomorrow — and I’m not saying that you will — you would have a great time.

Using the past form highlights the possibility that the marked clause might not ultimately be accepted.

Treating ‘ought’ as the semantic modal past of ‘must’ in this way, however, isn’t without its potential costs. One worry is that it incorrectly predicts that ‘ought’ is semantically equivalent to ‘would have to’, and fails to capture the import of ‘ought’ claims on how things are in the actual world (see the discussion of Definitions 2 and 3 above). As von Fintel & Iatridou (2008: 128–131) observe, ‘ought’ cannot be replaced by ‘would have to’, as reflected in (27)–(29).

(27) a. I ought to help the poor. In fact, I must.
    b. ?I would have to help the poor. In fact, I must.

(28) a. I ought to help the poor, but I don’t have to.
    b. ?I would have to help the poor, but I don’t have to.

(29) a. (If Fred wanted to get to the island) he would have to use this boat.
    b. He ought to use this boat.

Languages that mark the weak/strong necessity distinction morphologically use the same string to express weak necessity (= ‘ought’) and counterfactual necessity (= ‘would have to’). Given compositionality, it would be preferable, other things equal, to give these strings the same semantics. Unlike previous accounts, the present account has the advantage of doing so. Expressions of weak necessity are given precisely the semantics we would expect given their lexical and morphological features across languages. Differences between uses of ‘ought’ and ‘would have to’ can be derived from this semantics and general interpretive and conversational principles.

Using a clause that lacks the standard indicative presupposition places a burden on the interpreter’s task of inferring which possibilities are being talked about. Typically a condition that specifies which possibilities are relevant must be salient in the context — either explicitly in the linguistic context, as in (30), via an ‘if’-clause or previous sentence, or implicitly in the extra-linguistic context, as in (31).

(30) a. If I bought this guitar, my wife would kill me.
    b. I couldn’t buy this guitar. My wife would kill me.

(31) [Context: We are trying out electric guitars in a music store. Looking at a
very expensive vintage Gibson Les Paul, I say:] My wife would kill me.

'Would have to' interpretations are ordinary cases of this kind. The condition that figures in a ‘would have to’ claim must be salient in the linguistic or extra-linguistic context, as in (32) and (33), respectively.

(32) a. If I wanted to buy this guitar, I would have to check with my wife.
b. I could buy this guitar. But I would have to check with my wife.

(33) [Context: Same as in (31)]
I would have to check with my wife.

If no condition is readily retrievable, using ‘would have to’ is anomalous.

(34) [Context: We are strangers standing in a hotel lobby. I notice you fumbling with your bags. I say:]?
Here, I would have to help you.

What distinguishes weak necessity interpretations (=‘ought’) is that they lack this salience requirement, as reflected in (35).

(35) [Context: Same as in (34)]
Here, I ought to help you.

The distinctive features of weak necessity modals, I suggest, are conversational effects of using an expression that conventionally lacks the usual indicative presupposition but fails to be subordinated to a particular contextually salient condition.

Weak necessity modals are neither marked as being about the actual world nor are they indicated as being about some other particular salient possibility. So, for a speaker’s utterance of ‘Ought ϕ’ to be relevant, she must be treating the necessity claim as holding given some condition plausibly relevant to the necessity of ϕ. Recall our discussion in §§2–3 of the conversational role of ‘ought’. Suppose we are considering the question of the necessity of ϕ. Uttering ‘Must ϕ’ would require settling precisely which considerations apply given the circumstances. We might prefer not to restrict the future course of the conversation in this way. Nevertheless each of us takes some ways of extending the current conversation and addressing this question to be more likely or better than others. Using ‘ought’ allows us to consider the necessity of ϕ as holding, not in the current context, as with ‘must’, but in a preferred (most likely, normal, desirable) continuation or minimal revision of
the current context, whatever that might turn out to be. We can capture a role for ‘ought’ claims in inquiry without treating them as directly placing constraints on the set of live possibilities.

This feature of the use of weak necessity modals sets up a contrast with ‘would have to’. The (a)-examples with ‘would have to’ are acceptable, but the (b)-examples with ‘ought’ are not.

(36)  
   a. If I was a mobster, which I’m not, I would have to kill you.
   b. I ought to kill you.

(37)  
   [Context: I don’t know whether Alice will come to my wedding next month. As a matter of fact, unbeknownst to me, she won’t end up coming.]
   a. If Alice came to my wedding next month, I would have to send her a thank you card.
   b. I ought to send Alice a thank you card.

However, the above discussion suggests that if we make explicit a condition that is mutually endorsed in the conversation, the effects of a ‘would have to’ claim should be closer to those of an ‘ought’ claim. This prediction appears to be borne out.

(38)  
   a. Alice left an hour ago. If there wasn’t any traffic and everything was normal, she would have to be at her office by now. In fact, I checked and there wasn’t any traffic and everything was normal. So she must be at her office by now.
   b. Alice left an hour ago. She ought to be at her office by now. In fact, I checked, and there wasn’t any traffic and everything was normal. So she must be at her office by now.

(39)  
   [Context (see (10)): Alice wants to go to Harlem and is considering with her mother, Martha, whether to take the A or the C train. The A train is quicker, but the C train is safer. Martha says:]
   a. If safety was most important, you would have to take the C train. In fact, safety is more important, as we can agree. So you have to take the C train.
   b. You ought to take the C train. In fact, safety is most important, as we

Compare Schueler’s (2011: 8) claim that the implicit antecedent in an implicit conditional is an antecedent that “expresses the most plausible alterations to current contextual knowledge which would make the content of the [implicit conditional] (interpreted as a consequent in the paraphrase) relevant to the context of utterance.” See Farkas & Bruce (2010) on the importance of representing projected future states of the conversation in a model of discourse.
can agree. So you have to take the C train.

In sum, the potential worry for the semantics in Definition 4 was that it made unclear precisely how assertions of ‘Ought φ’ update the context, given that they needn’t involve predicating the necessity of φ of (candidates for) the actual world. As far as conventional meaning goes, weak necessity modals lack the standard indicative presupposition that the topic worlds are included in the context set. Exactly how uses of ‘Ought φ’ update the context, given this semantics, may vary among contexts: updating with ‘Ought φ’ could involve eliminating worlds w such that the most desirable worlds accessible from w aren’t worlds in which φ is necessary; or it could involve eliminating worlds w such that the most normals worlds accessible w aren’t worlds in which φ is necessary; or perhaps it could have some non-eliminative effect, as by drawing attention to the possibility that φ is necessary, but without conventionally expressing a particular attitude toward this possibility. We could build a sensitivity to a set of maximal worlds in a salient ordering into the very meaning of ‘ought’, as in the semantics in Definition 2. But we shouldn’t dismiss out of hand an alternative conversational strategy which derives this apparent sensitivity — and the resulting contrast between ‘ought’ and ‘would have to’ — from general principles of pragmatic reasoning. To fix ideas I have taken up the latter strategy here, but an alternative way of treating ‘ought’ as the semantic modal past of ‘must’, perhaps along the lines of Definition 2 or 5, may ultimately prove superior. The issue calls for further investigation. (See the Appendix for additional discussion and formal details for developing the kind of semantics in Definition 4.)

A second potential worry with the analyses in Definitions 3–4 is that they fail to predict certain entailment relations between ‘ought’, on the one hand, and ‘must’ and ‘may’, on the other. The examples in (40)–(41) are anomalous.

(40)  #I mustn’t lie to Alice, but I ought to.
(41)  #I can’t (/may not) lie to Alice, but I ought to.

But the proposal seems to allow that ‘Ought φ and must ¬φ’ and — assuming ‘must’ and ‘may’ are duals (Definition 5) — ‘Ought φ and ¬may φ’ are consistent.

**Definition 5.** 
\[ \text{May } φ \text{^c} = \lambda w: w \in c . \cap (P_w \cup \{ \text{[φ]^c} \}) \neq \emptyset \]

It would seem possible both for the necessity of ¬φ to hold throughout the context set (as required by the ‘must’/‘may’ conjunct), and for the necessity of φ to hold at

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\[37\text{With ‘mustn’t’ the negation is internal (must } < \neg\text{). With ‘can’t’ and deontic ‘may not’ the negation is external (}/\neg < \text{can/may}).\]
certain relevant worlds outside the context set (as required by the ‘ought’ conjunct).

I think this aspect of the account is actually a feature, not a bug. The point is
clearer in the epistemic case. The discourses in (42)–(43), unlike the discourse in
(44), are perfectly coherent.

(42) Alice must not have gotten home yet; she hasn’t called, and she always calls
right away to let us know she got back safely. But she did leave two hours
ago. She ought to be home already. I hope there wasn’t an accident.

(43) Alice can’t have gotten home yet; she hasn’t called, and she always calls right
away to let us know she got back safely. But she did leave two hours ago.
She ought to be home already. I hope there wasn’t an accident.

(44) #Alice can’t have gotten home yet; she hasn’t called, and she always calls right
away to let us know she got back safely. But she did leave two hours ago.
She must be home already. I hope there wasn’t an accident.

Epistemic ‘Must φ’ commits the speaker to high credence in φ and epistemic ‘May φ’
commits the speaker to some credence in φ. Epistemic ‘must’ entails epistemic ‘may’.
But epistemic ‘Ought φ’ doesn’t commit the speaker to any credence in φ. Surpris-
ingly, epistemic ‘must’ doesn’t entail epistemic ‘ought’, and epistemic ‘ought’ doesn’t
entail epistemic ‘may’ (cf. SWANSON 2012a, SILK 2013a). (More on this in §5.)

Though epistemic ‘Ought φ’ is compatible with a denial of ‘φ’ — it doesn’t com-
mit the speaker to any unconditional credence in φ — it still expresses a doxastic
attitude toward φ. It expresses a conditional attitude about the likelihood of φ given
a relevant subset of one’s evidence, on the assumption that conditions are normal in
the relevant respects (§§2–4, cf., e.g., GROEFSMA 1995: 72–73; WEDGWOOD 2007:
118–119). One may infer from the falsity of φ that conditions aren’t in fact normal.
This excludes the use of ‘May φ’ (or ‘Must φ’); however, since ‘ought’ can be used to
talk about the modal status of φ in non-live possibilities, ‘Ought φ’ may still be felici-
tous. 20 It is this that grounds the failure of certain entailments between epistemic

20 It is an interesting question under what conditions epistemic ‘Ought φ’ can be felicitously used
when ¬φ is accepted. One possibility is that one cannot have direct evidence that circumstances aren’t
normal in the relevant respects, and that one would have expected conditions to be normal were it
not for one’s direct evidence that ¬φ. Support for this comes from the fact that it seems preferred
for subsequent denials that conditions are normal to be headed by epistemic ‘must’, which typically
signals that its prejacent is the conclusion of an inference (see, e.g., KARITUNEN 1973, COATES 1983,
PALMER 2001, VON FINTEL & GILLIES 2010).

(i) She ought to be here by now, but she isn’t. Something must have (/?has) gone wrong!
This suggests that one’s belief that circumstances aren’t normal is indirect, based on an inference from
'ought', on the one hand, and epistemic 'must' and 'may', on the other.

It is hard to come up with coherent deontic examples analogous to the epistemic examples in (42)–(43). Hard, but perhaps not impossible:

(45) I must tell my wife the truth about the affair. I know I shouldn't; it'll only hurt her. But I must.
(46) I know I shouldn't tell my wife the truth about the affair; it'll only hurt her. But I can't lie to her.
(47) #I must tell my wife the truth about the affair. I know I can't; it'll only hurt her. But I must.

I grant that it isn't immediately obvious what to say about these examples. It is interesting that the entailments from 'must' to 'ought' and from 'ought' to 'may' seem more evident in the case of non-epistemic readings. I won't attempt to speculate about why here. But even with the examples in (45)–(46) notwithstanding, assuming we want a unified analysis for epistemic and non-epistemic readings of the modals, we should prefer an account that avoids treating these entailments as semantically valid.

5 Entailingness and performativity

In §4 we saw that there are good reasons for treating 'ought' semantically as the modal past of 'must', and I offered several ways of doing so by incorporating general insights about the role of counterfactual marking (Definitions 1–4). In this section I will argue that refining our account in this way helps explain several seemingly unrelated puzzles concerning entailingness and performativity with 'ought' and 'must'.

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29 Again, in calling a use "epistemic" I simply mean that it involves (in some sense) an assessment of the truth or likelihood of a proposition given a certain body of evidence (§2). This follows the typological literature in treating the sorts of non-entailing uses of 'ought' in (42)–(43) as epistemic (see, e.g., Coates 1983, Palmer 1990, 2001, Bybee et al. 1994, van der Auwera & Plungian 1998, Nuyts 2001, Huddleston & Pullum 2002, a.m.o.). One could stipulate a meaning for 'epistemic' on which such uses couldn't count as epistemic, but it is hard to see what would motivate this (see §4). In any case, what matters for present purposes is simply that the uses of 'ought' in these examples are compatible with a denial of the prejacent. 'Ought' contrasts with both 'must' and 'may' in this respect. What we call the relevant reading of 'ought' is irrelevant. (It is perhaps interesting that weak adjectives ('appropriate', 'important') — the adjectives whose strength corresponds to that of weak necessity modals — cannot even express circumstantial (non-deontic, non-epistemic) modality (Van Linden & Verstraete 2011: 154–156; Van Linden 2012: 53–54, 72–73.).)
First, though many authors have claimed that ‘Ought \( \phi \)' on its epistemic reading expresses that \( \phi \) is probable, we have seen that this isn't quite right (§7). Whereas ‘Must \( \phi \)' commits the speaker to a high unconditional credence in \( \phi \), ‘Ought \( \phi \)' doesn't commit the speaker to any unconditional credence in \( \phi \) (Swanson 2012a). Reconsider (21).

(21) a. Alice ought to be here by now, but she isn't.
   b. #Alice must be here by now, but she isn't.

Epistemic ‘Must \( \phi \), but \( \neg \phi \)' is inconsistent in a way that epistemic ‘Ought \( \phi \), but \( \neg \phi \)' is not (cf. n. 29). Surprisingly, there is a robust body of evidence that this holds for deontic readings as well (though see below).

(48) a. You ought to help your mother, but you won't (/but I know you won't).
   b. ?You must help your mother, but you won't (/but I know you won't).

Of course obligations can go unfulfilled. What is interesting is that speakers appear to assume otherwise, at least for the purposes of conversation, when expressing obligations with ‘must’.

Our discussion in §4 of the pragmatic import of counterfactual markers suggests one natural way of capturing this data. Since ‘must’ doesn’t have a counterfactual element to its meaning, the context set must include \( \bigcap P_w \) for all worlds \( w \) in the context set. So, if ‘Must \( \phi \)' is accepted, \( \neg \phi \) cannot be satisfied throughout the context set; hence the inconsistency of ‘Must \( \phi \), but \( \neg \phi \)' on any reading. However, there is no similar restriction on the value of the conversational background \( P \) at worlds outside the context set. The value of \( P \) at non-live possibilities needn’t be compatible with the common ground. Since ‘ought’ can take us to worlds outside the context set in assessing the necessity of its prejacent, as long as all the relevant worlds in which the necessity holds are outside the context set, ‘Ought \( \phi \)' can be true at a live possibility \( w \) even if all the worlds in the context set are \( \neg \phi \)-worlds; hence the consistency of ‘Ought \( \phi \), but \( \neg \phi \).’ Even if Swanson (2012a: 22–23) is right that “pure premise semantics on its own” cannot capture the above (non-)entailingness data, the analyses in §§2–4, along with independently attested contextual constraints associated

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with mood and counterfactual marking, provide a natural explanation.  

Deontic ‘ought’ and ‘must’ are often thought to differ in their conventional force. It is often claimed that in root clauses deontic ‘must’ conventionally performs a directive speech act — i.e., that it is conventionally used to try to get someone (possibly oneself) to do something — perhaps in addition to performing an assertion.  

Even if deontic ‘Ought $\phi$’ can be used to perform an imperatival speech act in certain contexts, its directive force is typically much weaker. Paul McNamara characterizes the phenomena well:

> To say that one ought to take a certain option is merely to provide a nudge in that direction. Its typical uses are to offer guidance, a word to the wise (“counsel of wisdom”), to recommend, advise or prescribe a course of action… In contrast, to say that one must take a certain option is to be quite forceful. Its typical uses are to command, decree, enact, exhort, entreat, require, regulate, legislate, delegate, or warn. Its directive force is quite strong. (McNamara 1990: 156)

Previous accounts often stipulate the apparent performative element to deontic ‘must’ as an ad hoc component of its conventional meaning — e.g., by positing

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32 This of course isn’t the only possible explanation for the (non-)entailingness data in (21) and (48). One alternative is to say that ‘must’ is only interpreted with respect to a modal base (or the union of several modal bases), not an ordering source (see n. 13 cf. Hacquard 2009: 290n.9). (As far as the interpretation of ‘must’ goes, one might say, “all laws are natural laws” (cf. Piaget 1962: 340).) Since modal bases are realistic — they consist of propositions true at the world of evaluation — ‘Must $\phi$’ would then entail ‘$\phi$’. For the sake of argument I put aside this added constraint on the interpretation of ‘must’. There are good reasons for introducing ordering sources into the semantics, both empirical (in handling inconsistent premise sets and gradability) and conceptual (in distinguishing facts and norms, and dynamic and deontic modality). We can explain the (non-)entailingness data without needing to appeal to ad hoc stipulations about the interpretation ‘must’. Second, Swanson 2012 captures the data by including in the semantic entry for ‘must’ but not ‘ought’ a constraint that requires high credence in the modal’s prejacent. It would be better, I take it, if we could explain the data in terms of independent features of the semantics of ‘ought’ and ‘must’, as I have argued we can. Third, one might explain the data by appealing to the different performative properties of weak and strong necessity modals (see n. 53). I argue below that the analysis in the main text has the advantage of deriving these performative properties, without needing to take them as basic. See also Hacquard 2009 for discussion of entailingness with root modals in the perfective more generally.

an independent dynamic element in the lexical semantics (see esp. Portner 2009, also Ninan 2005, Portner 2007, Swanson 2008). Though a dynamic implementation might be desirable on other grounds, our discussion of (21) and (48) suggests a strategy for deriving the contrasting speech act properties of deontic ‘ought’ and ‘must’ from their static semantics and general pragmatic considerations. Accepting ‘Must ϕ’ is incompatible with denying ‘ϕ’. So, if the truth of ‘ϕ’ is assumed to be under the control of some relevant subject, updating with ‘Must ϕ’ will commit the subject of the obligation to seeing to it that ϕ. So, it is no surprise that ‘must’ should be thought to be conventionally directive. But since accepting ‘Ought ϕ’ is compatible with denying ‘ϕ’, updating with ‘Ought ϕ’ needn’t commit anyone to seeing to it that ϕ. So, we correctly predict that even if deontic ‘ought’ can be used to perform a directive speech act, it doesn’t do so as a matter of its conventional meaning. Further, given our discussion of the conversational role of ‘ought’ in §§3–4, it is unsurprising that deontic ‘ought’ claims should often perform more moderate speech acts of recommending or advising. In uttering ‘Ought ϕ’ one can convey one’s preference that ‘ϕ’ be accepted, but without imposing the truth of ‘ϕ’ on the common ground.

I have said that ‘Must ϕ but ¬ϕ’ is inconsistent on any reading. This claim may need to be qualified. Though there is significant independent data that speakers find deontic ‘Must ϕ but ¬ϕ’ to be anomalous (see n. 31), some speakers report that they

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35 It isn’t implausible that the drastic decline in frequency of deontic ‘must’ is due in no small part to the above features of its meaning and use (cf. Myhill 1993, 1996, Smith 2003, Leech et al. 1993, Close & Aarts 2010).
36 I have said that if ‘Must ϕ’ is accepted, then ‘¬ϕ’ cannot be true throughout the context set. This leaves open whether ‘¬ϕ’ may be true at some worlds in the context set, and thus seems to predict that accepting deontic ‘Must ϕ’ is compatible with accepting the epistemic possibility of ‘¬ϕ’. This prediction appears to be borne out by corpus data. Verstraete 2007 cites (i) with an imperative, which we can adapt with ‘must’ as in (ii).

(i) You’ve got to take a stand Tom. You’ve got to do it mate. […] Don’t stand for it, because if you do you’ll just get trampled on. (CB ukspok)

(ii) You mustn’t stand for it, because if you do you’ll just get trampled on.

Though a sentence such as (iii) strikes me somewhat anomalous, this is arguably due to a general norm of cooperative conversation that interlocutors do what they can to make the actual world be among the best worlds (cf. Portner 2007: 358).

(iii) ?You must go to confession, but maybe you won’t (/but you might not).

On this diagnosis, (iii) would be anomalous to the extent that it is anomalous to commit someone to help see to it that ϕ while expressly admitting the possibility of ¬ϕ.
can find such examples to be consistent in certain contexts. Consider (49).

(49) I must go to confession; I’m a Catholic. But I’m not going to. I haven’t practiced for years.

I myself find it hard to hear an utterance of (49) as being consistent and sincere. But what is important is that even speakers who can hear it as such agree that it would sound better if a strong necessity modal like ‘have to’ or ‘be required’ was used instead of ‘must’, as in (50).

(50) I have to (/I’m required to) go to confession; I’m a Catholic. But I’m not going to. I haven’t practiced for years.

Intuitively, in (50) it is consistent for the speaker to dismiss the act of going to confession because she isn’t endorsing the norms which entail that she is obligated to do so. She is simply reporting what is required by them.

This suggests that one can hear an utterance of (49) as consistent and sincere to the extent that one accepts “objective” uses of ‘must’, in (roughly) the sense of Lyons 1977. Adapting Lyons’s terminology, say that a modal is used endorsingly if it presents the speaker as endorsing the considerations with respect to which the modal claim would be true; and say that a modal is used non-endorsingly if it does not. Among strong necessity modals, ‘be required to’ is typically used non-endorsingly; ‘have to’ and ‘(have) got to’ are more flexible, with ‘have to’ tending more toward the non-endorsing side of the spectrum and ‘(have) got to’ more toward the endorsing side; and ‘must’ is nearly always used endorsingly. It is easier to hear a sincere utterance with (e.g.) ‘have to’ or ‘be required to’ as consistent with the speaker’s rejecting or being indifferent about the considerations that would verify the modal claim:

(51) [Context: Some friends are deciding whether to go home or stay out late for a party.]
a. You must get home by 11, but I don’t care whether you do.
b. #Bert must get home by 11. Aren’t his parents stupid? I would stay out if I were him.

(52) [Context: same as in (51)]
a. You have to (/are required to) get home by 11, but I don’t care whether you do.
b. Bert has to (/is required to) get home by 11. Aren’t his parents stupid? I would stay out if I were him.

However, the alleged acceptability of examples like suggests that non-endorsing uses of ‘must’ may be possible for some speakers.

The distinction between endorsing and non-endorsing uses can help in the following way. The explanation offered above for the contrast between the (a)-examples and the (b)-examples in and turned on a difference between weak and strong necessity modals — namely, that weak necessity modals fail to presuppose that the modal’s domain of quantification is a subset of the context set. What the data in highlights is that this presupposition can be locally satisfied: it can be satisfied in a context other than the global discourse context. Specifically, it can be satisfied in the accommodated context that represents the body of considerations and background facts that the modal claim is about. This accommodated context needn’t be compatible with the context set. If it isn’t, the prejacent of the strong necessity modal can be true throughout the context set. Non-endorsing uses of – pose no more of a challenge than ordinary examples like in which a strong necessity modal appears in an intensional context.

(53) Alice thinks she must go to confession tomorrow. But we’ll talk to her tonight and show her she’s wrong. She won’t end up going; she’ll come out with us instead.

(54) As far as the priest is concerned, I must go to confession tomorrow. But I’m not going to. I haven’t practiced for years.

In the modal’s domain of quantification need only be included in the local contexts characterizing (what we are presuming to be) Alice’s and the priest’s beliefs, respectively. It is only with endorsing uses of strong necessity modals that must be included in the global context set.

[^39]: There is nothing special about deontic readings in these respects. Non-endorsing uses of epistemic strong necessity modals are also compatible with the denial of their prejacent, as reflected in
So, the promised qualification is this: for *endorsing* uses of a strong necessity modal, ‘STRONG $\phi$’ performs a directive speech act and is incompatible with a denial of ‘$\phi$’. The claims about entailings and performativity with strong necessity modals in root clauses are restricted to specifically endorsing uses. What makes these claims compelling for the case of ‘must’ is that it is typically used endorsesingly. But to the extent to which one finds non-endorsing uses of ‘must’ acceptable, to that same extent one will find ‘Must $\phi$ but $\neg \phi$’ to be consistent and find deontic ‘Must $\phi$’ to lack imperatival force.

What is distinctive about weak necessity modals is that *even when they are used endorsingly* they are non-entailing and can lack imperatival force. ‘Ought’ and ‘should’ are like ‘must’ in typically being used endorsesingly. Parallel to (52), the claims in (55) would be more naturally expressed as in (56).

(55) | a. You ought to get home by 11, but I don’t care whether you do.  
   | b. Bert ought to get home by 11. Aren’t his parents stupid? I would stay out if I were him.

(56) | a. You’re supposed to get home by 11, but I don’t care whether you do.  
   | b. Bert is supposed to get home by 11. Aren’t his parents stupid? I would stay out if I were him.

Nevertheless a characteristic use of ‘ought’ is with an explicit or implicated denial of its prejacent (§4).

### 6 Negotiability and collective commitment

We have seen two dimensions along which necessity modals can differ: first, they can differ in strength; second, they can differ in the degree to which they are used to

the following modification of a case from Angelika Kratzer (2012: 98–99).

(i) | [Context: We are standing in front of a locked filing cabinet. None of us has had access to the information in it, but we know that it contains the police’s complete evidence about the murder of Klotho Fischer. We are betting on who must have killed Fischer according to the information in the filing cabinet. You, who are innocent, say:]  
You: I must have done it.  
[Pia overhears you and comes in from the other room.]  
Pia: Wait, you killed Fischer?!?  
You: No, no. I didn’t do it. We were just talking about the police’s evidence.

40Hence why I have chosen to frame the discussion primarily in terms of these modals: doing so brackets orthogonal issues concerning (non-)endorsingness.
express the speaker’s endorsement of the considerations that would verify the modal claim. The primary emphasis in this paper has been on elucidating the first dimension, the distinction between weak and strong necessity. But the discussion in §5 of the distinction between endorsing and non-endorsing uses can help us respond to an alternative recent account of the weak/strong necessity distinction developed in Rubinstein. Rubinstein’s discussion is rich; for reasons of space I must reserve a more thorough discussion for elsewhere (see my 2012, 2013c). However, briefly considering Rubinstein’s account will help elucidate several distinctive features of the account developed in this paper.

On Rubinstein’s view, what distinguishes weak necessity modals is that they are interpreted with respect to “priorities” — norms, goals, desires (Portner 2007, 2009) — which are presumed to be negotiable. (Rubinstein doesn’t examine epistemic modals.) The view is summarized as follows:

[S]trong necessity modals are only sensitive to prioritizing premises that the conversational participants are presupposed to be collectively committed to… [I]f any participant in the conversation were given the chance to defend these priorities, it is assumed in the context of the conversation that they would do so. Weak necessity modals take into account all these premises plus some more. For these additional premises, lack of collective commitment is presupposed… [A] speaker uses a weak modal when he or she believes (perhaps mistakenly) that the secondary priorities it depends on are still up for discussion. (Rubinstein 2012: 51–52)

It is hard to know what is predicted by this account until more is said about what exactly is involved in a “commitment to defend” a priority, how intuitively relevant priorities are to be represented in specific examples, and how these representations reflect negotiability vs. non-negotiability. Even so, our previous discussion gives us reasons to doubt that the weak/strong necessity distinction will be best captured in terms of whether there is collective commitment to a body of priorities.

Rubinstein is explicit that commitment to a priority amounts to an endorsement of that priority as desirable (2012: 78; see also Portner & Rubinstein 2012). But we have seen that the weak/strong necessity distinction cuts across the distinction between modals that express (collective) commitment in this sense and those that don’t. First, there are uses of weak necessity modals that involve collective endorsement to a priority. In the interlocutors are both expressly committed to the value of family, and yet using ‘ought’ is felicitous, indeed, preferred. Second, there
are uses of strong necessity modals in which the speaker expressly rejects commitment to the priorities that verify the necessity claim, as we saw in (49) and (52) (and possibly (49)). The lack of endorsement can even be common ground, as in (57).

(57) [Context: We’re teenage siblings. It’s 10:30 p.m., and we plan on staying out and going to a party. We know our parents are already asleep.]

You: When is curfew, again? We need to make sure that we tell Mom we got back before then if she asks.

Me: We have to be home by 11. Isn’t Mom stupid? It’s amazing that she thinks her rules matter at all. C’mon, let’s go.

The account in this paper — the specific proposals about how considerations are represented in the premise semantics, the conventional contents of weak and strong necessity modals, and the associated contextual constraints — better captures Rubinstein’s intuitions about negotiability and collective commitment. An utterance of ‘STRONG ϕ’ expresses collective commitment in the same sense as an utterance of any other context-sensitive indicative sentence: one commits to the value of the context-dependent item being as one’s utterance assumes, and to the world being as one’s utterance says it is, given this assumed value. Uttering ‘He is sleeping’ (i) assumes that a certain actual individual \( m \) is the contextually salient male, and (ii) proposes to restrict the context set to worlds in which \( m \) is sleeping; using ‘he’ expresses a commitment that the contextually salient male in fact has the property ascribed. Likewise, uttering ‘STRONG ϕ’ (i) assumes that a certain conversational background \( P \) encodes the content of the relevant considerations, and (ii) proposes to restrict the context set to worlds \( w \) in which \( ϕ \) follows from \( P_w \); using a strong necessity modal expresses a commitment that the contextually supplied conversational background verifies the necessity of the prejacent in the actual world. But having this latter commitment is compatible with not endorsing the premises in \( P_w \), for any \( w \) in the context set. In (57) we can accept that the house rules require us to be home by 11 while denying that those rules should play any role in guiding our plans.41

The putative negotiability and lack of collective commitment associated with weak necessity modal claims is elucidated by treating them as necessity claims that needn’t be verified at the actual world. What is marked as negotiable in a weak necessity modal claim isn’t what considerations are relevant. It is whether we are in a

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41Rubinstein cannot accept this alternative way of understanding (collective) commitment given her broader applications of the notion to explaining patterns of verbal mood marking. It is crucial to her account of mood selection ([Portn & Rubinstein 2012]) that the operative notion be commitment to the content of the premise set as desirable, reasonable, etc.
world in which those considerations verify the necessity of the prejacent. But lacking this commitment to the prejacent’s being necessary is compatible with endorsing the considerations encoded in the given conversational background — indeed, ‘ought’ is typically used endorsingly (§8). In (3) we can endorse the value of family even if we prefer not to settle how it relates to other potentially competing values.

In sum, uses of strong necessity modals express collective commitment in the sense that they assume that the relevant considerations are thus-and-so, and make a claim about what is necessary in light of those considerations in the actual world. Having these commitments is compatible with failing to endorse the premises from which the prejacent follows. Uses of weak necessity modals convey negotiability in the sense that they don’t commit one to being in a world in which the prejacent is necessary. This is compatible with endorsing the premises from which the prejacent would follow. The relation between weak and strong necessity modals and common ground assumptions needn’t be stipulated or treated as basic in an account of the weak/strong necessity distinction. It follows from the modals’ semantics and general pragmatic principles.

7 Conclusion

Let’s recap. I have argued that the common semantic core of weak necessity modals across their various readings (deontic, epistemic, etc.) is that they bracket whether their prejacents are necessary (in the relevant sense) in the actual world. ‘Ought ϕ’ can be accepted without needing to settle that the relevant considerations (norms, values, goals, etc.) apply in such a way as to verify the necessity of ϕ. This analysis carves out an important role for expressions of weak necessity in conversation, deliberation, and planning. Weak necessity modals allow us to entertain and plan for hypothetical extensions of the current context. They afford a means of coordinating our norms, values, goals, and expectations while remaining open to new evidence about how the relevant considerations apply. The account also provides a systematic explanation for a wide variety of linguistic data — e.g., concerning the relative felicity of weak and strong necessity modals in context, the relation between weak and strong necessity modals and standing contextual assumptions, the morphosyntactic properties of expressions of weak necessity cross-linguistically, and the contrasting performative properties of weak and strong necessity modals. The range of semantic and pragmatic phenomena that are unified under and explained by our analysis lend it a robust base of support.

The data considered here certainly aren’t the only data that must be explained
by an overall theory of weak and strong necessity modals. For instance, there are also interesting contrasts concerning comparatives, interactions with quantifiers, polarity effects, and neg-raising, among others.\footnote{See, e.g., \textsc{Lassiter} 2011, 2012, \textsc{Iatrídu & Zeijlstra} 2013, \textsc{Portner & Rubenstein} 2014.} Moreover our discussion has highlighted a range of ways in which phenomena with weak and strong necessity modals interact with more general issues in linguistics and philosophy of language, as concerning context-sensitivity, presupposition, counterfactuality, mood, assertion, and performativity. These interactions afford a rich array of possible directions for future research. I welcome the development of alternative ways of systematizing the data with which the present account may be compared.

In closing I would like to briefly mention a potential broader application for this linguistic work on weak and strong necessity modals. Consider the case of deontic readings. A notion of obligation or deontic necessity is central in (meta)normative theory and deontic logic. We are often interested in investigating what we are actually required to do. We wish to guide our planning and influence others’ behavior in light of the norms we accept. A speaker-endorsing strong necessity modal like ‘must’ is well-suited to the task. However, using ‘must’ is often awkward. We may want to talk about obligations which held in the past, or which may go unfulfilled or be overridden in the future. Or we may want to communicate information about a body of norms without necessarily registering commitment to them or enjoining others to share in such commitment. A modal like ‘should’ or ‘be required to’ can thus be more suitable. There is a wide range of expressive resources at our disposal for coordinating our actions and states of mind. This is for the better given the variety of our purposes. But it also raises a philosophical risk. Bracketing differences among necessity modals might turn out to be harmless for the purposes of (meta)normative inquiry. But it might not. It is worth investigating to what extent inattention to differences among necessity modals might have obscured intuitions and hindered theorizing on broader philosophical issues. A tantalizing possibility.\footnote{See \textsc{Silk} 2013a, 2013b for specific discussion and examples.}

\section*{Appendix} Update semantics for weak and strong necessity modals

In §4 I offered several strategies for implementing the proposal that weak necessity modals bracket whether the necessity of the prejacent holds in the actual world. This Appendix outlines an update semantics which formalizes the contrasting up-
date potentials of weak and strong necessity modals. For concreteness I develop the semantics within an Update with Centering framework, adapting Bittner 2011, though I depart from Bittner’s specific account in several respects (see also Stone 1999). Alternative implementations are of course possible.

Update with Centering (UC) is a dynamic update system that represents how informational and attentional states develop in discourse. Typed discourse referents are ranked to reflect the relative salience of objects under discussion. Update with Modal Centering, UCω, includes discourse referents not only for individuals but also for worlds and propositions. All sentences are treated as introducing a relevant possibility, or modal topic, being talked about. (Hereafter I treat possibilities as propositions.) With assertions of simple indicative sentences the relevant possibility being commented on is the context set, typically the most salient possibility in the discourse. Not all modal topics, however, need be included in the context set. For instance, counterfactual marking cancels the default assumption that the modal topic — the possibility being talked about — is included in the context set. This semantic framework affords a means of unifying our representation of the contextual effects of uses of weak and strong necessity modals.

Updates in UCω are functions from contexts (information-attention states) to contexts (information-attention states). Contexts are represented with sets of sequences of discourse referents for individuals δ, worlds ω, and propositions Ω (conceived as sets of worlds ωt). These discourse referents are divided between those that are currently in the center of attention, or topical (τ), and those that are currently backgrounded (⊥). The bottom list ⊥ can be utilized in analyzing (e.g.) grammatical centering, tense, negation, questions, and — I will argue — modal remoteness. The discourse referents in each list, τ, ⊥, are ranked according to their relative salience or attentional prominence. A column || is used to pick out the set of discourse referents from a given list. For instance, τΩ, is the most salient (leftmost) proposition in the top list, and τω|| is the set of worlds in the most salient world column in the top list. (Hereafter I write Ta, ⊥a as short for Ta1, ⊥a1; see A.1) The context set is identified with this set of topical worlds, i.e. the topical proposition τΩ = τω||. A context is a set of pairs ⟨τ, ⊥⟩ of subsequences τ and ⊥ of ranked discourse referents.

Let’s start with an assertion of a simple sentence such as (58).

(58) Alice is generous.

Suppose we haven’t yet settled whether or not Alice is generous. The initial context set p₀ consists of worlds w₀, w₁, such that Alice is generous in w₁ but isn’t generous in w₀. As the most salient possibility in the discourse, this possibility p₀ serves as the
default modal topic for interpreting ordinary indicative assertions. The meaning of \[58\] is given in terms of how it updates this default modal topic.

Modifying Bittner [2011], I propose the following UC\(\omega\) representation of \[58\]:

\[
(59) \quad \begin{align*}
[w] & : P[\bot \omega \in T\omega] \quad \vdash [x | x = \text{Alice}] : [w \in \bot \omega]\wedge \text{generous}_w(\top \delta) ; \\
P[p = \bot \omega] & \vdash [\top \omega = \bot \omega] ; [p | p = \text{null}]
\end{align*}
\]

The input context \(c_0\) consists of two \(\top \bot\)-lists each of which includes a discourse referent for the initial context set \(p_o\) and a topic world \(w_0, w_1\) in \(p_o\). Asserting \[58\] involves seven updates, as reflected in \[60\], where the output context (set of \(\top \bot\)-lists) is given below each update. Boxes with variables, of the form \(\top [d | \ldots d \ldots]\) or \([d | \ldots d \ldots]\), are recentering updates which introduce a discourse referent satisfying ‘\(\ldots d \ldots\)’ into the most prominent spot in the center of attention or background, respectively. Boxes without any variables, of the form \([\ldots]\), are information updates, or tests, which eliminate sequences in the context that don’t satisfy the constraint ‘\(\ldots\)’.

\[
(60) \quad \begin{align*}
& c_0 & c_1 & c_2 & c_3 & c_4 & c_5 & c_6 \\
& \langle (w_0, p_0), () \rangle & \langle (w_0, p_0), (w_0) \rangle & \langle (w_0, p_0), (w_0) \rangle & \langle (a, w_0, p_0), (w_0) \rangle & \langle (a, w_0, p_0), (w_0) \rangle & \langle (a, w_0, p_0), (w_0) \rangle & \langle (a, w_0, p_0), (w_0) \rangle \\
& \langle (w_0, p_0), (w_1) \rangle & \langle (w_0, p_0), (w_1) \rangle & \langle (a, w_0, p_0), (w_1) \rangle & \langle (a, w_0, p_0), (w_1) \rangle & \langle (a, w_0, p_0), (w_1) \rangle & \langle (a, w_0, p_0), (w_1) \rangle & \langle (a, w_0, p_0), (w_1) \rangle \\
& \langle (w_1, p_0), () \rangle & \langle (w_1, p_0), (w_0) \rangle & \langle (w_1, p_0), (w_0) \rangle & \langle (a, w_1, p_0), (w_0) \rangle & \langle (a, w_1, p_0), (w_0) \rangle & \langle (a, w_1, p_0), (w_0) \rangle & \langle (a, w_1, p_0), (w_0) \rangle \\
& \langle (w_1, p_0), (w_1) \rangle & \langle (w_1, p_0), (w_1) \rangle & \langle (a, w_1, p_0), (w_1) \rangle & \langle (a, w_1, p_0), (w_1) \rangle & \langle (a, w_1, p_0), (w_1) \rangle & \langle (a, w_1, p_0), (w_1) \rangle & \langle (a, w_1, p_0), (w_1) \rangle \\
\end{align*}
\]

\[44\] I bracket complications concerning tense. See [\textit{A.3}] for relevant definitions and abbreviations.
The first update introduces a domain of possibly relevant worlds into the bottom sequence, yielding $c_1$. Like [Bittner 2011], I use the top sequence in representing the context set. However, following [Murray 2014], I use the bottom sequence to keep track of possibilities we are considering but aren’t currently committed to. The worlds added to the bottom sequence at this step needn’t be in the current context set. Subsequent updates introduce constraints on these worlds and indicate speakers’ commitments about them. For instance, importantly, the indicative presupposition (indicated by the preposed superscript P) in the second update restricts the set of worlds introduced in the first update to worlds in the initial context set, yielding $c_2$. This reflects how in ordinary indicative assertions the set of topic worlds — the worlds being talked about — are the live possibilities in the conversation. The effect of the first two updates is thus to introduce the worlds in the context set into the bottom sequence. The third update introduces into each top sequence $\top$ an individual discourse referent $a$ for Alice, yielding $c_3$. The fourth update introduces the worlds in where Alice is generous into the bottom sequence, yielding $c_4$. It checks, for each $\top \bot$-list in the context, whether the topical individual $\top \delta$ (=Alice) is generous in the most prominent world in the bottom sequence $\bot \omega$. Since Alice isn’t generous in $w_0$, only $w_1$ is introduced. The fifth update introduces a propositional discourse referent $p_1$ for this set of most prominent worlds in the bottom sequence $\bot \omega || = \{p_1 = \{w_1\}\}$, yielding $c_5$. (The superscript $\{\}$ indicates the characteristic set.) However, the context set isn’t yet restricted; the update is a pure attention update. The possibility that Alice is generous is registered as being under consideration, but hasn’t yet been committed to. The sixth update represents the proposal to update with this possibility and accept the assertion. The update checks, for each world $\top \omega$ in the context set that it is identical to the most prominent world $\bot \omega$ in its row. The first sequence is ruled out and the context set $\top \omega ||$ is restricted to $\{w_1\}$, yielding $c_6$. The final update recenters attention on the new context set by introducing into the top sequence a propositional discourse referent $p_2$ for it, yielding the final output context $c_7$. This possibility $\top \omega || = \{p_2 = \{w_1\}\}$ can then serve as the default modal
There are four features of this example that I want to highlight. First, the first update, which occurs with any sentence, introduces a set of possibly relevant worlds. Second, the indicative presupposition restricts this set to worlds in the context set. These updates are distinctive of the version of UC outlined here. Third, the bottom sequence keeps track of the proposed possibility and puts it on the conversational table. Fourth, the success of the assertion registers a specific attitude toward this possibility — acceptance that it is true — and restricts the context set accordingly. Asserting \( \text{[58]} \) thus provides both an informational and attentional update: it updates information, reflected in the reduction of the context set, and also attention, reflected in the introduction of a new modal referent as the primary topic.

Now consider \( \text{[61]} \), a sentence with the strong necessity modal 'must'.

\( \text{[61]} \)

Alice must be generous.

Like with \( \text{[58]} \), the meaning of the indicative modal sentence \( \text{[61]} \) is given in terms of how it updates the default modal topic, or context set. I propose the following UC\( \omega \) representation of \( \text{[61]} \) given in \( \text{[62]} \).

\( \text{[62]} \)

\[
\begin{align*}
[w] &; P_\omega \in T_\omega ;] \uparrow [x \in \text{Alice}] ; [w \in T_\omega \wedge \text{generous}_w (T_\omega)] ; \\
[w \in T_\omega \wedge \cap P_w \in T_\omega] ; [p \in T_\omega] ; [T_\omega = T_\omega] ; \uparrow [p \in T_\omega]
\end{align*}
\]

Like with \( \text{[58]} \), the first update introduces a set of possibly relevant worlds, which is restricted to the context set by the indicative presupposition in the third update. The distinctive dynamic contribution of the modal is that it itself introduces a topical possibility — here, the possibility that Alice is generous — and then comments on it (cf. Stone 1999). I treat the modal as contributing a semantic object \( P \), where the resolution of \( ? \) is tied to the reading of the modal (deontic, epistemic, etc.). Again, crucially, the input modal topic, which constrains the candidate values of \( P \), is presupposed to be the topical proposition, set to the input context set \( T_\omega \). The context set thus serves as a modal base for the relevant norms, expectations, etc. This ensures that the worlds in which the necessity claim is said to hold are included in the context set.

The UC\( \omega \) representation in \( \text{[62]} \) treats an assertion of \( \text{[61]} \) as involving eight updates. Let's assume an input context \( c' \) with an initial context set \( p' \) which includes not only worlds \( w_0 \) and \( w_1 \) but also \( w_3 \). Let's assume that Alice is generous only in \( w_1 \).
and \( w_1 \). And let’s assume that the modal ‘must’ is given a deontic reading, \( \mathbf{P}^d \), and that the value of \( \mathbf{P}^d \) at \( w_0 \) and \( w_1 \), but not at \( w_3 \), entails that Alice is generous. As the reader can verify, the input and output updates for \([62]\) are as follows (the preposed superscript \( \chi \) indicates the characteristic function):

\[(63) \quad c'_f := \chi\{\{(w_0, p_o), \emptyset\}\}, \quad c'_8 := \chi\{\{(p'_2, a, w_0, p_o), (p'_1, w_0, w_1, w_0)\}, \{(w_1, p_o), \emptyset\}\}, \{(w_3, p_o), \emptyset\}\}, \{(p'_2, a, w_0, p_o), (p'_1, w_0, w_3, w_0)\}\}, \{(p'_2, a, w_0, p_o), (p'_1, w_0, w_1, w_3)\}\}, \{(p'_2, a, w_0, p_o), (p'_1, w_0, w_3, w_3)\}\}, \{(p'_2, a, w_1, p_o), (p'_1, w_1, w_3, w_0)\}\}, \{(p'_2, a, w_1, p_o), (p'_1, w_1, w_3, w_3)\}\}, \{(p'_2, a, w_3, p_o), (p'_1, w_3, w_3, w_0)\}\}, \{(p'_2, a, w_3, p_o), (p'_1, w_3, w_3, w_3)\}\}, \{(p'_2, a, w_1, p_o), (p'_1, w_1, w_3, w_3)\}\}, \{(p'_2, a, w_3, p_o), (p'_1, w_3, w_3, w_3)\}\}\}.

As in \([59]\), the first and second updates introduce the worlds in the context set \( (w_0, w_1, w_3) \) into the bottom sequence, satisfying the indicative presupposition; and the third update introduces into each top sequence an individual discourse referent \( a \) for Alice. The fourth update also makes use of the bottom sequence, introducing into it the worlds in this set where the topical individual \( \top \delta \) (=Alice) is generous. Since Alice isn’t generous in \( w_0 \), only \( w_1 \) and \( w_3 \) are added. The fifth update reflects the modal’s evaluation of this newly introduced possibility \( \downarrow \omega_1 = \{w_1, w_3\} \). The update introduces the worlds in the aforementioned domain (current \( \downarrow \omega_2 \)) at which \( \mathbf{P}^d \) entails that Alice is generous into the bottom sequence. That is, it checks, for each world \( \downarrow \omega_2 \) in \( \downarrow \omega_2 \) = \( \{w_0, w_1, w_3\} \), that \( \mathbf{P}^d_{\downarrow \omega_2} \) entails the possibility \( \downarrow \omega_1 \), i.e. that \( \mathbf{P}^d_{\downarrow \omega_2} \) is included in the set of worlds in the context set where Alice is generous. Since only \( w_0 \) and \( w_1 \) pass this test, only these worlds are introduced into the bottom sequence. The sixth update introduces a propositional discourse referent \( p'_1 \) for this current set of most prominent worlds in the bottom sequence \( \downarrow \omega_1 = \{p'_1\} = \{w_0, w_1\} \). This attentional update represents the necessity claim being put on the conversational table. The seventh update represents the success of the assertion, and acceptance of the necessity claim. This update eliminates the sequences in which \( w_1 \) is the (local) topical world, restricting the context set \( \top \omega \) to \( \{w_0, w_1\} \). The final update recovers
attention on the new context set by introducing a propositional discourse referent
\( p' = x\{w_0, w_1\} \), yielding \( c'_p \). This possibility in which the deontic necessity of Alice’s being generous is accepted can then serve as the default modal topic.

An important feature about this example is that the initial context set \( p'_p \) ultimately serves as a kind of modal base for the relevant norms \( P^d \). Because of the indicative presupposition, the only worlds at which the necessity claim is evaluated are worlds in the initial context set. Successfully asserting \( (61) \) requires accepting the truth of the necessity claim throughout the set of live possibilities. Like with \( (58) \), asserting \( (61) \) both updates information, reflected in the reduction of the context set, and updates attention, reflected in the introduction of the modal referent \( p'_p \) as the primary topic.

In §§5–7 I argued that weak necessity modals cancel the presupposition associated with ordinary indicative sentences (which includes sentences with strong necessity modals) that the worlds being talked about are in the context set. In the present framework this amounts to treating weak necessity modals as dropping the assumption that the topic worlds introduced into the bottom sequence are included in the default modal topic \( T\omega\). I propose \( (65) \) as a first-pass semantic representation of \( (64) \) in \( UC_\omega \).

\begin{align*}
(64) & \quad \text{Alice should be generous.} \\
(65) & \quad \begin{align*}
[w]; & \quad [x | x = \text{Alice}] ; [w | w \in T\omega \land \text{generous}_w (T\delta)] ; \\
[w] & \quad [w \in T\omega] \land \bigcap P_w \subseteq T\omega ; [p | p = \bot] \\
\end{align*}
\end{align*}

(cf. Definition 4, §4)

The sequence of updates in \( (65) \) contrasts with the sequence in \( (62) \) in the following respects: it lacks the updates \( P^[\bot \in T\omega] \), \( [\bot = T\omega] \), and \( [p | p = \bot] \), associated with the indicative assertion. The first update introduces into the bottom sequence a set of potentially relevant worlds. However, there is no restriction of this set to worlds in the context set. This has the result that the propositional discourse referent introduced into the bottom sequence in the final update may include worlds which verify the necessity claim but which are outside the context set. Moreover there is no restriction of the context set to worlds where it is deontically necessary that Alice is generous. Suppose \( w_2 \), a potentially relevant world outside the context set, is such that \( P^d_{w_2} \) entails that Alice is generous. As the reader can verify, the final update of \( (65) \) introduces a propositional discourse referent \( p''_1 := x\{w_0, w_1, w_2\} \) into the bottom sequence. Successfully asserting \( (64) \) puts this proposition \( p''_1 \) on the conversational table, but doesn’t conventionally commit one to its truth.

Though the updates in \( (65) \) don’t directly restrict the context set, they don’t have
no conversational import. Updating with (65) centers attention on a set of potentially relevant worlds at which Alice’s being generous is deontically necessary, but doesn’t require committing for the future course of the conversation that the actual world is among them. In effect, (65) treats (64) as a topic-comment sequence without the comment: a modal topic is introduced for consideration — the possibility that Alice’s being generous is deontically necessary — but no explicit comment is made about it as a matter of conventional meaning. The conventional role of weak necessity modals, on this semantics, isn’t to update information. It is to place a necessity claim on the conversational table and center attention on it. This can have additional conversational effects as described in this paper.

The sequence of updates in (65) is one first approximation for a treatment of weak necessity modals in UC. Following our discussion in §7 there may ultimately be reasons for revising it. One might explicitly restrict the class of potentially relevant worlds introduced in the first update to closest worlds that satisfy some possibly counterfactual condition, or to worlds that are maximal in some (other) contextually relevant sense (most desirable, normal, etc.). The updates would then place constraints on the input context set via the accessibility relation which determines the specific restriction. The final two updates in (59) and (62) could be reintroduced to update the common ground information and recenter attention accordingly. One way of implementing these alternative updates for (64) is given in (66), where $\text{MAX}_w(p)$ specifies a preferred subdomain of a set of worlds $p$ relative to the evaluation world $w$ (for some relevant, lexically unspecified sense of ‘preferred’, e.g. most desirable, normal, etc.):

$$\begin{align*}
(66) & \quad [w]; \top[x \mid x = \text{Alice}]; [w \mid w \in \downarrow \omega \land \text{generous}_w(\top \delta)]; \\
& \quad [w \mid w \in \downarrow \omega \land \bigcap \text{P}_w \subseteq \downarrow \omega]; [w \mid w \in \downarrow \omega \land \text{MAX}_w(\downarrow \omega) \subseteq \downarrow \omega]; \\
& \quad [p \mid p = \downarrow \omega]; [\top \omega = \downarrow \omega]; [\top [p \mid p = \top \omega]]
\end{align*}$$

(cf. Definition 2, §4)

Note that this sequence of updates doesn’t restrict the context set to worlds in which Alice’s being generous is deontically necessary; rather it restricts the context set to worlds $w$ such that the relevant accessible worlds $w'$ from $w$ — which may not themselves be in the context set — are worlds at which Alice’s being generous is deontically necessary. Alternatively, instead of complicating the semantics in this way, we

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46 This contrasts with non-assertive discourse moves, like questions, which also introduce propositional discourse referents into the bottom sequence but don’t restrict the context set. Whereas questions introduce propositional discourse referents for each of their answers (Bittner 2011), thereby inducing a partition on the information state, the same doesn’t hold for uses of weak modals.
could attempt to derive these apparent conversational effects pragmatically in the
manner suggested in §4. Not all context changes need be explicitly encoded in our
representation of conventional meaning.

(One additional alternative is to treat \([64]\) as a counterfactual comparative as
suggested in Definition \([2]\). \([64]\) would be represented as a topic-comment sequence,
where the topical hypothesis is the set of possibly counterfactual worlds where Al-
ice’s being generous is deontically necessary, and the main attitudinal comment is
that this possibility is preferred (in some lexically unspecified sense) at the topical
world \(\top_\omega\) to a relevant alternative possibility (in the simplest case, the possibility
that Alice’s being generous isn’t deontically necessary). How precisely to formalize
this in \(UC_\omega\) depends on more general issues concerning topic-comment sequences,
conditionals, and the contrast between indicative and subjunctive conditionals.)

In closing I would like to briefly connect the proposed updates for weak and
strong necessity modals to the discussions in §§4–5 concerning (non-)entailingness.
One way of adapting common definitions of truth in dynamic semantics for the
present framework is as follows:

**Definition 6.** (truth, v1). For a model \(M\) and \((st)\) term \(K\):

- \(\top_{M,c} K = \{ (\tau_j) | j \in D_l \land (\forall g: j \in \{K\}^g) \}
- For any world \(w\), let \(C_w\) be the set of contexts \(c_w \in D_{st}\) that have perfect infor-
mation about \(w\), i.e. the set of contexts whose context set \(\top_{\omega,} = \{ w \}\).
  i. \(K\) is true at \(w\) (relative to \(M\)) iff \(\exists p \in D_{\omega,} \cdot \top_{M,c_w} K = \{ p \} \land p = \{ w \}\)
  ii. \(K\) is false at \(w\) (relative to \(M\)) iff \(\exists p \in D_{\omega,} \cdot \top_{M,c_w} K = \{ p \} \land p = \emptyset\)

This says that \(K\) is true at \(w\) iff given perfect information about \(w\) — i.e., an initial
context set \(\{ w \}\) — updating with \(K\) doesn’t lead to the empty information state (cf.,
e.g., Van Benthem et al. 1997: 594). This definition predicts the (static) inconsistency of
‘Must \(\phi\), and \(\neg \phi\)’. There is no \(\neg \phi\)-world at which ‘Must \(\phi\)’ is true, and hence no world at which ‘Must \(\phi\), and
\(\neg \phi\)’ is true. \([66]\), by contrast, can be true at worlds in which Alice isn’t generous.
Definition \([8]\) predicts that ‘Ought \(\phi\), and \(\neg \phi\)’ is (statically) consistent, given the sort
of analysis in \([66]\). However, this definition fails to assign a truth value to \([65]\),
since it doesn’t recenter the primary modal topic. We could avoid this by extend-
ing the definition of truth to assign truth values to terms that update the primary
backgrounded item \((\lambda j)\) to a specific proposition.

**Definition 7.** (truth, v2).

- \(\bot_{M,c} K = \{ (\lambda j) | j \in D_l \land (\forall g: j \in \{K\}^g) \}

45
A.1 Definitions

The following are several relevant definitions for the above UC\textsubscript{ω} semantics, adapted from [Bittner 2011]. For additional definitions and syntactic and compositional semantic details, see [Bittner 2011]; cf. also [Stone 1999].

Definition 8. (lists, contexts). Given a non-empty set \( D \) of objects:

- \( D^{n,m} = D^n \times D^m \) is the set of \( \top \bot \)-lists of \( n \top \)-objects and \( m \bot \)-objects.
- For any \( \top \bot \)-list \( i \in D^{n,m} \), \( \top i := i_1 \) and \( \bot i := i_2 \). Thus, \( i = (\top i, \bot i) \).
- An \( (n, m) \)-context is any subset of \( D^{n,m} \). \( \emptyset \) is the absurd context.

Definition 9. (UC\textsubscript{ω} types). The set of UC\textsubscript{ω} types \( \Theta \) is the smallest set such that (i) \( \delta, \omega, t, s \in \Theta \), and (ii) \( (ab) \in \Theta \) if \( a, b \in \Theta \). \( s \) is the type of \( \top \bot \)-lists. The subset \( \mathbb{D} \mathcal{R}(\Theta) = \{\delta, \omega, \omega t\} \) is the set of discourse referent types in \( \Theta \). Propositional discourse referents are defined as type \( \emptyset := \omega t \).

Definition 10. (UC\textsubscript{ω} frames). A UC\textsubscript{ω} frame is a set \( \{D_a | a \in \Theta \} \) of non-empty pairwise disjoint sets \( D_a \) such that

i. \( D_1 = \{1, o\} \),
ii. \( D_{ab} = \{f | \emptyset \subseteq \text{Dom} f \subseteq D_a \land \text{Ran} f \subseteq D_b\} \), and
iii. \( D_\delta = \bigcup \{D^{n,m} | 0 \leq n \land 0 \leq m\} \),

where \( D = \bigcup \{D_a | a \in \mathbb{D} \mathcal{R}(\Theta)\} \).

\[\text{Definition 6.}
\]

This assigns a truth value to (65) and predicts the consistency of ‘Ought \( \phi \), and \( \neg \phi \).\textsuperscript{47}

This brief discussion of truth in UC\textsubscript{ω} highlights the essentially dynamic nature of weak and strong necessity modals on the present semantics. Updating with (62)/(65) isn’t equivalent to intersecting the input context set with the set of worlds at which the sentence is true. Accepting (61) or (64) isn’t equivalent to adding its truth conditions to one’s stock of information. This limited role for a notion of truth is familiar among dynamic semantic accounts: the primary notion in representing linguistic meaning isn’t truth but how expressions conventionally update context.
Definition 11. (UCω models). A UCω model is a pair \( M = (\{ D_a \mid a \in \Theta \}, [ ] ) \) of a UCω frame and an interpretation function \([ ] \) such that \( \forall A \in \text{Con}_a; \[ A \] \in D_a \).

Definition 12. (UCω semantics). The following are several relevant semantic clauses. (The proposed superscripts \( \chi \) and \( \{ \} \) indicate the characteristic function and characteristic set, respectively.) For any model \( M \) and assignment function \( g \):

i. \( [A]^g = [A] \), if \( A \in \text{Con}_a \)
\( = g(A) \), if \( A \in \text{Var}_a \)

ii. \( [\lambda u_a(B)]^g(d) \equiv [B]^g[u/d] \), if \( d \in D_a \)

iii. \( [BA]^g \equiv [B]^g([A]^g) \)

iv. \( [A = B]^g = 1 \) iff \( [A]^g, [B]^g \in D_a \land \[ A \] ^g = \[ B \] ^g \)

v. \( [u_a \oplus B]^g \equiv ((g(u_a) \oplus \top [[B]^g]), \bot [[B]^g]) \)
\( [u_a \oplus B]^g \equiv (\top [[B]^g], (g(u_a) \oplus \bot [[B]^g]) \)

vi. \( [\top a_n]^g(i) \equiv ((\top i)_n) \), if \( i \in D_a \)
\( [\bot a_n]^g(i) \equiv ((\bot i)_n) \), if \( i \in D_a \)

vii. \( [A\{B\}]^g \equiv \chi \{ [A]^g(j) \mid j \in \{ [B]^g \} \}

viii. \( c[A; B]^g \equiv c[A]^g[B]^g \)

Remarks: In the centering rule (v), \( d \oplus x := \langle d, x_1, \ldots, x_n \rangle \), for an object \( d \) and sequence \( x \). (v) says that \( g(u_a) \) is introduced at the top of the relevant subsequence of the input \( \top \) list \( [B]^g \). In (vi), \( (x)_n \) is the subsequence of type \( a \) coordinates of the sequence \( x \), and \( (x)_n \) is the \( n \)th coordinate of \( x \). (vii) treats \( A\{B\} \) as denoting the set of all \( A \)-objects on the \( B \)-lists.

Definition 13. (context sets, defaults).

- The context set is a non-empty set of worlds \( p \). By default \( p \) is the topical proposition \( \top \), it sets the default modal topic.
- The initial context set \( p_o \) determines the default context \( \sharp p_o = \chi \{ \{ w, p_o \}, \{ \} \} \mid w \in \{ p_o \} \).

Definition 14. (truth v1, v2). (See Definitions 3-7)

Abbreviations (cf. also STONE1999) (\( a \in \text{DR}(\Theta), R \in \{ =, \epsilon, \notin, \in \} \))

- Static relations
  \( A_a \in B_{at} \) for \( BA \)
  \( A_a \notin B_{at} \) for \( \neg BA \)
  \( A_{at} \subseteq B_{at} \) for \( \forall u_i; u \in A \rightarrow u \in B \)
  \( B(A_1, \ldots, A_n) \) for \( BA_1 \ldots A_n \)
Local projections, conditions, and updates

\[
\begin{align*}
\top a, \bot a & \quad \text{for } \top a_1, \bot a_1 \\
A^a_1, A^a_2 & \quad \text{for } \lambda i_i A, \lambda i_i A_i \\
B^R A & \quad \text{for } \lambda i_i B^R_i A A^i \\
B^W(A_1, \ldots, A_n) & \quad \text{for } \lambda i_i B(W^{\top}i, A^\top_i, \ldots, A^\top_n) \\
(C_1, C_2) & \quad \text{for } \lambda i_i C_i \land C_i \\
\lceil C \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \lambda j_i \cdot C_i \\
\lceil [u_a] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \exists u_a \exists j_i \cdot j = (u^{\top} \oplus i) \land I_i \\
\lceil [u_a] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \exists u_a \exists j_i \cdot j = (u^{\top} \oplus i) \land I_i \\
\lceil [u_a] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \exists u_a \exists j_i \cdot j = (u^{\top} \oplus i) \land I_i \land C_i \\
\lceil [u_a \ldots u_n | C] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \exists u_a \exists u_n \exists j_i \cdot j = (u^{\top} \oplus \ldots (u_n^{\top} \oplus i)) \land I_i \land C_i \\
\lceil [u_a \ldots u_n | C] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \exists u_a \exists u_n \exists j_i \cdot j = (u^{\top} \oplus \ldots (u_n^{\top} \oplus i)) \land I_i \land C_i \\
B^W & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \lambda j_i \cdot B(\{I\}) \\
\lceil [u_a \ldots u_n | C] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \lambda j_i \cdot B(\{I\}) \\
A_{(st)\text{at}} & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \lambda j_i \cdot A \{I\} \land B \{I\} \\
P^W & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot P^W \{I\} \\
\max^W & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \max^W \{B(\{I\})\} \\
\end{align*}
\]

Global updates

\[
\begin{align*}
\lceil [a A R B] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \lambda j_i \cdot A \{I\} \land B \{I\} \\
\lceil [a R B] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \lambda j_i \cdot A \{I\} \land B \{I\} \\
\lceil [u_a \ldots u_n | a R A] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \exists u_a \exists j_i \cdot j = (u^{\top} \oplus i) \land I_i \land u A \{I\} \\
\lceil [u_a \ldots u_n | a R A] \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot \exists u_a \exists j_i \cdot j = (u^{\top} \oplus i) \land I_i \land u R A \{I\} \\
\lceil (K_{(st)\text{at}}; K'_{(st)\text{at}}) \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot (K' \{I\}) \{j\} \\
\lceil P^W \{K_{(st)\text{at}}\} \rceil & \quad \text{for } \lambda I_i \cdot \lambda j_i \cdot K \{I\} \land \forall u_a : u \in \top \omega \{I\} \rightarrow u \in \top \omega \{K\} \\
\end{align*}
\]

Derivations of the updates described above may proceed accordingly.

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