

ABSTRACT

Title of Dissertation: TELEOLOGICAL MODALITY IN
GRAMMAR AND DISCOURSE

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There seems to be something intrinsically special about the pursuit of goals compared to that of knowledge and regulations. When one is asked about how to achieve a goal, it's often sufficient to list one way, as opposed to all the ways to fulfill the goal. However, when it comes to asking about what one is allowed to do, for instance, it seems that one should be maximally informative by giving all true answers. This dissertation investigates teleological (i.e., goal-oriented) modality that's used to express possibilities and necessities given particular goals. In it, I examine two constructions in which teleological modality gives rise to unexpected readings that seem to be absent with any other modal flavors. The first one is so called *anankastic conditionals*; the second one is dubbed *sufficiency modal constructions*. What is so special about teleological modality? Does it require a separate grammatical treatment from other modality? I argue that in both environments, the apparent restriction to teleological modality is not a grammatical constraint, but an indirect consequence of

the fact that we conceptualize teleological necessity differently than necessity claims of other flavors. Specifically, I argue that teleological necessity claims are compatible with multiple possibilities to achieve a goal, while deontic and epistemic necessities state the absolute.

TELEOLOGICAL MODALITY IN GRAMMAR AND DISCOURSE

by

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Chapter 1: Introduction

1.1 Overview

There seems to be something intrinsically special about the pursuit of goals compared to that of knowledge and regulations. When one is asked about how to achieve a goal, it's often sufficient to list one way, as opposed to all the ways to fulfill the goal. However, when it comes to asking about what one is allowed to do, for instance, it seems that one should be maximally informative by giving all true answers. This dissertation investigates how humans interpret language expressing goals and requirements that involve modal vocabulary, like *can* and *have to*. Speakers use modal vocabulary to discuss scenarios beyond the actual world. For instance, we can talk about the requirements for achieving a goal — ‘I *have to* gather the ingredients if I want to bake a cake’; or potential outcomes — ‘Someone *could* break in if I leave the door open’. In formal semantics, these modal auxiliary verbs can be defined by two parameters: FORCE and FLAVOR. Modal force distinguishes between *necessity* and *possibility*. A necessity modal claim states the absolute, while a possibility modal claim states one possibility. In addition to auxiliary verbs, modality can also be expressed using lexical items — possibility can be expressed via adjectives like *possible* or by adverbs like *perhaps*, while necessity can be expressed via adjectives like *necessary*.

- (1) **Necessity modals:** *must, have to, should, would*

Example: Employees must wash their hands.

- (2) **Possibility modals:** *can, could, might, may*

Example: Sue could be in her office now.

Modal flavor refers to the interpretation a modal receives based on relevant information used for evaluation (Hacquard, 2011; Condoravdi and Francez, 2022; Portner, 2009). A modal claim receives an *epistemic* flavor when it's evaluated relative to available evidence or what we know. A *deontic* flavor arises when the evaluation is based on laws, norms, or regulations. *Teleological* modality concerns the pursuit of a goal, while *bouletic* modality is reflected by the desire to do something. Finally, an *ability* reading of a modal arises when it's evaluated relative to physical abilities.

(3) **Epistemic**

- a. It must/might/may be raining outside!
- b. Given that Al just walked in with a wet umbrella, it must/might/may be raining outside.

(4) **Deontic**

- a. You have to file your taxes before April. 15th.
- b. In view of the tax laws, you have to file your taxes before April 15th.

(5) **Teleological**

- a. Sam must pass the qualifying exam.
- b. In view of his goal to be a PhD candidate, Sam must pass the qualifying exam.

(6) **Bouletic**

- a. Sara should start saving now.
- b. Given Sara's desire to go to Italy this summer, Sara should start saving now.

(7) **Ability**

- a. Sue can run a marathon.
- b. Given her physical abilities, Sue can run a marathon.

This dissertation focuses on teleological modality that's used to express possibilities and necessities given particular goals. In particular, it examines two highly specific constructions in which teleological modality gives rise to unexpected readings that seem to be absent with any other modal flavors.

The first construction in which teleological modality seems to behave eccentrically is *anankastic conditionals* (von Wright, 1963), as in (8-a). These conditionals depict a relation between the complement of the attitude verb in the antecedent (i.e., to go to Harlem) and the prejacent of the modal in the consequent (i.e., take the A train). Roughly speaking, (8-a) means getting to Harlem requires taking the A train, as in (8-b). Anankastic conditionals like (8-a) are puzzling because while the expected reading under standard analyses of modals and conditionals is for the necessity claim to depend on the *desire* to go to Harlem (i.e., you *want* to go to Harlem), the intuitive reading is for the modal to depend

on going to Harlem (i.e., you *go* to Harlem). This makes it difficult to derive the intuitive reading compositionally: we cannot just ignore the attitude verb *want* in the antecedent, and turn (8-a) into (8-b) literally.

- (8) a. If you want to go to Harlem, you have to/must take the A train. (Sæbø, 2001)
b. If you go to Harlem, you have to/must take the A train.

Notice that not all conditionals of the form *if want ϕ , then have to ψ* express an anankastic, means-to-end reading. Consider an ordinary *want*-conditional in (9-a). Suppose the most indicative symptom for mpox is the desire to scratch one's eyes. Unlike anankastic conditionals where the attitude verb *want* doesn't seem to contribute to the interpretation of the sentence, in (9-a) the desire to scratch one's eyes does matter. Specifically, (9-a) does not mean scratching your eyes requires getting tested for monkey pox. Rather, the *desire* to scratch one's eyes requires getting tested.

- (9) a. If you want to scratch your eyes, you have to/must check for mpox.
b. ? Checking for mpox is necessary for scratching your eyes.

What exactly is giving rise to the unexpected readings in anankastic conditionals and how do we derive it compositionally? Is teleological modality a deciding factor for these readings? If so, where does this flavor constraint come from?

Prevailing accounts derive anankastic readings by proposing either a special semantics for *want* (Condoravdi and Lauer 2016), or a special way of interpreting a conditional with a teleological modal (von Fintel and Iatridou 2005; von Stechow et al. 2006) — all seems to suggest that anankastic readings are limited to the attitude verb *want* and teleological modality. However, in this dissertation, I will show that teleological modality is not responsible for these unexpected readings in anankastic conditionals — they are routinely available with teleological modality, but can occur with other modal flavors under the right contextual conditions. Thus, despite appearances, anankastic conditionals do not necessitate a distinct treatment of teleological modals from other modals. The puzzle replicates across flavors, and, as we will see, can be resolved without modifying standard semantics for modals and conditionals.

The second construction involving teleological modality is what von Fintel and Iatridou (2007) dubs “The sufficiency modal constructions”. Consider a canonical example from von Fintel and Iatridou (2007). Suppose you want to get some good cheese. You can get good cheese from the North End, New York, and Switzerland. Given your location, Boston, the North End is the easiest destination to get to. Upon knowing your goal of getting good cheese, I utter (10-a). Intuitively, what I mean by it is ‘you *can* go to the North End, but you don’t have to’. However, standard semantics for *only* (Horn, 1969) predicts (10-a) to mean (10-c), contrary to intuition. In other words, what is predicted in these sufficiency constructions is a necessity inference; yet intuitively, the meaning is something weaker. Strange as sufficiency constructions may seem, their distributions are, in fact, highly constrained. For one, a weakened modal inference seems to be only available when the necessity modal expresses a teleological flavor, as we will see in Chapter 3. This raises some immediate questions: Why is there a flavor restriction? and where does it come from? Does it suggest that teleological modality is fundamentally different from other modal flavors? If so, how might we implement this difference?

- (10) a. To get good cheese, you only have to go to the North End.
 b. $\Rightarrow$ To get good cheese, you *can* go to the North End.
 c. $\nRightarrow$ To get good cheese, you *have to* go to the North End.

I will argue that, ultimately, there is nothing *grammatically* special about teleological modality that gives rise to sufficiency reading. However, I will argue that only teleological modals are pragmatically felicitous in sufficiency constructions, and that this is because sufficiency statements are answers to mention-some questions, which, I will show, always involve a teleological possibility modal. Ultimately, I take the felicity of teleological modals in sufficiency constructions and mention-some environments to come from the fact that goals can be satisfied in many ways, but do not need to be satisfied exhaustively: fulfilling the goal in one way suffices. Hence, I argue these constraints to teleological modality do not suggest that teleological modals are grammatically distinct from other modal flavors; instead, they are an indirect consequent of the fact that we conceptualize teleological necessities different than other modal flavors.

In the rest of the introduction, I will first give a brief background on the semantics of modality. Then, I will detail the plan for each chapter, streamlining the empirical and theoretical contributions.

1.2 A brief background on modality

Modals can express a variety of flavors. Depending on the context, in some languages like English the flavor of the same modal auxiliary can vary as well. For instance, in a context where Sal is required by her doctor to eat eggs for additional protein intake, *must* expresses a deontic reading, conveying an obligation or requirement. Conversely, the same sentence can be used to express an inference based on observed evidence. For instance, if we notice Sal consistently buys two dozens of eggs a week, we might conclude that she ‘must’ eat them as a matter of habit/preference. In this instance, the modal receives an epistemic reading. This kind of variation in the interpretation of the same modal auxiliary can be found with other modal verbs like *may* in English and in other languages. Does this suggest that a modal auxiliary like *must* is ambiguous? How do we decide which flavor a modal expresses when the same modal can convey various flavors?

(11) Sal must eat eggs.

Originated from modal logic, standard approaches to modality treat modals as quantifiers over possible worlds: possibility modals express *existential* quantification over possible worlds, and necessity modals have *universal* quantification over possible worlds. The interpretation of a modal depends on the set of possible worlds it quantifies over, which is determined by an accessibility relation. When a modal quantifies over a set of possible worlds compatible with what is known, the modal receives an epistemic flavor; when it quantifies over a set of worlds compatible with certain goals, it receives a teleological interpretation, and so on. (von Fintel, 2006a; Hacquard, 2011; Condoravdi and Francez, 2022)

Kratzer (1981, 1991) offers an analysis for modals that allows us to capture the difference in flavors when they are expressed by the same modal. For Kratzer, there is just one *must*; that is, even though *must* can express different flavors, it share the same lexical entry. The difference in flavor

arises from contextually determined restrictions. Specifically, in the Kratzerian framework, modals are interpreted relative to two “conversational backgrounds”: a modal base (determined by the accessibility relation) and an ordering source. The modal base consists of a set of consistent, true propositions that are relevant for interpreting the modal. There are two types of modal bases: epistemic and circumstantial. The epistemic modal base is used for evaluating epistemic modal claims. For instance, the modal in “Sam must be in his office right now” receives an epistemic interpretation, if it’s evaluated relative to an epistemic modal base consisting of what is known about Sam. Conversely, the circumstantial modal base is used for all ‘root’ (i.e., non-epistemic) flavors (Hoffman, 1966): deontic, ability, bouletic, and teleological. For instance, the modal *can* in “if you want to get good cheese, you can go to Trader Joe’s” expresses a teleological flavor, and it’s evaluated relative to a circumstantial modal base consisting of relevant facts (e.g. that Trader Joe’s sells high-quality cheese). The ordering source helps further distinguish the differences between root flavors. Specifically, an ordering source can contain propositions expressing laws, norms, desires, or goals. When the propositions in the ordering source are laws, the modal has a deontic flavor; when they are desires, the modal receives a bouletic flavor; when they are goals, the modal receives a teleological flavor. The modal base first restricts the set of worlds to those compatible with relevant facts. Once the modal base picks out the set of worlds compatible with either what is known (epistemic) or with some circumstances (circumstantial) in the world of evaluation, these worlds are then ordered based on how they satisfy the propositions (desires, laws, etc.) in the ordering source. Effectively, the modal ends up quantifying over the most ideal worlds of the modal base, given the ordering set by the ordering source. In this framework, a necessity claim, *must p* is true if and only if the prejacent *p* is true in all of these most ideal worlds, given the lexical entry in (12):

$$(12) \quad \llbracket \text{must} \rrbracket^w = \llbracket \text{have to} \rrbracket^w = \lambda f_{\langle s, \langle s, t \rangle \rangle} \cdot \lambda g_{\langle s, \langle s, t \rangle \rangle} \cdot \lambda p_{\langle s, t \rangle} \cdot \forall w' \in_{g(w)} \left(\bigcap f(w) \right) : p(w') = 1$$

where ${}_{\rho}(X) = \{ w \in X : \neg \exists w' (w' <_{\rho} w) \}$ (von Fintel and Heim, 2011)

While a modal like *must* can express both epistemic and deontic flavors, epistemic and root modals differ in many aspects. We have seen that these two classes of modals differ semantically: while

epistemic modal claims are evaluated relative to an epistemic modal base, root modals are evaluated relative to a circumstantial modal base. They are also argued to be syntactically distinct. For instance, epistemic modals have been argued to scope above tense and aspect, root modals below (Cinque, 1999). For more discussion, see Hacquard (2011). Do these differences between root and epistemic modals pose a challenge for a unifying analysis of modality? Setting aside epistemic modals for now, in the face of the puzzles investigated in this dissertation, can we at least maintain a unified treatment of teleological and other root modals?

There seems to be some syntactic differences between teleological and other root modals. For one, only teleological modality is associated with a purpose clause, which is used to describe goals (Nissenbaum, 2005; von Stechow et al., 2006). For instance, (13) contains a purpose clause, which specifies the goal of getting good cheese. The modal *have to* has a teleological interpretation — in view of the goal of getting good cheese, you have to go to the North End.

(13) To get good cheese, you have to go to the North End.

Second, Rubinstein (2012) shows that while *need* and its counterparts in Hebrew and Hindi can express deontic and teleological necessity when it takes an infinitival complement, it can only express teleological necessity with a nominal complement. For instance, consider the example from (Rubinstein 2012:155). *Need* with a nominal complement as in (14-a) appears to only have a teleological interpretation. In other words, it lacks the deontic interpretation that's observed in (14-b) when *need* takes an infinitival complement.

(14) Context: City regulations mandate that home owners put up fences between their properties. You and your neighbor get along very well without a fence. In fact, both of you object to a fence because it would have to go right on top of the beautiful flower beds that have been flourishing between your properties. You say to your neighbor:

- a. We need a fence.
- b. We need to put up a fence. (*according to city regulations.*)

While there are some differences between teleological and other root modals, in this dissertation, I will investigate two peculiar constructions that seem to be limited to teleological modality and probe whether these constraints warrant a separate grammatical treatment of teleological modality.

1.3 Chapter 2: Anankastic conditionals

Chapter 2 presents the problems with anankastic conditionals and offer a pragmatic solution to them. Existing literature claim that only teleological modality can trigger this means-to-end, anankastic reading. The antecedent of (15) expresses the hypothetical goal of going to Harlem, and the consequent specifies that taking the A train is the only way to get there. Roughly speaking, (15) means going to Harlem requires taking the A train. These conditionals are particularly puzzling because it's possible to understand them in a way where we ignore the attitude verb *want*, and the sentence can still be true even if you don't want to go to Harlem.

(15) If you want to go to Harlem, you have to take the A train.

Existing literature claim that only teleological modality can trigger this means-to-end, anankastic reading on which the modal in the consequent of the conditional seems to be restricted by the *complement* of the attitude verb inside the antecedent, as opposed to the entire antecedent. This motivates proposals that derive the anankastic reading either by proposing a special semantics for *want* (Condoravdi and Lauer, 2016), or a special way of interpreting a conditional with a teleological modal (von Stechow and Iatridou, 2005; von Stechow et al., 2006). However, I show that the apparent restriction to teleological modality assumed by previous accounts is empirically incorrect. I show that modals of epistemic and deontic flavors can give rise to the anankastic-like, which I call “harmonizing”, interpretation as well. For instance: (16-a) can convey the deontic claim in (16-b), and (17-a) can convey the epistemic claim in (17-b). Scripts *T*, *D*, and *E* stand for teleological, deontic, and epistemic:

- (16) a. If the Provost states that grades be posted on Monday, Al must_D finish grading now.
b. If grades are to be posted on Monday, Al must_D finish grading now.

- (17) a. If Sherlock Holmes thinks that the crime occurred at 6pm, Al must_E be the culprit.
 b. If the crime occurred at 6pm, Al must_E be the culprit.

I offer a pragmatic account which is based on an observation: harmonizing reading obtains only when “ $x A p$ ” warrants the defeasible pragmatic inference that $x \{must/have to\}_F p$, where the modal flavor F happens to match the flavor of the consequent modal. For instance, one can infer from the attitude report in (18-a) in the antecedent the teleological necessity in (18-b):

- (18) a. You want to go to Harlem.
 b. You must_T go to Harlem.

One can also infer from the attitude report in (19-a) the deontic necessity in (19-b):

- (19) a. The Provost states that grades be posted on Monday
 b. Grades must_D be posted on Monday

And one can infer from the attitude report in (20-a) the epistemic necessity in (20-b):

- (20) a. Sherlock Holmes thinks that the crime occurred at 6pm.
 b. The crime must_E have occurred at 6pm.

The account I will propose is pragmatic, and not semantic nor syntactic, unlike most previous accounts. Specifically, I will show that the availability of a “harmonizing” reading is dependent upon whether the speaker can be assumed to take the attitude subject as a reliable authority in the relevant modality. For instance, if we replace the subject Sherlock Holmes in (17-a) with dim-witted Watson, whose epistemic authority we don’t trust, the harmonizing reading seems to disappear.

In a nutshell, I will argue that harmonizing arises from a necessity inference derived from the meaning of the attitude report in the antecedent, together with uncontroversial background assumptions, whose modal flavor happens to match the flavor of the modal in the conditional’s consequent. Because the modal in the necessity inference and the modal in the consequent happen to quantify over the same set of worlds when the meaning of the conditional is enriched with the modal inference,

the consequent modal ends up quantifying over worlds in which the complement of the antecedent's attitude verb p holds. To illustrate, the desire report in (8-a), '*You want to go to Harlem*', invites the inference that '*You have to_T go to Harlem*'. The teleological necessity modal in this inference matches in flavor with the consequent modal: both quantify over the same worlds, namely those compatible with your goals (in those worlds in which the antecedent holds). When the meaning of the conditional is enriched with the modal inference, we obtain that in all worlds compatible with your goals—those in which you want to go to Harlem—you do go to Harlem and you take the A train.

This general pragmatic solution to anankastic conditionals and their kin can predict when harmonizing readings are possible, when they are not, and the highly context-sensitive nature of the process. And it does so without relying on any flavor-specific idiosyncrasies. Given that the problems to anankastic conditionals extend beyond teleological modality and can be resolved pragmatically, it suggests that there is nothing grammatically special about teleological modality to give it its own separate treatment from other modals.

1.4 Chapter 3: The flavor restriction in sufficiency

Chapter 3 establishes the fact that there is a flavor constraint in sufficiency constructions, like (21-a). Consider the cheese example, repeated here as (21-a). While the standard semantics for *only* predicts (21-a) to mean (21-c), the intuitive reading seems to be much weaker, as in (21-b).

- (21) Context: There are three places to get good cheese: New York, North End, and Switzerland.
 Given that we are in Boston, North End is the easiest to get to.
- a. To get good cheese, you only have to go to the North End.
 - b. $\Rightarrow$ To get good cheese, you can go to the North End.
 - c. $\nRightarrow$ To get good cheese, you have to go to the North End.

In this chapter I show that the weakened modal inference is only available when the necessity modal expresses a teleological modal flavor, and it is not observed when the modal is epistemic or deontic. To illustrate, consider (22-a) with a deontic necessity modal. Unlike the canonical cases with a teleo-

logical necessity modal, here it appears that *only* does entail its prejacent (i.e. ‘you have to submit your W2’ in (22-b)). In other words, with a deontic modal (22-a) doesn’t lack the necessity inference that’s absent in sufficiency constructions, as shown in (22-b).

(22) Context: according to the laws about filing taxes, submitting a W2 is necessary for filing a tax return.

a. To file for a tax return, you only have to submit your W2.

b. $\Rightarrow$ To file for a tax return, you *have to* submit your W2.

Only also seems to presuppose its necessity prejacent when the necessity modal under *only* has an epistemic flavor. The modal *has to* in has an epistemic flavor - given what we know Sara and her relationship to Sue, the only explanation for her irrational behaviors is such that she had just seen Sue. In this case, *only* presupposes its prejacent; namely, ‘she has to have just seen Sue’. Therefore, with both epistemic and deontic necessity modals, we can’t seem to get a sufficiency reading – it is only available when the modal flavor is teleological.

(23) Context: Suppose Sara really dislikes Sue and whenever she encounters Sue, she gets frustrated and acts irrationally.

a. If Sara is this upset, she only has to have just seen Sue.

b. $\Rightarrow$ If Sara is this upset, she has to have just seen Sue.

In the second half of Chapter 2, I delineate three existing proposals to sufficiency constructions. I show that while previous accounts derive the weakened modal inference in one way or another, they either fail to realize or account for the fact that a weakened modal inference is subject to a teleological flavor constraint. Specifically, we will see that Condoravdi and Francez (2022) derives the prejacent inference through domain restriction. Their account seems to be sensitive to the flavor constraint as weakening is obtained partially via manipulating the modal’s ordering source. However, nothing in their system seems to prevent one from tempering with the ordering sources of epistemic and deontic modals and thus, deriving weakening when there is none, leading to potential over-generalization

issues. Alonso-Ovalle and Hirsch (2022) von Fintel and Iatridou (2007) derive the possibility inference either introducing a scalar operator *AT LEAST* at the LF or via splitting the scope of *only* to negation and exceptive – none of which actually interacts with the modal to have an influence on its flavor.

Why is the availability of a weakened modal inference subject to a flavor constraint? Is this because the analysis of teleological modality is fundamentally different from the analyses of modals expressing other flavors? In Chapter 4, I suggest two possibilities: one that explains the flavor constraint by arguing that there is a grammatical distinction between teleological modality and others, and another that accounts for the flavor restriction pragmatically. I will ultimately be pursuing the pragmatic account and argue that there is nothing grammatically special about teleological modality.

1.5 Chapter 4: Deriving the flavor restriction in sufficiency

Chapter 4 proffers two routes to account for the flavor constraint in sufficiency constructions. The overarching insight pursued in this chapter is that there seems to be something special about teleological necessity modals — teleological necessities can be satisfied with different possibilities, while deontic and epistemic necessities state the absolute. This distinction, I argue, is essentially why a weakened modal inference is only available when the necessity modal in a sufficiency construction expresses a teleological flavor.

I consider two ways to implement this insight: a semantic route for accounts that derive sufficiency readings as weak necessity inferences, and a pragmatic route for accounts that derive sufficiency readings as possibility inferences. The former follows insights from von Fintel and Iatridou (2007) and Condoravdi and Francez (2022). In particular, I consider the possibility that there is a grammatical difference between teleological and other modalities: while the latter involve a modal base and a single ordering source, teleological modals involve a modal base and *two* ordering sources — a primary one containing a designated goal contributed by the purpose clause, and a secondary one where other considerations help pick out the best way to achieve the designated goal. To illustrate, the purpose clause in (24-a) specifies that the designated goal is getting good cheese, which is the sole goal in the primary ordering source of the necessity modal. Suppose you also have the goal to relax, and that going to

the North End for good cheese is the easiest to get good cheese compared to going to New York or Switzerland. In this case, since ‘to relax’ isn’t expressed by the purpose clause, it will be a subsidiary goal in the modal’s secondary ordering source. The modal base and the primary ordering source first yield a set of best worlds that’s compatible with the relevant facts in *w* and where you get good cheese. The secondary ordering source then further restricts that set of best worlds in which the designated goal is achieved; as a result, we have a set of very best worlds that best fit both the primary and secondary ordering sources; namely, a set of worlds where you get good cheese easily. On this analysis, (24-a) can be construed as (24-b), and has the truth conditions in (24-c).

- (24)
- a. To get good cheese, you only have to go to the North End.
 - b. To get good cheese easily, you only have to go to the North End.
 - c. In all *w*’ compatible with relevant facts in *w* that best fit your goals in *w* and where you get good cheese easily, you go to the North End.

Given that only teleological modals have a secondary ordering source that’s responsible for a weaker interpretation of the necessity modal, it follows that a weakened modal inference is unavailable with deontic and epistemic modals and thus, the flavor constraint is captured. Nevertheless, I will show that as it stands, the semantic route faces some non-trivial challenges, which ultimately motivates the pursuit of a pragmatic route to the flavor constraint.

The pragmatic route accounts for the flavor constraint by relating sufficiency statements to the questions they address. Specifically, I argue that, by the maxim of *relevance* (Grice, 1975), an occurrence of a sufficiency statement requires the presence of a mention-some question, which allows speakers to give one true answer to settle the question, as opposed to all true answers.

For instance, suppose there are two places to get good cheese: Whole Foods and Trader Joe’s. The speaker asks the question in (25-a) and I provide the answer in (25-b). Here, saying “Whole Foods” doesn’t mean that it is the only place where one can get good cheese; instead, it’s compatible with there being other places where one can get good cheese, and I’m simply giving one of those places.

- (25) a. Where can I get good cheese?
 b. Whole Foods.

When it's felicitous to settle the question by giving one true answer, the question then receives a mention-some interpretation. The availability of a mention-some reading, as we will see, is surprisingly subject to the same flavor constraint as we have seen in sufficiency constructions; that is, a question can only receive a mention-some answer if it contains a possibility modal of teleological flavor. To illustrate, consider the following example adapted from Xiang (2023). The modal in (26-a) has a deontic flavor. In this context, if the speaker is seeking information regarding department regulations, it seems that the hearer should provide all true answers to the question. In other words, a mention-some interpretation doesn't seem to be available when the modal has a deontic flavor.

- (26) Context: Alice needs someone to sign a document for her. According to the regulations, this document can be signed by either her mentor, the program director, or the department chair. One signature is sufficient. Bob knows the regulations well.
- a. According to the rules, who can sign this document?
 b. ? Your mentor \.

I will exploit this flavor parallel between mention-some interpretations and sufficiency constructions by proposing that a sufficiency statement must answer a mention-some question. For example, a sufficiency statement as in (27-b) cannot occur without a mention-some question as in (27-a), which in itself contains a modal expressing a teleological flavor.

- (27) a. Where can I get good cheese?
 b. To get good cheese, you only have to go to Whole Foods.

By establishing the parallel that mention-some interpretations and sufficiency constructions are subjected to the same flavor constraint and that sufficiency statements are answers to mention-some questions, I reduce the flavor constraint in sufficiency constructions to that in mention-some questions in the sense that the former inherits the flavor constraint from the latter. I take the felicity of teleo-

logical modals in both sufficiency constructions and mention-some environments to come from the observation that teleological necessities can be satisfied with possibilities, while epistemic and deontic necessities state the absolute. Hence, I argue that teleological modality is conceptually, but not grammatically special.

1.6 Chapter 5: Deriving anankastic sufficiency constructions

Chapter 5 is devoted to deriving weakened modal inferences from anankastic sufficiency constructions, using the pragmatic account to anankastic conditionals proposed in Chapter 2. von Stechow and Iatridou (2007) observes that the presence of a purpose clause is not necessary for the availability of a weakened modal inference, as such reading can arise with anankastic conditionals and causal conjunctions. For instance, consider the cheese example in (28-a). Just like canonical sufficiency constructions with a purpose clause, from an anankastic sufficiency construction like (28-a), we can obtain the inference that you *can* go to the North End to get good cheese, but you don't *have to* go there. That is, anankastic sufficiency constructions lack the necessity inference, as in (28-c), aligning with the entailment pattern observed in canonical sufficiency cases.

(28) *Anankastic sufficiency construction*

- a. If you want to get good cheese, you only have to go to the North End.
- b. $\Rightarrow$ If you want to get good cheese, you can go to the North End.
- c. $\nRightarrow$ If you want to get good cheese, you have to go to the North End.

This chapter will show that anankastic sufficiency statements encounter the same problems we see in anankastic conditionals. In the course of doing so, I will present how the pragmatic solution to anankastic conditionals can resolve those problems in anankastic sufficiency constructions and derive a weakened modal inference.

Chapter 6 gives a summary of the previous chapters, highlights the contributions of this dissertation, points out remaining issues, and concludes.

To summarize, this dissertation investigates the behaviors of teleological modality in anankastic

conditionals and sufficiency modal constructions. While teleological modality has been argued to be a distributional factor for the availability of anankastic reading, I show that the apparent restriction to teleological modals is empirically wrong: problems with anankastic conditionals can be replicated with epistemic and deontic modals. I offer a pragmatic account to anankastic conditionals that takes these unexpected readings to be results of pragmatic conspiracies independent of a particular modal flavor. Thus, there's nothing *grammatically* special about teleological modals from the perspective of anankastics. Turning to sufficiency, we see that the phenomenon *is* limited to teleological modality. I argue that the apparent flavor constraint in sufficiency constructions is rather indirect; specifically, I show that sufficiency statements are answers to mention-some questions, which are themselves restricted to teleological modality. I take the felicity of teleological modals in sufficiency constructions and mention-some environments from the fact that goals can be satisfied in many ways, but do not need to be satisfied exhaustively: fulfilling the goal in one way suffices. Hence, I argue that teleological modality is conceptually, but not grammatically special.

Chapter 2: Being pragmatic about anankastic conditionals

2.1 Introduction

A speaker can use (1a) to convey that you getting to Harlem requires you taking the A train, just like (1b). On this “anankastic” reading of the conditional (von Wright, 1963), it seems irrelevant whether you actually want to go to Harlem or not. The claim would be true even if your actual desires conflict with going to Harlem. This makes it difficult to derive the reading compositionally: we cannot just ignore *want* in the antecedent, and turn (1a) into (1b) literally.¹

- (1) a. If you want to go to Harlem, you have to take the A train. (Sæbø, 2001)
- b. If you go to Harlem, you have to take the A train.

Prevailing accounts derive anankastic readings by proposing either a special semantics for *want* (Condoravdi and Lauer, 2016), or a special way of interpreting a conditional with a teleological (goal-based) modal (von Stechow et al., 2006; von Fintel and Iatridou, 2005). These proposals, however, miss a generalization that we report here, and which, we argue, warrants a pragmatic solution to the problem.

We show that anankastic conditionals are an instance of a general pattern. For any number of attitude verbs, not just desire, and modal flavors *F*, not just teleological,² when the antecedent expresses “*subject* ATTITUDE *p*”, the consequent modal, MOD_F , may be interpreted as restricted to *p*-worlds. For example, (2a) can convey the deontic claim in (2b), and (3a) can convey the epistemic claim in (3b). We will use subscripts *T*, *D*, and *E* for teleological, deontic, and epistemic, respectively:

- (2) a. If the Provost requests that grades be posted on Monday, Al must_D finish grading now.
- b. If grades are to be posted on Monday, Al must_D finish grading now.
- (3) a. If Sherlock Holmes thinks that the crime occurred at 6pm, Al must_E be the culprit.
- b. If the crime occurred at 6pm, Al must_E be the culprit.

¹This chapter is a joint work with Valentine Hacquard, and it is to appear in *Semantics of Natural Language*.

²Modals in anankastic conditionals are taken to be teleological (von Fintel and Iatridou, 2005). One might wonder whether they might be better classified as “bouletic”, thus as based not on goals, but on desires. However, the difference between teleological and bouletic modality is difficult to pin down. As Cariani (2024) puts it, “the distinction between goals and desires is not sufficiently clear to ground anything of theoretical significance.” We will thus follow the literature here, and label this type of goal/desire-based modality “teleological”.

The generality of the pattern requires a broader explanation. Our account is based on an observation: the anankastic-like interpretation—which we will call “harmonizing”—obtains only when “*Subject* ATTITUDE *p*” warrants the defeasible inference that *Subject* $\{must/have\}_F p$, where the modal flavor *F* happens to match the flavor of the consequent modal. For instance, the attitude report ‘You want to go to Harlem’ in (1a) warrants the teleological inference that *you have to_T go to Harlem*; the attitude report ‘The Provost requests that grades be posted on Monday’ in (2a) warrants the deontic inference that *grades must_D be posted on Monday*; and the attitude report ‘Sherlock thinks that the crime occurred at 6pm’ in (3a) warrants the epistemic inference that *the crime must_E have occurred at 6pm*.

Our proposal will be pragmatic, and not semantic nor syntactic, unlike most previous accounts. We will show that this is necessary, given the highly context-sensitive nature of when harmonizing is possible. Indeed, whether a “harmonizing” reading is possible depends on whether the speaker can be assumed to take the attitude subject as a reliable authority in the relevant modality. For instance, if we replace the subject Sherlock Holmes in (3a) with his slow-witted acolyte, Watson, the harmonizing reading seems to disappear.

In a nutshell, we will argue that harmonizing arises from a pragmatic necessity inference derived from the meaning of the attitude report in the antecedent, together with uncontroversial background assumptions, whose modal flavor happens to match the flavor of the modal in the conditional’s consequent. Because the modal in the necessity inference and the modal in the consequent happen to quantify over the same set of worlds when the meaning of the conditional is enriched with the modal inference, the consequent modal ends up quantifying over worlds in which the complement of the antecedent’s attitude verb *p* holds. To illustrate, the desire report in (1a), ‘*You want to go to Harlem*’, invites the inference that ‘*You have to_T go to Harlem*’. The teleological necessity modal in this inference matches in flavor with the consequent modal: both quantify over the same worlds, namely those compatible with your goals (in those worlds in which the antecedent holds). When the meaning of the conditional is enriched with the modal inference, we obtain that in all worlds compatible with your goals—those in which you want to go to Harlem—you do go to Harlem and you take the A train.

We begin this paper with a review of the problem and the main prior analyses, in §2. In §3 we show how the apparent non-compositionality problem of anankastic conditionals is more general, and can be replicated with attitude verbs beyond *want*, and modal flavors beyond teleological modality, though the availability of such readings is importantly constrained. In §4 we provide a pragmatic proposal based on our empirical generalization for when harmonizing readings are available and when they are not. In §5, we show that harmonizing is a truly pragmatic phenomenon by considering shortcomings with potential lexical, syntactic, or semantic alternatives. We discuss further related cases and potential counterexamples in §6, and conclude in §7.

2.2 The apparent non-compositionality of anankastic conditionals

Suppose that taking the A train is the only way to get to Harlem. This means-to-an-end relation can be reported using an *anankastic conditional* like (1a). Anankastic conditionals seem to express a relation between the *complement* of the attitude verb *want* (e.g., you go to Harlem) and the prejacent of the necessity modal (e.g., you take the A train). Roughly speaking, (1a) conveys that you going to Harlem requires you taking the A train.

Note that not all conditionals of the form *if want p, then have to q* have the same means-to-an-end, anankastic reading, as noted by Hare (1968). The conditional in (4), for instance, intended as advice to a recovering alcoholic, does not mean that *drinking* requires you to think about your family, but rather that the *desire* to drink does, as a way to help you *not* drink.

(4) If you want to drink, you have to think about your family.

Classic accounts of modals and conditionals (Kratzer, 1981, 1986) predict the right truth-conditions for ordinary *want*-conditionals like (4). However, they predict that (1a) should be false in scenarios where you don't *actually* want to go to Harlem, or worse, you want to go somewhere that requires taking another train, contrary to intuitions.³

³Condoravdi and Lauer (2016) show that the problems with anankastic conditionals arise on any restrictor analysis of conditionals. Here we use the classic Kratzerian framework to illustrate the issues.

To see why, let's briefly consider a classic Kratzerian semantics for modals and for conditionals. In the Kratzerian framework (Kratzer, 1981, 1991), modals are interpreted relative to two “conversational backgrounds”: a modal base and an ordering source. Conversational backgrounds are functions from worlds to sets of propositions: modal bases provide propositions that express facts in the world of evaluation w ; ordering sources provide ideals in w (e.g., desires, goals, laws). The modal base first restricts the set of worlds to those compatible with certain facts, and the ordering source is then used to rank these worlds: the modal ends up quantifying over the most ideal worlds of the modal base, given the ordering set by the ordering source. A necessity claim, *must* p or *have to* p is true if and only if the prejacent p is true in all of these most ideal worlds, given the lexical entry in (5):

$$(5) \quad \llbracket \text{must} \rrbracket^w = \llbracket \text{have to} \rrbracket^w = \lambda f_{\langle s, \langle s, t \rangle \rangle} \cdot \lambda g_{\langle s, \langle s, t \rangle \rangle} \cdot \lambda p_{\langle s, t \rangle} \cdot \forall w' \in_{g(w)} \left(\bigcap f(w) \right) : p(w') = 1$$

where $\rho(X) = \{ w \in X : \neg \exists w' (w' <_{\rho} w) \}$ von Fintel and Heim (2011)

Modals in anankastic conditionals are taken to express *teleological* modality. Teleological modals are interpreted relative to a circumstantial modal base f , consisting of relevant facts in the world of evaluation, including those involved in traveling to Harlem for (1a), and a teleological ordering source g , which consists of your goals in the world of evaluation.

- (6) a. $f(w) = \{p: p \text{ is a relevant fact in } w\}$
 b. $g(w) = \{p: p \text{ is one of your goals in } w\}$

A teleological modal ends up quantifying over worlds compatible with the relevant facts that best obey some relevant goals (*your* goals in (1a)) in the world of evaluation (the actual world in (1a)). In this system, the propositions of the ordering source are not ranked relative to one another. Suppose Al has two incompatible goals: she wants to go to Harlem and she also wants to go to Hoboken, but cannot do both. Because the two goals cannot be ranked, the worlds that best fit them are not all of one sort: in some, she goes to Harlem, in others, she goes to Hoboken. Since the best worlds are not all Harlem worlds, the theory predicts that it is false to say ‘Al has to go to Harlem’ using *have to* teleologically—evidently a correct prediction: it is not true that *Al has to_T go to Harlem*, if she also wants to go to Hoboken, and cannot do both. As we will see, what allows the theory to make the right predictions in

this scenario will turn out to be its downfall in anankastic conditionals.

Turning to the semantics of conditionals, under a classic restrictor analysis (Kratzer, 1986), *if*-clauses restrict the modal base of the modal in the consequent. (In the absence of an overt modal, the *if*-clause is taken to restrict a covert epistemic necessity modal, NEC.) In (1a), the antecedent restricts the worlds quantified over by the consequent modal *have to* to those where you want to go to Harlem. Thus, (1a) is predicted to be true just in case:

- (7) In all w' compatible with the relevant facts in w that best fit your goals in w , and where ***you want to*** go to Harlem in w' , you take the A train

To see the problem with anankastic conditionals, suppose that, in the actual world, taking the A train is the only way to get to Harlem, but you do not want to go to Harlem or anywhere that requires the A train. In this scenario, (1a) is still intuitively true, since taking the A train is necessary for going to Harlem, regardless of whether you want to go there or not. The truth conditions in (7), however, predict that it should be false, because (7) requires that you take the A train in all of the worlds most ideal given your *actual* goals. In this scenario, the most ideal worlds are not worlds where you take the A train, since your actual goals do not include going to Harlem or anywhere requiring taking the A train.

The classic analysis of modals and conditionals faces two problems with anankastic conditionals: a “non-compositionality problem”, and a “conflicting goals problem” (von Stechow and Iatridou, 2005). Concerning the first problem, Sæbø (2001) first showed that this semantics doesn’t allow the hypothetical desire in an anankastic conditional to have any bearing on the ordering source of the modal in the consequent: *have to*’s ordering source orders worlds of the modal base relative to your *actual* desires. However, intuitively, the modal does in fact seem to be restricted to worlds that best obey this desire. In response, Sæbø fixes the problem by forcing the complement of *want* (in (1a), *you go to Harlem*) to be directly added to the ordering source. But this solution is non-compositional: it just uses a subpart of the antecedent, namely the complement of *want*, to restrict the interpretation of the consequent. A compositional solution should use the entire antecedent. In response, subsequent

accounts assume a “double modal” analysis⁴, building on Frank (1997), according to which conditionals are always implicitly modalized by NEC, even in the presence of an overt modal in the consequent (Huitink, 2005; von Fintel and Iatridou, 2005; von Stechow et al., 2006; Condoravdi and Lauer, 2016)

A double modal analysis was first argued for deontic conditionals like (8), where the antecedent expresses a hypothetical law (here, that jaywalking is a crime), and the consequent modal is interpreted deontically:

(8) If jaywalking is illegal, Al must_D get a fine. (*adapted from* von Fintel and Iatridou (2005))

A *single* modal restrictor analysis for (8) has the antecedent restrict the consequent modal’s modal base to worlds where jaywalking is illegal. However, the *ordering source* of the consequent modal still consists of *actual* laws. If jaywalking is legal in the actual world, then (8) is predicted to be false, contrary to intuitions, as it is not true that in all the best deontic worlds given actual laws, Al gets a fine. A double modal analysis fixes the problem by having the antecedent restrict a higher epistemic necessity modal, NEC. The consequent modal is then relative to those epistemic worlds in which jaywalking is illegal, thereby allowing its ordering source to contain a law prohibiting jaywalking.

With a double modal analysis, a conditional like (1a) has two layers of modality: the overt modal in the consequent, *have to*, and the higher, unpronounced, epistemic necessity modal, NEC, which the antecedent restricts. (1a) has the structure in (9a), and truth conditions in (9b):

- (9) a. NEC [you want to go to Harlem] [*have to* [you take the A train]]
b. In all w' compatible with what is known in w and where you want to go to Harlem, all w'' given the facts in w' that best fit your goals in w' are such that you take the A train

The antecedent restricts the epistemic modal. The lower modal *have to* is then evaluated relative to those worlds w' in which you want to go to Harlem. It can then pick out the best circumstantial worlds given your goals in w' . Given that you want to go to Harlem in w' , going to Harlem can now be one of the goals that make up *have to*’s ordering source. The double modal analysis thus fixes the “compositionality problem”, by providing a way for the desire expressed in the antecedent (going to

⁴For an account of anankastic conditionals that does not assume a double modal structure, see Cariani (2024)

Harlem) to be part of the ordering source of the modal in the consequent.

However, the “conflicting goals problem” remains. While a double modal analysis allows for the desire expressed in the antecedent to be added to the consequent modal’s ordering source, it doesn’t force this desire to trump other desires that conflict with it. Consequently, the analysis makes the wrong predictions in scenarios where, as far as the speaker of (1a) knows, you have a desire that *conflicts* with the one expressed in the antecedent. Suppose, as before, that going to Harlem requires taking the A train, and going to Hoboken requires taking the PATH train. Suppose further that the speaker allows that you may also want to go to Hoboken. In this case, there will be worlds w where you have both desires, but since you cannot go to both places at once, the most ideal worlds given your goals will be divided into worlds where you go to Harlem (and take the A train) and worlds where you go to Hoboken (and take the PATH train): (1a) is predicted to be false, contrary to intuitions.

Anankastic conditionals thus seem to require that the hypothetical goal (*you going to Harlem*) trump any other potentially conflicting goals (e.g., *you going to Hoboken*). Effectively, what seems to be needed to get the right truth conditions for a conditional like (1a) is for the consequent modal to quantify only over worlds verifying the complement of *want* (*you go to Harlem*), thereby eliminating worlds where you go to Hoboken. This has been achieved in two main ways in the previous literature. One solution is to induce a ranking that automatically breaks the tie in conflicting desires towards the one mentioned in the antecedent. This is done by appealing to a special semantics for *want*, according to which *want* can either express a pure desire, or an “effective preference”, i.e., a desire that trumps all other conflicting ones (Condoravdi and Lauer, 2016). The dialogue in (10) illustrates the two readings of *want*:

- (10) a. A: Do you want to go to the party?
 b. B₁: Yes/I want to, but I have to babysit my sister.
 c. B₂: No/I don’t want to, I have to babysit my sister.

With B₁, B expresses the pure desire to go to the party (irrespective of B’s other desires or obligations), while with B₂, B claims to not effectively *want* to go to the party, because of their need to babysit.

According to Condoravdi and Lauer (2016), this action-guiding *want* is what is involved in anankastic conditionals, guaranteeing that the desire expressed (e.g., going to Harlem) outranks other conflicting ones (e.g., going to Hoboken).

The other solution appeals to a syntactic stipulation, according to which the complement of *want* restricts the consequent via a covert purpose clause associated with teleological modality, as in (11a). This analysis is motivated by the fact that purpose clauses can independently be used to state goals explicitly, as in (11b) (von Fintel and Iatridou, 2005; von Stechow et al., 2006):

- (11) a. If you want to *p*, then [to *p*] you must *q*
 b. To go to Harlem, you have to take the A train.

Each type of approach has its own merits and challenges (see e.g., Condoravdi and Lauer (2016) for arguments against the syntactic approach, and Phillips-Brown (2019) for arguments against the lexical approach). In this paper, we mostly put aside these issues, and point out that, while the literature has zoomed in on *want* and teleological modality, the apparent non-compositionality problem of anankastic conditionals can in fact be replicated with attitude verbs beyond *want*, and modals beyond teleological ones. Thus, the problem is much more general, and so, we argue, must its solution be. We propose such a solution, according to which there is nothing semantically nor syntactically special about anankastic conditionals. Like Condoravdi and Lauer, we take anankastic conditionals to be regular conditionals. However, unlike Condoravdi and Lauer, we propose a general account that goes beyond *want*, and isn't tied to lexical idiosyncrasies.

In the next section, we show that attitude verbs and modals of *any* flavor can, in principle, give rise to what we call “harmonizing” readings,⁵ in which the complement of an attitude verb in the antecedent of a conditional seems to restrict the consequent modal. In §4 and §5, we argue that the phenomenon is pragmatic in nature, and that harmonizing arises from a necessity inference derived

⁵We use the term “harmonizing” to evoke the term “harmonic”, coined by Alonso-Ovalle and Menéndez-Benito (2018), to refer to modals that seem to inherit their domain anaphorically from a higher attitude or modal, by being “anchored” to their content (Hacquard, 2006; Kratzer, 2012). We use the term *harmonizing* rather than *harmonic*, since we don't assume that the domain of the consequent modal is inherited anaphorically from the attitude verb in the antecedent, but merely happens to match in flavor, as we will discuss in §4 and §5.

from the meaning of the attitude report in the antecedent, together with uncontroversial background assumptions, whose modal flavor happens to match that of the consequent modal. But while harmonizing readings can be found with various attitude verbs and modal flavors, we will show that they crucially do not arise automatically: they are blocked, for instance, when the attitude holder is taken not to be an authority in the relevant modality. For instance, the variant of (1a) in (12) does not as easily get an anankastic reading according to which going to Harlem requires taking the A train, unless it is common ground that Mary's desires dictate your own:

(12) If Mary wants you to go to Harlem, you have to take the A train.

Our pragmatic account will straightforwardly capture this context-sensitivity, and can best accommodate the full range of data associated not only with anankastic conditionals, but harmonizing conditionals in general.

2.3 Harmonizing beyond anankastics

In this section we present data showing that the same apparent non-compositionality of anankastic conditionals, where a clause embedded inside the antecedent seems to restrict the consequent modal, can be found beyond *want* and teleological modality.

First, and as already noted by Sæbø (2001) and Condoravdi and Lauer (2016), desire and goal-oriented predicates other than *want* can also give rise to anankastic readings, as illustrated in (13). As with (1a), (13) can be true even in situations where your actual plans or desires conflict with going to Harlem:

(13) If you *{intend/plan/hope/would like}* to go to Harlem, you have to take the train.

Moreover, the apparent non-compositionality of anankastic conditionals is not confined to desire predicates and teleological modality. It can be replicated with other modal flavors and embedding verbs. We first turn to deontic cases, with the example in (2a), repeated in (14a):

(14) a. If the Provost requests that grades be posted on Monday, Al must_D finish grading.

- b. In all w' compatible with the facts in w that best obey the rules in w and where the Provost requests that grades be posted Monday, Al finishes grading

Classic Kratzerian accounts for modals and conditionals yield the truth conditions in (14b), which come out as false, contrary to intuitions, in case the rules in the actual world require that grades be posted on days other than Monday. Yet (14a) seems to have a harmonizing reading where the *complement* of *request* restricts the deontic modal *must* in the consequent ('If grades are to be posted on Monday, Al must_D finish grading').

A double modal analysis can help fix the non-compositionality problem here. After all, this analysis was designed specifically to let the consequent modal of deontic conditionals inherit laws stated in the antecedent *qua* laws, as we saw with (8). With a double modal structure, (14a) has the LF in (15a) and truth conditions in (15b). The consequent modal quantifies over worlds compatible with the rules in worlds w' in which the Provost requests that grades be posted on Monday. *If* we take the Provost's words as law, we can add the proposition that grades are posted on Monday (i.e., the attitude verb's complement) to the modal's ordering source:

- (15) a. NEC [the Provost requests grades be posted Monday] [must_D [Al finish grading]]
- b. In all w' compatible with what we know in w , and where the Provost requests that grades be posted Monday, all w'' compatible with the facts in w' that best obey the rules in w' are such that Al finishes grading

As for the "conflicting goals" problem, it seems this may not have a counterpart in the legal domain, where the requirements are underwritten by laws and not goals.⁶ Legal rulings governing a community may relate to each other differently than do personal desires. The Provost may overrule whatever came before, but your own desire to go to Harlem may not eclipse your interest in Hoboken. Consequently, without this second problem to solve, a double modal analysis may be sufficient to handle the deontic

⁶Kratzer (1991) classic example to motivate the double relativity of modals does include conflicting laws, inherited from judgments made by different judges. However, it is difficult to recreate naturalistic examples where one ruling wouldn't override others. If we do allow for the possibility of conflicting laws, our account will be able to neutralize the offending ones, by making the content of the rule expressed in the antecedent hold in all worlds quantified over by the consequent modal, just as with conflicting desires.

cases. Here it only needs to handle the compositionality problem. And to do that it needs one crucial provision: that the *complement* of attitude verbs like *request* counts as law for purposes of the consequent modal. We will come below to what would underwrite this provision.

Turning next to epistemic modality, we can also find harmonizing readings with conditionals, as illustrated in the example in (3a), repeated as (16a) below, which classic Kratzerian accounts predict to have the truth conditions in (16b):

- (16) a. If Sherlock Holmes thinks that the crime occurred at 6pm, Al must_E be the culprit.
 b. In all w' compatible with what is known in w , and where Sherlock believes in w' that the crime occurred at 6pm, Al is the culprit in w'

Contra intuitions, the truth conditions in (16b) come out as false in a scenario where the evidence in the actual world leaves open whether the crime was committed at 6pm or 7pm, and where Al has an irrefutable alibi from 7pm onward, but not before. This is so because in such a scenario, some of the worlds compatible with the evidence have Al be the culprit (the worlds where the crime was committed at 6pm), but not all of them (those where the crime was committed at 7pm). The content of the complement of the attitude verb in the antecedent should have no bearing on the consequent modal. However, if we trust Sherlock's epistemic authority, it seems that (16a) can have a harmonizing reading, expressing that Al must_E be the culprit, if the crime was committed at 6pm. Here again, it seems as if we need to be able to have the complement of the attitude verb in the antecedent restrict the modal in the consequent.

To sum up, the apparent non-compositionality problem of anankastic conditionals, where the *embedded* complement of an attitude verb in the antecedent seems to restrict the consequent modal, is not confined to the attitude verb *want*, nor to teleological modality: it arises with other embedding verbs in the antecedent, and can be replicated with epistemic and deontic modality. Hence, solutions tailored to teleological modality or to *want* (or desire verbs more generally) are insufficient to account for the full range of data discussed in this section. We could, of course, provide separate treatments for each of these cases. Instead, we will offer a pragmatic account that generalizes across modal

flavors and attitudes, and derives harmonizing readings without postulating anything special about teleological modality or desire predicates, solving both the non-compositionality problem common to all modal flavors, and the conflicting goals problem specific to anankastic conditionals in the process.

As we will now see, one of the main motivations for a pragmatic account is that harmonizing seems to be context-sensitive. Indeed, while harmonizing readings can occur with various attitude verbs and modal flavors, the availability of these readings seems to be restricted. Consider, for instance, a variant of (16), shown in (17a):

- (17) a. If silly Watson thinks the crime occurred at 6pm, Al must_E be the culprit.
 b. If the crime occurred at 6pm, Al must_E be the culprit.

The harmonizing reading in (16a), which conveys (17b), arises when the subject of the belief report in the antecedent is Sherlock Holmes, a highly regarded detective, whose epistemic authority the speaker trusts. This reading, however, seems to disappear in (17a), when the subject is replaced by silly Watson, whose epistemic authority the speaker does not trust.

Similarly, (14a) can convey (18b), when the subject of *request* is *the Provost*, whom we take to be an authority on university regulations. This harmonizing reading, however, seems to disappear when the subject is replaced by eager undergrad *Chad*, who has no legal authority on university regulations.

- (18) a. If Chad requests that grades be posted on Monday, Al must_D finish grading now.
 b. If grades are to be posted on Monday, Al must_D finish grading now.

Returning finally to teleological modality, the anankastic reading seems to disappear when the wantor is a random individual, Mary (as we saw in (12)), whose desires are irrelevant to yours, or worse, when the wantor is someone whose desires you definitely do not want to endorse, for instance, Satan. Indeed, one would not readily interpret (19a) as expressing that *going to Harlem* requires taking the PATH train, like (19b). (19a) simply expresses that *Satan's desire for you to go to Harlem* requires that you take the PATH train, perhaps to avoid succumbing to any kind of temptation. This conditional could be true, for instance, in a situation where Harlem is unreachable by the PATH train, and you happen to want to do the *opposite* of what Satan wants you to do. (19a) only gets a harmonizing

(anankastic) interpretation, if Satan’s desires dictate your own, i.e., if ‘*Satan wants p*’ implies that *p* is necessary given *your* goals.

- (19) a. If Satan wants you to go to Harlem, you have to_B take the PATH train.
 b. If you go to Harlem, you have to_T take the PATH train.

What we see is that attitude verbs and modals of *any* flavor can, in principle, give rise to harmonizing readings, but that the availability of these readings is context-sensitive. It depends on whether the speaker can be assumed to take the subject of the attitude report to be an authority in the relevant modality: Sherlock, but not Watson, for epistemic modality, the Provost, but not Chad, for deontic modality, you, but not Satan, for teleological modality keyed to your desires.

In the following section, we propose an empirical generalization that captures when harmonizing is available, and when it is not. This generalization will lead to our pragmatic proposal for anankastic conditionals, and harmonizing more generally, according to which harmonizing results from a modal inference that naturally arises from the meaning of the proposition expressed by the complement, together with additional background assumptions, and where the flavor of modality of the inference matches that of the consequent modal. This account will derive all of the cases where harmonizing happens, without over-extending to cases where it doesn’t, and it will solve in particular the case of anankastic conditionals, without postulating a peculiar semantics for *want*, or a special syntax for conditionals with telological modals.

2.4 Proposal

We argue that the harmonizing readings of anankastic conditionals and their kin are pragmatic in nature. They arise from an optional modal inference, derived from the meaning of the proposition expressed by the conditional’s antecedent, together with uncontroversial background assumptions. When this modal inference matches in flavor with the modal of the consequent, it gives the illusion that the complement of the attitude verb in the antecedent restricts the consequent modal. But, we argue, it does so indirectly, by having the modal inference quantify over the same set of worlds as the conse-

quent modal. We now spell out this proposal and its two main ingredients, “Necessitation by Attitude” (NBA)—the modal inference derived from the attitude report in the antecedent, and “Flavor Matching”. We show how to derive harmonizing readings based on these two ingredients, and how to prevent them.

2.4.1 Necessitation by Attitude (NBA)

Looking at the instances when harmonizing readings arise, we first note an empirical generalization. In examples (1a), (2a), and (3a), a modal inference seems to arise naturally from the meaning of the attitude report in the antecedent of the conditional, which happens to match in flavor with the modal in the consequent. In (1a), we can infer from the attitude report in the antecedent ‘*You want to go to Harlem*’ the teleological necessity that *you have to_T go to Harlem*. In (2a), we can infer from the attitude report ‘*The Provost requests that grades be posted on Monday*’ the deontic necessity that *grades must_D be posted on Monday*. And in (3a), we can infer from ‘*Sherlock thinks that the crime occurred at 6pm*’ the epistemic necessity that *the crime must_E have occurred at 6pm*. Schematically, the generalization can be stated as follows:

- (20) **Necessitation by Attitude (NBA):** *subject* ATTITUDE $p \Rightarrow \Box_F p$
where F is some modal flavor

Before we detail our account, two notes are in order about the modal $\Box_F$ in (20).⁷ First, necessities are expressed in English either by *must* or *have to* (*should* and *ought to* express “weak necessity”). In the theoretical literature, these modals are assumed to express a variety of different flavors. But in fact, at least in colloquial North American English, *must* is almost always used epistemically Tagliamonte and D’Arcy (2007); deontic uses can sound formal, and bouletic and teleological uses are almost impossible. Meanwhile the semi-modal *have to* is natural for teleological and bouletic necessities, and for many cases of epistemic modality (see Williams et al. (2025)). We use $\Box_F$ in (20), to state our generalization, which is intended to stand for either *must* or *have to*, depending on flavor. Second, one

⁷We are grateful to Clemens Mayr and to two anonymous reviewers for helpful discussion on these points.

might wonder if the NBA that a verb like *want* tends to trigger might not better be labeled as “bouletic” (desire-based), rather than “teleological” (goal-based). As mentioned in footnote 1, distinguishing bouletic and teleological modality is difficult, and some may question whether genuine cases of the former truly exist.⁸ Whether there is a genuine distinction between bouletic and teleological modality in fact doesn’t matter to us. What matters is that utterances of the form ‘you want to *p*’ seem to routinely trigger an inference that *p* is necessary given what you want, expressible with a necessity modal in English like *have to*, which we might call either bouletic or teleological.

In all cases where harmonizing goes through, the subject of the attitude report can be viewed as an authority in the relevant modality. With teleological modality, as in (1a), we routinely take people to be authorities on their own goals and desires: obtaining what one wants should fulfill one’s goals. Thus *you* are an authority for teleological necessities relative to *your* desires: you are naturally compelled to have your own desires fulfilled. However, one may be less compelled to fulfill someone *else*’s desires. Thus, when we change the subject from *you* to *Satan* in (19a), the NBA inference fails to go through without further assumptions. This is because we are unlikely to infer from ‘*Satan wants p*’ that *p* is teleologically necessary for *you*, unless we know that Satan’s desires dictate your own. If we enrich the context with the assumption that you are a Satanist, a harmonizing reading becomes possible. We will return to the meaning of *want* and teleological necessity, and the fairly automatic nature of the inference from the former to the latter in §4.4.

With deontic modality, as in (14a), we take the Provost to be a legal authority on university policies. Thus, we can infer from ‘*The Provost requests that p*’ that it is deontically necessary that *p*: the NBA inference goes through. However, this inference disappears in (18a), when the subject *the Provost* is replaced with *Chad*, a student with no authority on university policies.

Lastly, with epistemic modality, as in (16a), we readily take the revered detective Sherlock Holmes to be an epistemic authority, and when we do, we infer from ‘*Sherlock Holmes thinks p*’, that it is epistemically necessary that *p*: the NBA inference goes through. However, in (17a), this in-

⁸Examples of bouletic modality from the literature include “Given how you love chocolate, you should try this cake” (Portner, 2009), or “You have to go to your room [Stern father]” (von Fintel, 2006b). It is not clear, however, how these are truly distinct from an interpretation where the necessity is in terms of goals, rather than desires.

ference disappears when the subject is replaced by Sherlock’s dense acolyte *Watson*, whose epistemic authority we do not trust.

To sum up, Necessitation by Attitude is an inference that arises naturally from the meaning of an attitude report in the antecedent of a conditional, when the attitude holder is assumed to be an authority in the relevant modality. When the flavor of the modal inference matches the modal in the consequent, we derive a harmonizing reading, as discussed in the next section.

Note that we take NBA inferences to be run-off-the-mill, defeasible inferences, based on world knowledge. They are similar to the kind of inference one draws from “Al is a basketball player” to the assumption that Al is tall. Just like with NBA, such inferences can pragmatically enrich a conditional: when one hears “If Al is a basketball player, he needs an extra long bed”, one naturally restricts the interpretation of the consequent to worlds where Al is tall, something one might not do if we were to replace “basketball player” with “skateboarder”. Finally, we take the NBA inference to be a *general* inference. Thus, it should hold not just in our world, but in all worlds that we take to be like ours. We will thus assume that the NBA holds in all worlds that are epistemically accessible. This importantly will allow the NBA inference to hold in conditionals, which we assume are implicitly quantified by an epistemic modal NEC, following the literature discussed in §2.⁹

2.4.2 Flavor Matching

When a modal inference is triggered by Necessitation by Attitude (NBA), a harmonizing reading for a conditional becomes possible if the flavor of the modal in the consequent of the conditional matches the flavor of the modal in the NBA. We refer to this condition as Flavor Matching:

(21) **Flavor Matching:** the consequent modal F matches the NBA-derived $\Box_F$

In (1a), the flavor of the NBA modal is teleological, which is the flavor of the modal in the consequent (both modals are anchored to the addressee’s goals). In (2a), both modals are deontic, and in (3a), both modals are epistemic.

⁹We are grateful to Clemens Mayr for making us realize that we needed to make this assumption explicit.

Importantly, we do not take the domain of the consequent modal to be inherited anaphorically from the attitude verb in the antecedent, or by any semantic mechanism. Rather, we assume that the domain of the consequent modal is restricted by the prejacent of the NBA-derived modal inference indirectly, from the fact that the two modals happen to quantify over the exact same sets of worlds. We justify this pragmatic proposal over semantic or syntactic alternatives in §5.

We propose that harmonizing arises pragmatically when the modal inference derived from the meaning of an attitude report in the antecedent (NBA) matches in flavor with the modal in the consequent (Flavor Matching), as schematized below. Take a conditional of the form ‘*If subject ATTITUDE p , must_F q* ’ in (22a). Via NBA, we derive the necessity inference *must_F p in all epistemically accessible worlds in which subject ATTITUDE p* , as sketched in (22b). Flavor Matching occurs when the NBA modal and the consequent modal match in flavor, as shown in (22c). (22d) shows the meaning of (22a) enriched with the inference in (22b), in boldface. Given that both the NBA modal and the consequent modal quantify over the same set of F worlds, it looks as if the consequent modal is directly restricted by the complement of the attitude verb, *viz.* the prejacent p of the NBA modal (in boldface). (22d) can be simplified as in (22e),¹⁰ giving the illusion that the complement of the attitude in the antecedent directly restricts the consequent modal:

- (22) a. If subject ATTITUDE p , must_F q
b. **NBA:** *subject ATTITUDE $p \Rightarrow \Box_F p$ (in all epistemically accessible worlds)*
c. **Flavor Matching:** F in $\Box_F p$ matches F of consequent modal
d. $\Rightarrow$ If subject ATTITUDE p , $\Box_F p$ and $\Box_F q$
e. $\Rightarrow$ If subject ATTITUDE p , $\Box_F \mathbf{p}$ and q

The following illustrates harmonizing with the textbook Harlem conditional, repeated in (23a). First, we assume that *you* are an authority on your own desires. Thus, through NBA, we obtain the modal

¹⁰An anonymous reviewer points out that this assumes Consistent Agglomeration, according to which ‘MOD ϕ ’ and ‘MOD ψ ’ entail ‘MOD $\phi \ \& \ \psi$ ’, which Kratzerian modal accounts guarantee. However, this assumption may be contentious. For discussion, see Boylan (2023), who argues that Agglomeration holds for deontic, but not epistemic *ought*, though it is not clear to us that the arguments carry over to epistemic *must* or *have to*, which are the modals we take to be at play in the NBA inferences.

inference in (23b). Since the teleological flavor of the modal of the NBA inference matches the teleological flavor of the consequent modal, Flavor Matching occurs, as in (23c). This leads to the harmonizing reading in (23d), where the meaning of (23a) used in this context is enriched with the NBA inference (indicated in boldface). As both the NBA and the consequent modals quantify over the same set of worlds, (23d) can be simplified as in (23e), giving the illusion that the complement of *want* ('you go to Harlem'), which is the prejacent of the NBA modal, directly restricts the consequent modal:

- (23) a. If you want to go to Harlem, you have to_{T_{you}} take the A train.
 b. **NBA:** You want to go to Harlem $\Rightarrow$ You *have to_{T_{you}}* go to Harlem (*in all epistemic worlds*)
 c. **Flavor Matching:** *T_{you}* in (22b) matches *T_{you}* in (22a)
 d. If you want to go to Harlem, **you have to_{T_{you}} go to Harlem** and you have to_{T_{you}} take the A train
 e. If you want to go to Harlem, you have to_{T_{you}} **go to Harlem** and take the A train

Harmonizing readings are prevented when either step, NBA or Flavor Matching, fails to hold. As we saw in the previous section, NBA can fail when the attitude holder is not taken to be an authority on the relevant modality. For instance, Satan may not be an authority on your desires, and thus it may not follow that *you have to_{T_{you}} go to Harlem* from the fact that Satan wants you to go. Harmonizing can also be prevented when Flavor Matching does not hold, for instance, if the consequent modal in (23a) is interpreted deontically, rather than teleologically. In the next section, we show how to derive harmonizing readings in more formal detail.

2.4.3 Deriving harmonizing conditionals

As in previous accounts, we assume the independently motivated double modal structure for conditionals (Frank, 1997; Huitink, 2005; von Fintel and Iatridou, 2005; Condoravdi and Lauer, 2016), according to which conditionals with an overt modal in the consequent involve an additional covert epistemic necessity modal (NEC), which the antecedent restricts. We assume that this double modal structure is always possible, not just with overt *root* modals (e.g., deontic, teleological) in the conse-

quent, but with overt epistemic modals as well. We however remain agnostic as to whether the covert modal is always present, or only optionally, so long as it is present when harmonizing arises.

Assuming a double modal structure, the Harlem conditional has the LF in (24a), where the antecedent restricts NEC. We get the truth conditions in (24b), assuming the lexical entry for *want* in (24c):¹¹

- (24) a. NEC [You want to go to Harlem] [**have to**_{Tyou} [you take the A train]]
 b. In all w' compatible with what is known in w and such that in all w'' compatible with your desires in w' you go to Harlem, all w''' compatible with the facts in w' that best fit your goals in w' are such that you take the A train in w'''
 c. $\llbracket \text{want} \rrbracket^w = \lambda p. \lambda x. \text{ in all worlds } w' \text{ compatible with } x\text{'s desires in } w, p(w')=1$

Through Necessitation by Attitude (NBA), we derive the teleological necessity inference in (25). Since the NBA holds across all epistemically accessible worlds, it will hold in the worlds w' quantified over by NEC:

- (25) a. $\llbracket \text{You want to go to Harlem} \rrbracket^{w'} \Rightarrow \llbracket \text{You have to}_{\text{Byou}} \text{ go to Harlem} \rrbracket^{w'}$
 b. In all w'' compatible with your goals in w' you go to Harlem $\Rightarrow$ In all w'' compatible with the facts in w' that best fit your goals in w' , you go to Harlem

Given that the NBA derives a teleological necessity, Flavor Matching holds: both the NBA modal and the teleological modal in the consequent quantify over worlds compatible with your goals in the same world of evaluation w' , namely, the worlds quantified over by the epistemic modal NEC in which the antecedent holds. Thus, we obtain that in all relevant teleological worlds, you go to Harlem (from NBA), and in all of these worlds, you take the A train (from the consequent). (26b) shows the truth conditions in (24b) enriched with the NBA inference in (25) (in boldface), and simplified in (26c):

- (26) a. $\llbracket \text{If you want to go to Harlem, you have to}_T \text{ take the A train} \rrbracket^w$
 b. In all w' compatible with what is known in w and such that in all w'' compatible with

¹¹This lexical entry is a simplification, and meant as a place holder for whatever the right semantics for '*want*' turns out to be, a topic of much debate, as we briefly discuss in §4.4.

your desires in w' you go to Harlem, **all w''' compatible with the facts in w' that best fit your goals in w' are such that you go to Harlem** and all w''' compatible with the facts in w' that best fit your goals in w' are such that you take the A train

- c. In all w' compatible with what is known in w and such that in all w'' compatible with your desires in w' you go to Harlem, all w''' compatible with the facts in w' that best fit your goals in w' are such that **you go to Harlem** and you take the A train

These enriched truth conditions give the illusion that the complement of the attitude verb directly restricts the consequent modal. However it does so indirectly, via the additional modal inference, derived pragmatically from the meaning of the attitude report in the antecedent, together with uncontroversial background assumptions (e.g., going to Harlem is achievable, etc.). Thus harmonizing solves the non-compositionality problem of anankastics conditionals pragmatically. It also solves the conflicting goals problem in the process, by having all of the worlds quantified over by the consequent modal be worlds in which you go to Harlem, thereby preventing any Hoboken worlds.

Note that we can derive the same harmonizing reading with other desire attitudes, as in (13), using the same mechanism. Harmonizing should occur whenever the NBA inference ‘*You have to_T go to Harlem*’ can be inferred from ‘*You {intend/hope/would like/wish} go to Harlem*’.

The harmonizing reading of the deontic conditional repeated in (27a) works the same way. Again, we assume a double modal structure, such that the antecedent restricts NEC, as shown in (27b), with the standard truth conditions in (27c), using the denotation for *request* in (27d):¹²

- (27) a. If the Provost requests that grades be posted Monday, Al must_D finish grading.
- b. NEC [the Provost requests grades posted Monday] [**must_D** [Al finish grading]]
- c. In all w' compatible with what is known in w and such that in all w'' compatible with what the Provost requests in w' grades are posted Monday, all w''' compatible with the facts in w' that best fit the rules in w' are such that Al finishes grading
- d. $\llbracket \text{request} \rrbracket^w = \lambda p. \lambda x. \text{ in all } w' \text{ compatible with what } x \text{ requests in } w, p(w')=1$

¹²This lexical entry and the one for *think* in (30d) are again a simplification. We are not committed to any particular semantics for attitude verbs, and simply want to show how to capture the NBA inference.

Through NBA, we derive the deontic necessity inference in (28) (again we assume that the NBA inference holds across all epistemically accessible worlds):

- (28) a. $\llbracket \text{The Provost requests that grades be posted Monday} \rrbracket^{w'} \Rightarrow \llbracket \text{Grades must}_D \text{ be posted Monday} \rrbracket^{w'}$
 b. In all w'' compatible with what the Provost requests in w' grades are posted Monday $\Rightarrow$
 In all w'' compatible with the facts in w' that best fit the rules in w' grades are posted Monday

The flavor of both the NBA modal and the consequent modal is deontic: the modals quantify over the same sets of worlds, and Flavor Matching obtains. (29a) shows the truth conditions in (27c) enriched with the (boldfaced) NBA inference in (28b), and simplified in (29b). Here again, the complement of the attitude report in the antecedent seems to restrict the consequent modal, but it does so via the addition of the defeasible NBA inference.

- (29) a. In all w' compatible with what is known in w and such that in all w'' compatible with what the Provost requests in w' grades are posted Monday, **in all w''' compatible with the facts in w' that best fit the rules in w' grades are posted Monday**, and in all w''' compatible with the facts in w' that best fit the rules in w' Al finishes grading
 b. In all w' compatible with what is known in w and such that in all w'' compatible with what the Provost requests in w' grades are posted Monday, in all w''' compatible with the facts in w' that best fit the rules in w' **grades are posted Monday** and Al finishes grading

We predict that similar harmonizing readings can arise with other attitudes used to report rules, e.g., if we replace ‘*request*’ with verbs *say*, *mandate*, or *declare*, via the same mechanism. We should get a harmonizing reading whenever the NBA inference ‘*Grades must_D be posted on Monday*’ can be inferred from attitude or speech reports like ‘*If the Provost {mandates/says/declares} that grades are posted Monday...*’.

We finally turn to harmonizing readings with epistemic conditionals, as in (3a), repeated in (30a) below. Here again, we assume a double modal structure for conditionals, so that (30a) has the LF in

(30b). This assumption is crucial for us, so that the NBA inference can be relative to the same worlds as the consequent modal.¹³ For concreteness, we assume that epistemic modals like *must* take an epistemic modal base and an optional stereotypical ordering source (Kratzer, 1981), and that *think* has the lexical entry in (30d). Given all this, the truth conditions for (30a) are given in (30c):

- (30) a. If Sherlock thinks the crime was committed at 6pm, Al must be the culprit.
 b. NEC [Sherlock thinks the crime was at 6pm] [**must**_E [Al is the culprit]]
 c. In all w' compatible with what is known in w and such that in all w'' compatible with Sherlock's beliefs in w' the crime was at 6pm, all w''' compatible with what is known in w' most stereotypical from the perspective of w' are such that Al is the culprit
 d. $\llbracket \text{think} \rrbracket^w = \lambda p. \lambda x. \text{ in all } w' \text{ compatible with } x\text{'s beliefs in } w, p(w')=1$

Here again, the NBA inference goes through (in all epistemically accessible worlds), assuming that we take Sherlock to be an epistemic authority:

- (31) a. $\llbracket \text{Sherlock thinks crime was at 6} \rrbracket^{w'} \Rightarrow \llbracket \text{the crime must}_E \text{ have been at 6} \rrbracket^{w'}$
 b. In all w'' compatible with Sherlock's beliefs in w' , the crime was at 6 $\Rightarrow$ In all w'' compatible with what is known in w' most stereotypical from the perspective of w' , the crime was at 6

And here again, we can enrich the truth conditions in (30c) with the NBA inference in (31), as shown in (32a). Given Flavor Matching, as the NBA modal and the consequent modal quantify over the same worlds (i.e., epistemic worlds anchored to the worlds quantified over by NEC), (32a) can be simplified as in (32b), once again giving the illusion that the complement of the antecedent's attitude verb directly restricts the consequent modal.

- (32) a. In all w' compatible with what is known in w and such that in all w'' compatible with Sherlock's beliefs in w' the crime was at 6, **in all w'' compatible with what is known in w' most stereotypical from the perspective of w' the crime was at 6**, and in all w'''

¹³For independent evidence for a double modal structure with epistemics modals, see Geurts (2004)

compatible with what is known in w' most stereotypical from the perspective of w' AI is the culprit

- b. In all w' compatible with what is known in w and such that in all w'' compatible with Sherlock's beliefs in w' the crime was at 6, in all w'' compatible with what is known in w' most stereotypical from the perspective of w' **the crime was at 6** and AI is the culprit

We predict that similar harmonizing readings can arise with other attitude reports (e.g., when we replace *think* in (30) with verbs like *say*, *believe*, or *assume*), using the same mechanism. We should get a harmonizing reading whenever the NBA inference '*The crime must_E have occurred at 6pm*' can be inferred from attitude or speech reports like '*Sherlock {said/believes/assumes} that the crime occurred at 6pm...*'.

In sum, we propose that anankastic conditionals, and harmonizing conditionals more generally, are the result of a modal inference derived from reasoning about the meaning of an attitude verb in the antecedent, a modal inference whose flavor matches the modal in the consequent. Our pragmatic account derives these readings without postulating any lexical idiosyncrasies for particular attitude verbs, or types of modality. It captures the context-sensitive nature of the availability of the readings, which, as we saw, seems to depend on how easily the attitude holder can be viewed as an authority in the relevant modality. In the next subsection, we show how to avoid harmonizing for regular *want* conditionals, and then justify further a pragmatic view of harmonizing over a semantic, syntactic or lexical alternative in §5.

Before we move on, we would like to note a parallel between the NBA inference at the heart of our pragmatic proposal, and parenthetical readings that arise with attitude reports. As first noted by Urmson (1952), attitude reports can sometimes give rise to so-called parenthetical readings, where the speaker seems to endorse the attitude, and somehow proffer its content (Hooper, 1975; Simons, 2007). (33a), for instance, can be used to indirectly assert (33b). This indirect assertion arises when the speaker takes the attitude holder, *Mom*, to be an authority on when bedtime is, and endorses her assertion, thus indirectly proffering that it is time for bed. As with the NBA, the endorsement is pragmatic, and the proffering indirect.

- (33) a. Mom {said / thinks} it's time for bed.
 b. $\Rightarrow$ It's time for bed.

As with the NBA, the availability of such parenthetical readings is sensitive to the context, and notably to the reliability of the subject of the attitude holder. Replacing *Mom* with an individual who the speaker does not take to be a trusted authority, such as *Bozo the Clown*, seems to prevent the indirect assertion:

- (34) a. Bozo the Clown {said / thinks} it's time for bed.
 b. $?\Rightarrow$ It's time for bed.

2.4.4 *want* vs. teleological *have to* and non-anankastic readings of *want* conditionals

The pragmatic nature of our proposal for anankastic conditionals was initially motivated by the fact that harmonizing goes beyond *want* and teleological modality. However, focusing on the original cases with *want*, one might wonder why the anankastic reading is so robust that it seemed to warrant syntactic or lexical treatments in the previous literature. How systematic are NBA inferences from ‘*you want p*’ to ‘*have to_{you} p*’? And if they are systematic, how do we obtain regular, non-anankastic readings of *want* conditionals, like the one in (4), repeated in (35) below? Recall that when (35) is uttered as advice to a recovering alcoholic, the intended meaning is not that *drinking* requires that you think about your family, but rather that *the desire to drink* does: in fact, the advice seems to be that you should think about your family in order *not* to drink. In this section, we briefly review meaning differences between *want* and teleological *have to*, and show how to derive non-anankastic readings for conditionals like (35).

- (35) If you want to drink, you have to think about your family.

We believe that the robustness of harmonizing readings in textbook anankastic conditionals is due to the quasi-automaticity of the NBA inference. Indeed, teleological *have to* and *want* seem almost

synonymous: both express a strong preference for a state of affairs. However, their meanings differ in at least one important way: *want* is parasitic on belief, teleological *have to* is not. While the precise semantics for *want* is subject to great debate in the literature (see e.g., Heim (1992); von Fintel (1999a); Villalta (2008); Condoravdi and Lauer (2016)), most would agree that it expresses a preference of the subject for a state of affairs, which has to be compatible with the subject's (sometimes fallible) *beliefs*. Thus, we can say that 'Al *wants* to sell her cello', even if she doesn't own a cello, but is under the misimpression that she does. Neither teleological nor bouletic *have to* (if distinct), however, rest on beliefs. In the Kratzerian tradition, all root modals are relative to a circumstantial modal base, which picks out worlds compatible with relevant facts in the world of evaluation, and quantifies over the worlds among those that best fit a salient set of priorities (like laws, goals, or desires—often the subject's). Teleological *have to* thus lacks *want*'s subjectivity: we cannot say that 'Al has to sell her cello', if she doesn't own one, regardless of what Al believes.

According to Phillips-Brown (2019), the doxastic nature of *want* turns out to be fatal for Condoravdi and Lauer's account, according to which *want* can be used to express two readings: pure desire, and 'effective preference', a special kind of preference that guides actions. The latter is what they assume is involved in anankastic conditionals, to guarantee that the expressed desire outranks other conflicting ones. Condoravdi and Lauer propose that an agent's preferences (e.g., desires) are arranged in a "preference structure", where they are ranked by how important they are to the agent. These preferences can be inconsistent, thus accommodating the intuition that we sometimes want incompatible things. However, to *act* on a desire or preference, one has to consolidate all of one's desires into an action-guiding set of preferences that is free of contradictions, which they refer to as an *effective preference structure*. A *consistency condition* requires that one's effective preferences cannot be inconsistent with respect to one's beliefs. For example, one cannot effectively want to go to Harlem and effectively want to go to Hoboken, while believing that one can't do both. Anankastic readings, they say, arise with effective preference *want*, which guarantees that the stated desire (e.g., going to Harlem) outranks all others that conflict with it (e.g., going to Hoboken). Phillips-Brown (2019) shows that this account makes the wrong predictions in a scenario where it is compatible with your beliefs

that one can both go to Hoboken and to Harlem, but not in reality. In such a scenario, it is still judged true that ‘*If you want to go to Harlem, you have to take the A train*’, but Condoravdi and Lauer predict that it should be false, as going to Hoboken should not be ruled out. Our analysis does not run into this problem, as it does not rely on the wanter’s beliefs. A harmonizing reading arises through the inference that ‘*you have to_{T_{you}} go to Harlem*’, where *have to*’s modal base is relative to relevant facts in the world of evaluation, not the wanter’s beliefs. The harmonizing reading thus comes out as true, regardless of what your beliefs are.

While *want* and teleological *have to* differ in subjectivity, the inference from the former to the latter always seems possible. If so, how do we prevent a harmonizing reading for (35)? Ultimately, we believe that the lack of harmonizing in (35) stems from a lack of *Flavor Matching*, and not necessarily from a lack of *NBA*. Indeed, a teleological necessity inference seems possible in (35) from ‘*You want to drink*’ to ‘*You have to_{T_{you}} drink*’: given your desires for immediate pleasure, it is teleologically necessary that you drink. However, the consequent modal seems to express a teleological necessity relative to a different set of your (longer term) goals or desires: desires to be healthy, to have a good relationship with your family, etc. It seems that both teleological *have to* and *want* can be relative to a host of different desires, even within a single individual, and that such desires can even be expressed within the same utterance. In a context in which I am conflicted between these two kinds of desires (immediate vs. long term), I can say: ‘*I want to drink and I want to not drink*’, or ‘*I have to_{T_{me}} drink and I have to_{T_{me}} not drink*’. Given the fine-graininess of the desires that both *want* and teleological *have to* can express, we take it that the lack of harmonizing in (35) is due to a lack of Flavor Matching. The NBA modal and the consequent modal are relative to different desires of yours: the former, relative to your desires for immediate pleasure, the latter, to your longer term desires. The modals then quantify over different worlds, and we do not get a harmonizing, anankastic reading.¹⁴

¹⁴We are grateful to an anonymous reviewer for helping us think through how to derive non-anankastic readings.

2.5 Harmonizing is pragmatic

As we have seen, anankastic conditionals, and harmonizing conditionals more generally, give rise to a puzzle where a clause embedded inside the antecedent (under an attitude verb), looks as if it restricts a modal in the consequent, in a seemingly non-compositional fashion. Here we have offered a pragmatic account of anankastic conditionals that generalizes across modal flavors and attitude verbs. In this section, we justify this pragmatic solution, by comparing it to three potential alternative implementations, inspired by current accounts of anankastic conditionals: a lexical one, a syntactic one, and a semantic one. We discuss potential problems with each of these alternatives, and show that there is flexibility in harmonizing, which can't be accounted for if harmonizing is hard-coded lexically, semantically, or syntactically. Hence, we propose that harmonizing is truly a pragmatic phenomenon, and that there is nothing syntactically, lexically, nor semantically special about anankastic conditionals.

2.5.1 A lexical alternative?

First, let's consider a lexical approach, which would essentially generalize Condoravdi and Lauer (2016)'s account of *want* to other attitude predicates: various attitude verbs could have an "effective" reading, where the attitude complement would somehow be taken to hold in the relevant modality. *Request* or *ask* could, for instance, have readings that express requirements that trump others, verbs like *think* might have a true belief reading, etc. It is unclear to us whether such an account could be made for all attitudes. But even if it could, we believe that a lexical implementation would still both over- and undergeneralize. First, a lexical approach would have to be supplemented by some pragmatic principles, to explain why "effective" readings depend on the reliability of the subject of the attitude verb in the relevant modality. This could well end up recapitulating the NBA, making the purported systematic ambiguity redundant. More decisively, a lexical approach would undergenerate, in that it would have to assume a fairly strict mapping between attitude meaning and modal flavor of the harmonizing modal. However, this mapping seems to be fairly flexible, and largely determined by context. For instance, the use of *want* with a subject considered a legal authority can trigger a

harmonizing *deontic* reading, as illustrated in (36a). This reading is derived straightforwardly in our pragmatic account, given that in such a context, the NBA inference in (36b) seems warranted:

- (36) a. If the Provost wants grades to be posted on Monday, Al must_D finish grading.
 b. The Provost wants grades to be posted on Monday $\Rightarrow$ Grades must_D be posted on Monday.

2.5.2 A syntactic alternative?

Harmonizing could also be implemented syntactically, by having a syntactic counterpart of the attitude verb's complement restrict the consequent modal, for instance, via a covert *given* clause. Such an account could be viewed as an extension of von Stechow and Iatridou (2005)'s treatment of anankastic conditionals beyond teleological modality.

von Stechow and Iatridou observe that anankastic conditionals like the Harlem sentence can be paraphrased using a purpose clause as in (37a), and propose that an elliptical purpose clause is also present in anankastic conditionals, as an argument of a teleological modal, whose content is supplied by the *if*-clause, as in (37b). They propose that teleological modals take two ordering sources, a primary ordering source (the designated goal), supplied by the elliptical purpose clause, which takes precedence over any other goals, and a secondary ordinary ordering source. The designated goal guarantees that the worlds quantified over by the modal are worlds in which you go to Harlem:

- (37) a. To go to Harlem, you have to take the A train.
 b. If you want to go to Harlem, then [to go to Harlem] you have to take the A train.

While this purpose clause analysis is tied to teleological modality, one might propose an extension of this idea, by syntacticizing the NBA inference in a covert *given*-clause, as sketched in (38). The content of the modal inference would have to be inherited from the antecedent through ellipsis, requiring a linguistic antecedent (underlined in (38)):

- (38) If you want *p*, then [given that you **have to** *p*] you **have to** *q*

It seems, however, that harmonizing readings can arise even in cases where the prejacent of the NBA modal (the modal in the *given*-clause in this syntactic implementation) lacks a true syntactic antecedent. Consider a scenario where both speaker and addressee know that Fletcher is a pathological liar, who only says the opposite of what is true. Fletcher claims that Al stole your money. In this scenario, the conditional in (39) seems to have a harmonizing reading, where the *negation* of the proposition expressed by the attitude verb’s complement seems to restrict the consequent modal, though there is no linguistic constituent “Al didn’t steal your money” that could serve as antecedent for the covert clause.¹⁵

- (39) a. If Fletcher said that Al stole your money, then Al must_E be innocent.
 b. If Fletcher said that Al stole your money, then it must_E be that **Al didn’t steal your money** and that Al is innocent.

This reading is, however, predicted by our pragmatic account, given that we can derive the NBA inference in (40) from the meaning of the antecedent together with the contextual assumptions given:

- (40) Fletcher said that Al stole your money. $\Rightarrow$ Al must_E not have stolen your money.

Note that in this case again, we find a parallel in behavior with parenthetical uses of attitude reports, suggesting that parenthetical uses and NBA inferences are made of the same pragmatic cloth. Indeed, if it is common ground that Fletcher is a pathological liar, a speaker could use an utterance of “Fletcher said that it’s raining” to proffer that it is *not* raining. We take these kinds of examples to support the view that harmonizing readings are pragmatic in nature, and cannot be straightforwardly derived syntactically.

2.5.3 A semantic alternative?

A final potential implementation for harmonizing conditionals is a semantic one, where harmonizing readings would arise via modal subordination (e.g., Roberts (1989); Roberts (2020); Brasoveanu

¹⁵We thank Yunhui Bai for discussion that led to this example, and Aron Hirsch for pointing out its relevance for a syntactic account.

(2010)), where the domain of the consequent modal would be determined anaphorically from the content of the attitude in the antecedent.

Stone (1999) and Sudo (2014) argue that attitude verbs like *want* can introduce a set of worlds that a subsequent modal can then be anaphoric to. This anaphoric relation could hold between the attitude in the antecedent and the modal in the consequent, assuming some kind of donkey-anaphoric treatment: roughly, (1a) would express that you take the A train in all of *those* worlds compatible with your desires in which you go to Harlem.

Assuming that anankastic conditionals result from modal subordination would easily extend to the other harmonizing cases that we have seen. However, it would also generate harmonizing readings where they do not seem to be attested. Indeed, we would expect that a modal could be anaphoric to *any* attitude report, including in cases where the speaker doesn't take the subject to be an authority in the relevant modality, as it isn't clear why speaker endorsement should matter for anaphoricity. Tricky cases of undergeneration discussed for the syntactic approach, such as (39a), would also be problematic for a semantic approach.

To sum up, we have seen that harmonizing readings can be found in all modal flavors and with a wide range of attitude verbs in the antecedent. We have also seen that their distribution is highly context-sensitive, in a way that semantic, lexical, or syntactic accounts can not derive straightforwardly. We conclude that there is nothing semantically nor syntactically special about anankastic conditionals and their kin: harmonizing is a pragmatic phenomenon.

2.6 Further issues

In this section, we discuss how our account can handle further cases, such as what Condoravdi and Lauer (2016) call near-anankastic conditionals, as well as potential counterexamples to our pragmatic account, which seem to involve apparent mismatches in flavor between the NBA and consequent modals. We close with a brief examination of embedding of the NBA inference.

2.6.1 Near-anankastic conditionals

As discussed in Condoravdi and Lauer (2016), the problems with anankastic conditionals are present in cases beyond *want* conditionals expressing a means-to-an-end relation. Consider for instance the example in (41):

(41) If you want to go to Disneyland, you have to spend at least five days there.

(Condoravdi and Lauer, 2016)

A consequent-focused conditional like (41) doesn't express that spending five days is necessary for going to Disneyland; instead, it is about what you have to do in worlds where you do go to Disneyland. Such examples are problematic for von Fintel and Iatridou (2005), as a purpose clause paraphrase (*'To go to Disneyland, you have to spend at least five days there'*) doesn't seem to capture the meaning of (41).

Our proposal accounts for these conditionals straightforwardly: (40) gets the LF in (42a), and the standard truth conditions in (42b). We assume that the NBA inference in (42c) goes through.

- (42) a. NEC [you want to go to Disneyland] [**have to**_{T_{you}} [you spend five days there]]
 b. In all w' compatible with what is known in w such that in all w'' compatible with your desires in w' you go to Disneyland, in all w''' compatible with the facts in w' that best fit your goals in w' you spend 5 days there
 c. $\llbracket \text{You want to go to Disneyland} \rrbracket^{w'} \Rightarrow \llbracket \text{You have to}_{\text{B}_{\text{you}}} \text{go to Disneyland} \rrbracket^{w'}$

Given the NBA inference, (42b) gets the enriched truth conditions in (43a) (with the NBA enrichment in boldface), and given Flavor Matching between the NBA modal and the consequent modal, (43a) gets simplified as in (43b):

- (43) a. In all w' compatible with what is known in w such that in all w'' compatible with your desires in w' you go to Disneyland, in **all w''' compatible with the facts in w' that best fit your goals in w' you go to Disneyland**, and in all w''' compatible with the facts in

w' that best fit your goals in w' you spend 5 days there

- b. In all w' compatible with what is known in w such that in all w'' compatible with your goals in w' you go to Disneyland, in all w''' compatible with the facts in w' that best fit your goals in w' **you go to Disneyland** and you spend 5 days there

2.6.2 Partial harmony

In this section, we turn to a couple of potential counterexamples to our account, where there seems to be a mismatch between the flavor of the NBA modal of the consequent modal, which should prevent harmonizing, but where a harmonizing reading does, in fact, seem to be possible.

First, Condoravdi and Lauer (2016) present an example where an anankastic reading of a *want* conditional seems to be available, but where the consequent modal is taken to be deontic:

- (44) If you want to use the exemption now, you will have to_D pay more taxes next year.

Under our account, we should only derive a harmonizing reading if an NBA inference goes through, and the flavor of the NBA modal matches that of the consequent modal. However, the only possible NBA inference for (44) seems to be teleological, not deontic. The attitude report '*You want to use the exemption now*' seems to trigger the inference that it is *teleologically* necessary for you to use the exemption, not that you are *legally* obligated to do so.

Importantly, we take NBA inferences to be just one kind of possible pragmatic enrichments, not the only one. In this particular example, we can easily assume that anyone would want to take advantage of any tax exemption that they qualify for. Given that the context presupposes that there is an exemption that can be used (given the use of the definite), it is fairly natural for the speaker to assume that if you want to and can use an exemption, then you will use it. We can thus interpret (44) with the enrichment in boldface in (45), and get an anankastic interpretation:

- (45) If you want to use the exemption now, **you will use the exemption now**, and you will have to_{T_{you}} pay more taxes next year, (**having used the exemption now**).

Another tricky example comes from a footnote in Condoravdi and Lauer (2016; 8:38), where it is used to show that on a restrictor analysis, the problems with anankastic conditionals are present even when the antecedent is about the facts that influence the contents of the modal base, and not the preferences in the ordering source. This problem is left as an open issue in Condoravdi and Lauer (2016). An adaptation of this example is given in (46), assuming a context where Al has been bragging about how much money she made this year:

(46) If we believe Al made lots of money, she will have to_D pay a lot of taxes.

In this example, we seem to get a harmonizing reading, where the complement of the attitude verb seems to restrict the modal base of the consequent modal: Al will have to pay a lot of taxes if she made a lot of money. Our account, however, only derives harmonizing readings when the flavor of the NBA modal matches the flavor of the consequent modal. The consequent modal in (46) is deontic, but while we can plausibly derive the epistemic NBA inference in (47b) from (47a), we cannot get the deontic one in (47c):

- (47) a. We believe Al made a lot of money.
 b. $\Rightarrow$ Al MUST_E have made a lot of money.
 c. $\nRightarrow$ Al MUST_D have made a lot of money.

Intuitively, it seems that what is going on in (46) is that we take as fact that Al made a lot of money, and we take this fact for granted for the interpretation of the consequent modal. We tentatively propose that harmonizing can occur here, if we assume the following NBA inference from a belief report to a *circumstantial* (C) necessity:¹⁶

(48) We believe Al made a lot of money $\Rightarrow \Box_C$ Al made a lot of money

¹⁶In the Kratzerian tradition, both circumstantial and epistemic modal bases pick out worlds compatible with some “facts” in the world of evaluation. They differ in that (only) the latter can ignore some of these facts. Kratzer (1991) famously shows this with a scenario in which we come to a new land, and see that the soil and climate are ideal for hydrangeas, but we know that hydrangeas never made it to this part of the world. In this scenario, the circumstantial claim “Hydrangeas *can* grow here” seems true, but the epistemic claim “Hydrangeas *might* be growing here” seems false. This, Kratzer argues, shows that the epistemic modal base must include the fact that hydrangeas have not yet made it to this part of the world, but the circumstantial base doesn’t. This might argue that circumstantial modal bases are simply subsets of epistemic ones, though see Condoravdi (2022) for discussion.

Since deontic modals take a circumstantial modal base, the modal inference would deliver that in all worlds quantified over by the modal's modal base, Al made a lot of money, and in the legally best of these worlds, she pays a lot of taxes, as desired.

Assuming the LF in (49a), and the NBA inference in (48), we obtain the enriched truth conditions in (49b), with the enrichment in boldface. Under the hypothesis that the NBA modal and the consequent modal quantify over the same circumstantial worlds (further ordered by a deontic ordering source, in the case of the latter), we can simplify (49b) as (49c):

- (49) a. NEC [we believe Al made a lot of money] [**must_D** [Al pays a lot of taxes]]
- b. In all w' compatible with what is known in w and such that in all w'' compatible with our beliefs in w' Al made a lot of money, in **all w'' compatible with the facts in w' Al made a lot of money**, and in all w'' compatible with the facts in w' that best fit the laws in w' Al pays a lot of taxes
- c. In all w' compatible with what is known in w and such that in all w'' compatible with our beliefs in w' Al made a lot of money, in all w'' compatible with the facts in w' that best fit the laws in w' **Al made a lot of money** and pays a lot of taxes

2.6.3 Embedding

We conclude this paper by briefly turning to matters of embedding. What happens when the attitude report that triggers the NBA inference, “*Subject ATTITUDE p*”, is itself embedded within the antecedent? Can we still get a harmonizing reading then? On our view, the prediction is that we can, provided that the antecedent triggers an NBA inference, from “*Subject ATTITUDE p*” to $\Box_F p$ in the relevant worlds, and that F matches the flavor of the consequent modal. Since this inference is pragmatic, the question of whether it arises will depend on various background assumptions, pertinent not only to the embedded ascription, but also to the predicates that embed it. In this section, we briefly discuss some examples, and conclude that the facts seem to be as we predict them to be.

First, it appears that harmonizing readings are possible when a neg-raising attitude verb in the

antecedent appears under negation. For instance, a natural interpretation of (50a) below, is the harmonizing reading that *not drinking* requires that you think of your family. This, we believe, is due to the NBA inference in (50b), where the negation is interpreted in the scope of the necessity modal:

- (50) a. If you *don't* want to drink, you have to think of your family.
 b. **NBA:** You don't want to drink $\Rightarrow$ You *have to*_{B_{you}} not drink (*in all epistemically accessible worlds*)

Similarly, we can get a harmonizing reading for (51a) as in (51b), thanks to the NBA inference in (51c), where the negation is again interpreted in the scope of the modal:

- (51) a. If Sherlock *doesn't* think that the crime occurred at 6pm, Al must be the culprit.
 b. If the crime *didn't* occur at 6pm, Al must be the culprit.
 c. **NBA:** Sherlock doesn't think the crime occurred at 6pm $\Rightarrow$ The crime *must*_E have *not* occurred at 6pm (*in all epistemically accessible worlds*)

We can also get a harmonizing reading when an attitude report is embedded under another, through a chain of NBA inferences. Thus, from (52a), we may infer (52b), if we take Sherlock to be an epistemic authority, and Watson a truthful speaker, via the NBA in (52c), assuming the NBA holds in the relevant worlds:

- (52) a. If Watson said that Sherlock thinks the crime occurred at 6pm, Al must be the culprit.
 b. If the crime occurred at 6pm, Al must be the culprit.
 c. **NBA:** Watson said that Sherlock thinks that the crime was at 6pm $\Rightarrow$ Sherlock *must*_E think that the crime was at 6pm (*in all epistemically accessible worlds*) $\Rightarrow$ The crime *must*_E have been at 6pm (*in all epistemically accessible worlds*)

But while harmonizing is possible in some cases where the attitude report is deeply embedded inside the antecedent, we predict that harmonizing will fail whenever the relevant NBA fails to arise. (53), for instance, doesn't get the reading in (52b), because the NBA inference in (52c) is not triggered.

- (53) If Watson falsely claimed that Sherlock thinks the crime occurred at 6pm, Al must_E be the culprit.

We leave other, more complex cases of embedding to future discussion.

2.7 Conclusion

Anankastic conditionals have been vexing for classic accounts of modals and conditionals. They give rise to an apparent non-compositionality problem, where the embedded complement of an attitude verb in a conditional's antecedent seems to restrict the modal in its consequent. Previous literature derives anankastic readings by postulating lexical or syntactic idiosyncrasies for *want* or for teleological modality in conditionals. We believe, however, that the focus on *want* conditionals has been myopic. It has led to over-specialized analyses that miss the bigger picture. In this paper we have shown that the apparent non-compositionality problem of anankastic conditionals can be replicated with attitude verbs beyond *want*, and modals beyond the teleological. All can give rise to what we called harmonizing readings, where the complement of an attitude verb in the antecedent of a conditional seems to restrict the modal in the conditional's consequent.

We have offered a pragmatic account of harmonizing conditionals that generalizes across modal flavors and attitude meanings. Specifically, we have argued that harmonizing arises when the meaning of the antecedent together with background assumptions give rise to a necessity inference that matches in flavor with the consequent modal. The complement of the attitude verb—which corresponds to the prejacent of the inferred necessity modal—looks as if it directly restricts the consequent modal. However, under our proposal, it only does so indirectly, through the fact that the inferred necessity modal—though it's not part of the truth conditions of the conditional—and the consequent modal happen to quantify over the exact same worlds.

This general pragmatic solution to anankastic conditionals and their kin can predict when harmonizing readings are possible, when they are not, and the highly context-sensitive nature of the process. And it does so without relying on any flavor-specific idiosyncrasies. Hence, there really does not seem

to be anything syntactically, or semantically special about anankastic conditionals. Harmonizing is wholly a pragmatic phenomenon.

Chapter 3: The flavor constraint in sufficiency constructions

3.1 Introduction

Only often receives an interpretation on which it presupposes the truth of its prejacent and asserts that all the other propositions that aren't entailed by the prejacent in the set of alternatives are false. For instance, the use of *only* in (1-a) presupposes its prejacent (i.e., John came to the party) is true, as in (1-b). The negation packed in the meaning of *only* then negates the rest of the alternatives in the set of alternatives, C , and (1-a) asserts that no one else came to the party (i.e. 'Al didn't come to the party', 'Sue didn't come to the party', etc).

- (1) a. Only John came to the party.
- b. Presupposition: John came to the party.
- c. Assertion: No one else came to the party.

Formally put, *only* has the lexical entry in (2):

$$(2) \quad \llbracket \text{only} \rrbracket (C) = \lambda p_{\text{st}}. \lambda w: p(w). \forall p' \in C [p \not\subseteq p' \rightarrow \neg p'(w)]$$

Interestingly, when used with a necessity modal in a goal-oriented environment, *only* does *not* seem to presuppose its prejacent. Specifically, when a necessity modal like *have to* appears in the scope of *only*, its force of quantification seems to weaken. To illustrate, consider the paradigm example from von Stechow and Iatridou (2007). Suppose there are three places to get good cheese: New York, Switzerland, and the North End (henceforth, NE), and that given our location (Boston), the NE is the easiest destination. On the analysis of *only* where *only* presupposes the truth of its prejacent (Horn, 1969), (3-a) should presuppose the truth of (3-b). However, the natural reading of (3-a) seems to be compatible with there being other places where you can get good cheese. That is, what is presupposed here seems to be a weaker meaning: going to the NE is *sufficient* for getting good cheese (i.e. you *can* go to the NE), but you don't *have to* go there. (3-a), thus, seems to imply (3-c). This is what von Stechow and Iatridou dub “the prejacent problem”: while the predicted presupposition (here, $\Box_{\text{NE}}$) expresses necessity, the intuitive reading yields possibility (here, $\Diamond_{\text{NE}}$).

- (3) a. To get good cheese, you only have to go to the NE.
- b. $\nRightarrow$ To get good cheese, you *have to* go to the NE.
- c. $\Rightarrow$ To get good cheese, you *can* go to the NE.

Previous proposals to derive sufficiency readings can be broadly divided into two camps: structural analyses (von Fintel and Iatridou, 2007; Alonso-Ovalle and Hirsch, 2022) and domain restriction (Condoravdi and Francez, 2022). To weaken the modal inference, von Fintel and Iatridou propose a weak semantics for *only* on which *only* is decomposed into two ingredients: NEGATION scoping over the necessity modal, and EXCEPTIVE situated below the necessity modal. In (3-a), EXC triggers the presupposition that you have to go either NY, or S, or NE to get good cheese (i.e., you have to go *somewhere*). It asserts that you don't go to NY or S in all cheese worlds; that is, there are worlds where you get good cheese, but don't go to NY or S. Since you have to go somewhere for good cheese, and you don't have to go to NY or S, we can get the possibility inference: there are some worlds where you get good cheese and you go to the NE. (3-a), on the scope-splitting analysis, thus has the meaning in (4):

- (4) To get good cheese, you don't have to go anywhere other than the NE.

Unlike von Fintel and Iatridou's proposal that weakens the semantics of *only*, Alonso-Ovalle and Hirsch derive the weakened meaning by introducing a covert scalar operator AT LEAST, which is sensitive to an effort-based ordering on a contextually salient set of alternatives. (3-a), under their construal, presupposes that you have to go somewhere in every world where you get good cheese. As we will see later, by negating alternatives *only* makes the assertive contribution that not every cheese world is one where you go to NY or S. Putting the presupposition and assertion together, we can get the weakened reading: there are some cheese worlds where you go to the NE and no further, and (3-a) roughly has the meaning expressed in (5):

- (5) To get good cheese, you have to at least go to the NE.

Condoravdi and Francez (2022) derives weakening by restricting the domain of the necessity modal via hard-wiring a 'preference to minimize the cost of goal realization' into an ordering source. Depart-

ing from the canonical Kratzerian ordering source on which its propositions are, crucially, *unranked* (Kratzer, 1981), their proposal allows the propositions in the ordering source of a sufficiency modal to be ranked based on the costs of goal realization. In the case of (3-a), this special ordering source restricts the modal base worlds to a set of best worlds where you get good cheese and incur no more than the cost of going to the NE and thus, ensuring that every good cheese world is one where you go to the NE. On their analysis (3-a) is construed as (6):

(6) To get good cheese *most easily/with the least amount of effort*, you only have to go to the NE.

To a large extent, the literature has focused on how to derive a sufficiency reading in cases where it *is* attested. My aim is to make progress towards understanding *when* a weakened modal inference can occur. Strange as the sufficiency constructions may seem, its distribution is in fact highly constrained, and this chapter will provide an overview of empirical generalizations as to how the distribution of sufficiency readings is constrained. In particular, several conditions must align for weakening to arise (Huitink, 2005; von Fintel and Iatridou, 2007; Condoravdi and Francez, 2022):

1. The modal in sufficiency constructions expresses universal force.
2. The necessity modal obligatorily scopes under negation.
3. The necessity modal has a teleological flavor.

Previous proposals have either have not recognized some of these ingredients for sufficiency or have focused in particular on the restriction with negation (von Fintel and Iatridou, 2007). In this chapter, I will be examining the flavor constraint in sufficiency modal constructions. The first goal of this chapter is to present an overview of the empirical landscape for the availability of sufficiency readings; in the course of doing so, I show that there *is* a flavor constraint in sufficiency constructions. The second goal is to show that none of the existing proposals to sufficiency can account for this flavor constraint. In §2 I will first discuss the ingredients for sufficiency; namely, the force restriction, the scope relative to negation, and the flavor constraint. I do so by presenting previously missing data where no weakened reading is observed with epistemic or deontic modals. In §3, I present three existing proposals in detail.

In §4, I discuss how each account can/cannot account for the licensing conditions for sufficiency. By doing so, I show that none of the previous approaches can explain why sufficiency is subject to the flavor constraint, and that all of them over-generate and predict weakening when there is none.

3.2 The empirical picture

In this section, I delineate the conditions for when a sufficiency reading is available and when it's not. The availability of sufficiency readings seem to be generally constrained by the following conditions:

1. The modal in sufficiency constructions expresses universal force.
2. The necessity modal obligatorily scopes under negation.
3. The necessity modal has a teleological flavor.

While the force restriction and scope relative to negation have received some attention in the previous literature, nothing has been said about why sufficiency constructions are subject to a flavor constraint and where it comes from. Specifically, von Stechow and Iatridou explicitly state that the flavor component doesn't come from the modal itself — it's the purpose clause that signals we are in a goal-oriented context (von Stechow and Iatridou 2007:448). Condoravdi and Francez (2022) and Alonso-Ovalle and Hirsch (2022) make no comments about why sufficiency constructions are subject to such flavor restriction. In what follows, I will first discuss condition 1 and 2. Then, I will present novel data showing that sufficiency readings aren't available with epistemic or deontic modals and, thereby, will argue that condition 3 holds, as well.

3.2.1 Condition 1: Sufficiency with possibility

When used with a possibility modal like *can* or *may*, (7-a) seems to express the meaning in (7-b). From both (7-a) and (3-a), we get the inference 'to get good cheese, you can go to the NE'. However, unlike (3-a), (7-a) presupposes that you can go to the NE, as expected under the standard semantics

for possibility modals and for *only* in (2); moreover, it asserts that you cannot go anywhere else for good cheese; namely, you have to go to the NE. This necessity inference observed in (7-a) is, crucially, missing in sufficiency constructions with necessity modals, like (3-a). Hence, as noted by von Fintel and Iatridou, the prejacent problem only arises with (some) necessity modals.

- (7) a. To get good cheese, you **can/may** only go to the NE.
 b. $\Rightarrow$ To get good cheese, you have to go to the NE.

The same observation is found in Mandarin Chinese, as in (8-a) and French, as in (9-a)¹, where a possibility modal under *only* gives rise to a necessity inference that's absent in sufficiency constructions with some necessity modals.

- (8) a. 如果你想买好的芝士，你只能去沃尔玛。
 b. Ruguo ni xiang mai haode zhishi, ni zhi neng qu Wuoerma.
 c. 'If you want to buy good cheese, you only can go to Walmart.'
 d. $\Rightarrow$ If you want to buy good cheese, you have to go to Walmart.
- (9) a. To get good cheese, you only can go to Lyon.
 b. Pour avoir du bon fromage, tu peux aller seulement à Lyon.
 c. for have of the good cheese, you can go only to Lyon.
 d. $\Rightarrow$ If you want to buy good cheese, you have to go to Lyon.

For more cross-linguistic data, see von Fintel and Iatridou (2007).

3.2.2 Condition 2: Scope relative to negation

While sufficiency modal constructions contain a necessity modal component, von Fintel and Iatridou observe that not all necessity modals can readily give rise to a weakened modal inference. Crucially, it is available only if the modal obligatorily scopes under negation. For instance, modals like *have to* and *need to* scope under negation, as in (10-a). When used in a sufficiency modal construction

¹I thank Sarah Boukendour for this example.

like (10-b), *have to* and *need to* give rise to the puzzling inference that going to the NE is *possible* but not *necessary*, as in (10-c): (von Fintel and Iatridou 2005:499)

- (10) a. You don't **have to/need to** go to the NE.
b. To get good cheese, you only **have to/need to** go to the NE.
c. $\nRightarrow$ To get good cheese, you have to/need to go to the NE.

On the contrary, necessity modals like *must* and weak necessity modals like *should* in (11-a) and (12-a) scope over negation. von Fintel and Iatridou show that when scoping over the negation, no weakening effect is observed:

- (11) a. You **must** not go to the NE.
b. To get good cheese, you only **must** go to the NE.
c. $\Rightarrow$ To get good cheese, you must go to the NE.
- (12) a. You **should/ought** not go to the NE.
b. To get good cheese, you **should/ought** only go to the NE.
c. $\Rightarrow$ To get good cheese, you should/ought go to the NE.

In addition to cross-linguistic data in Hindi and Greek discussed in von Fintel and Iatridou (2007), sufficiency modal constructions in Chinese² align with the observation that weak necessity modals don't give rise to weakened modal inferences.

- (13) a. 如果你想买好的芝士，你只应该去沃尔玛。
b. Ruguo ni xiang mai haode zhishi, ni zhi yinggai qu Wuoerma.
c. 'If you want to buy good cheese, you only should go to Walmart.'
d. $\Rightarrow$ If you want to buy good cheese, you have to go to Walmart.

²For the lack of accurate purpose clause expressions in Chinese, the examples are formulated in the style of anankastic conditionals, where the canonical purpose clause in sufficiency constructions is replaced with conditional antecedents containing *want*.

3.2.3 Condition 3: The flavor constraint

While some previous accounts acknowledge that a weakened modal inference is only available when the modal has a teleological flavor, as far as I know, only Huitink (2005) has provided an example where weakening is not available with epistemic modals³, and no one has shown sufficiency constructions with deontic modals do not give rise to sufficiency. In what follows, I will show that weakening is indeed not available with epistemic or deontic modals.

3.2.3.1 Teleological modality

In canonical sufficiency constructions like (3-a), repeated here as (14-a), the modality is expressed in the form of modal auxiliary.

- (14) a. To get good cheese, you only have to go to the NE.
b. $\Rightarrow$ You can go to the NE.
c. $\nRightarrow$ You have to go to the NE.

Here I bolster the empirical generalization that there *is* a flavor restriction in sufficiency constructions. I do so by showing that the availability of weakened modal inferences extends beyond auxiliary modals — sufficiency constructions with teleological lexical categories like verbs, nouns, and adjectives (i.e., ‘lexical modals’ (Traugott, 2011)) that express teleological modality and scope under negation, too, can give rise to weakened modal inferences.

Consider the cheese scenario with a lexical modal, like *necessary*. Suppose NE is the easiest to get to compared to NY and S, given our location (Boston). Just like the auxiliary modal *have to* in (3-a), the lexical modal *necessary* in (15) is a necessity modal that scopes under negation and expresses a teleological flavor, satisfying the three conditions (i.e., modal force; scope to negation; flavor constraint) for sufficiency.

³Here is the example from Huitink (2005), where she observes that the modal *has to* has an epistemic flavor, and that there is no weakened modal inference is available.

- (i) a. If Mary is to be happy, she only has to be in Rome.
b. $\Rightarrow$ If Mary is to be happy, she has to be in Rome.

(15) It is not necessary to go to the NE.

From (16-a) we seem to get the inference ‘it is sufficient to go to the NE to get good cheese, but you can also go somewhere further if you’d like’. The reading on which you *have to*/it is necessary to go to the NE, as in (16-c) is absent. Hence, in addition to auxiliary modals, we can obtain a sufficiency reading with a lexical modal, like *necessary*, as well.

- (16) a. To get good cheese, it is only **necessary** to go to the NE.
b. $\Rightarrow$ To get good cheese, it is sufficient to go to the NE.
c. $\nRightarrow$ To get good cheese, it is necessary to go to the NE.

The same inference pattern is observed with another lexical modal, like *need*. Same as *necessary*, *need* in (17) is a lexical necessity modal that has a teleological flavor and scopes under negation.

(17) There is no need to go to the NE.

Weakening seems to be observed in the case of (18-a) as well: we can get the inference that you can get good cheese at the NE, but you can do so elsewhere, too. In other words, there is no *need* to go to the NE for good cheese, as you can also go to NY or S.

- (18) a. To get good cheese, there is only a **need** to go to the NE.
b. $\Rightarrow$ To get good cheese, you can go to the NE.
c. $\nRightarrow$ To get good cheese, there is a need to go to the NE.

Here (14-a), (16-a), and (18-a) show that a sufficiency reading arises with both modal auxiliaries and lexical modals that express teleological necessity. In contrast, epistemic and deontic modals of any form do not give rise to weakened modal inferences.

3.2.3.2 Deontic modality

I now turn to examples showing the absences of sufficiency readings with deontic necessity modals. Consider the following example where a sufficiency reading doesn’t seem to be available

when the modal flavor is deontic⁴. The intuition is that (19-a) expresses that, according to the law, you have to submit the W2.

- (19) a. According to the law, you only have to submit your W2.
 b. $\Rightarrow$ According to the law, you *have to* submit your W2.

In view of the laws, it seems that (19-a) entails (19-b) and we can get the inference ‘submitting your W2 is a necessity’. Comparing (19-a) to canonical sufficiency constructions like (3-a), repeated below as (20-a):

- (20) a. To get good cheese, you only have to go to the NE.
 b. $\nRightarrow$ To get good cheese, you *have to* go to the NE.
 c. $\Rightarrow$ To get good cheese, you *can* go to the NE.

When the modal flavor is deontic, it appears that *only* does presuppose its prejacent (i.e. ‘you have to submit your W2’ in (19-b)). In other words, sufficiency constructions with a deontic modal like (19-a) don’t lack the necessity inference that’s absent in sufficiency constructions, as shown in (20-b).

The unavailability of a weakened modal inference can be further brought out by substituting *have to* with lexical modals like *require*, which unambiguously expresses a deontic flavor. To illustrate, *require* in (21) expresses a universal quantification over worlds and scopes under negation.

- (21) You’re not required to submit a W2.

While the conditions of modal force and scope relation to negation are both fulfilled, we don’t seem to observe weakening in the case of (22-a) with the deontic lexical modal *require*. That is, ‘you’re only required to go to submit your W2’ presupposes the prejacent of *only*: ‘you are required to go to submit your W2’, as in (22-b).

- (22) a. To file for a tax return, you’re only **required** to submit your W2.
 b. $\Rightarrow$ To get a tax return, you are required to submit a W2.

⁴I’m using ‘according to the law’ instead of the purpose clause to make the modal explicitly deontic.

3.2.3.3 Epistemic modality

A weakened inference seems unavailable when the necessity modal expresses an epistemic flavor as well. Before diving into the details, notice that all of the examples for sufficiency with epistemic modals will be formulated with conditional antecedents, as opposed to purpose clauses. As briefly shown in von Fintel and Iatridou (2007), the presence of a purpose clause isn't necessary for the availability of sufficiency readings, as such readings seem to be available with anankastic conditionals and causal conjunction. (See von Fintel and Iatridou 2007:447, and Chapter 5). Just like canonical sufficiency constructions with purpose clauses, in both anankastic conditionals like (23-a) and causal conjunctions like (24-a), we seem to obtain the inference that going to the NE is sufficient for getting good cheese. These two types of constructions, crucially, lack the necessity inference in (23-c) and (24-c), aligning with the entailment pattern observed in canonical cases like (20-a). Hence, while a sufficiency construction is canonically formulated with a purpose clause, which is used to describe goals and thus, renders a teleological flavor (Nissenbaum, 2005; von Stechow et al., 2006), an overt purpose clause is not a necessary ingredient for the availability of sufficiency readings as we have seen with anankastic conditionals and causal conjunctions. What matters is that the modal expresses teleological necessity.

(23) *Anankastic conditional*

- a. If you want to get good cheese, you only have to go to the NE.
- b. $\Rightarrow$ If you want to get good cheese, you can go to the NE.
- c. $\nRightarrow$ If you want to get good cheese, you have to go to the NE.

(24) *Causal conjunction*

- a. You only have to go to the NE and you will get good cheese.
- b. $\Rightarrow$ You can go to the NE and you will get good cheese.
- c. $\nRightarrow$ You have to go to the NE and you will get good cheese.

Returning to sufficiency constructions with an epistemic modal. Suppose Sara really dislikes Sue and

whenever she encounters Sue, she gets frustrated and acts irrationally:

- (25) a. If Sara is this upset, she only has to have just seen Sue.
b. $\Rightarrow$ If Sara is this upset, she has to have just seen Sue.

In this context, the modal *has to* in (25-a) has an epistemic flavor — given what we know Sara and her relationship to Sue, the only explanation for her irrational behavior is such that she had just seen Sue. In this case, *only* seems to presuppose its prejacent; namely, ‘she has to have just seen Sue’. Therefore, the construction *to p, you only have to q* with an epistemic modal also doesn’t seem to give rise to sufficiency readings.

In addition to auxiliary epistemic modals, no weakening is observed with lexical modals, like *certain* in (26), which has a universal quantification and scopes under negation.

- (26) It’s not certain that it’s raining tomorrow.

Again, given what we know about Sara’s relation to Sue, the only explanation for her frustration is such that she had just seen Sue. With the lexical epistemic modal *certain*, we seem to get the reading on which *only* presupposes its prejacent; namely, it’s certain that she had just seen Sue.

- (27) a. If Sara is this upset, it’s only **certain** that she had just seen Sue.
b. $\Rightarrow$ If Sara is this upset, it’s certain that she had just seen Sue.

In addition to the unavailability of sufficiency readings with epistemic and deontic *have to*, (22-a) and (27-a) show that, all else equal, we still do not get sufficiency with lexical modals expressing deontic and epistemic modal flavors. This further supports the empirical fact that there *is* a flavor restriction in the sufficiency constructions — sufficiency is only available when the modal expresses a teleological flavor.

So far, I have shown that there *is* a flavor constraint in sufficiency constructions by proving the following empirical data points:

1. Sufficiency readings are available with both lexical and auxiliary necessity modals that express teleological flavor.

2. Sufficiency readings are not available with both lexical and auxiliary necessity modals that express epistemic and deontic flavors.

Specifically, when used with epistemic and deontic necessity modals scoping under *only*, *only* presupposes its necessity prejacent, contrary to the weakened, existential inference we observe when *only* is used with teleological necessity modals. This reveals a previously overlooked empirical puzzle to sufficiency modal constructions: Why are sufficiency readings only available when the modal flavor is teleological? Why can't epistemic and deontic modals give rise to weakening? I call this puzzle 'Flavor exclusivity':

(28) **Flavor exclusivity:** Why is sufficiency limited to teleological modality?

3.2.4 Interim summary

In this section, I have delineated the overall empirical landscape for the availability of sufficiency readings, with special emphasis on the flavor exclusivity. In the course of doing so, I provided data on the previously acknowledged and yet, undocumented flavor constraint in sufficiency constructions. Specifically, I showed that sufficiency is not available with epistemic nor deontic modals of any category — it's only available with teleological modality. In the following section, I will first present three previous accounts in solving the prejacent problem. Then, I will discuss whether the licensing conditions for sufficiency can/cannot be accounted for by those proposals. By doing so, I will show:

1. None of the existing proposals can predict or explain the flavor exclusivity puzzle in sufficiency constructions.
2. All of the previous accounts over-generate and predict weakening when there is none.

3.3 Previous proposals

3.3.1 A split analysis of *only*

Motivated by cross-linguistic data in French, Spanish, Greek, Irish, etc., von Fintel and Iatridou (2007) offer an analysis of *only* where the meaning of *only* contains two components to derive the possibility inference ($\diamond_{NE}$): negation (NEG) and exceptive (EXC). NEG takes scope over EXC. EXC triggers an existential presupposition that something fulfills the at issue property encoded in the VP, and asserts that something other than the overt focal element fulfills that property. To illustrate, first consider an example of a bare *only*-statement where (29-a) has the LF in (29-b) and EXC has the lexical entry in (30), adapted from Alonso-Ovalle and Hirsch (6:8). Suppose the relevant set of alternatives is $\{NY, S, NE\}$.

- (29) a. I only went to the North End.
 b. $[_{TP} \text{ NEG } [_{EXC} [\text{the North End}]_F] \lambda_1 [_{VP} \text{ I went to } t_1]]]$

$$(30) \quad \llbracket \text{EXC} \rrbracket = \lambda x. \lambda f_{\langle e, st \rangle}. \lambda w: \exists y [f(y)(w)]. \exists z [z \neq x \wedge f(z)(w)]$$

Let ϕ be ‘I went to $_$ ’. EXC triggers the presupposition I went somewhere. And, it asserts I went somewhere other than the NE. NEG scopes over the proposition, yielding the propositions ‘I didn’t go to NY’ and ‘I didn’t go to S’:

- (31) a. Presupposition: $\phi_{NE} \vee \phi_{NY} \vee \phi_S$
 b. Assertion: $\neg (\phi_{NY} \vee \phi_S) \Leftrightarrow \neg \phi_{NY} \wedge \neg \phi_S$
 c. $\therefore \phi_{NE}$

Given that I went to somewhere among NE, NY, and S; and that I didn’t go to NY nor S, we get the prejacent inference that I went to the NE.

Now let’s see how von Fintel and Iatridou’s proposal solves the prejacent problem. The cheese example, repeated here as (32-a), has the LF in (32-b). EXC scopes under the modal and triggers the existential presupposition that you go somewhere to get good cheese and asserts that you go somewhere

other than the NE to get good cheese.

- (32) a. To get good cheese, you only have to go to the North End.
 b. $[_{TP} \text{ NEG } [_{VP_2} \text{ have } [[_{EXC} [\text{the North End}]_F] \lambda_1 [_{VP_1} \text{ you go to } t_1]]]]$

So far, everything looks the same as what we have seen in the bare *only* statement. Now taking the modal element and NEG into account: the presupposition, you go somewhere in every world you get good cheese, triggered by EXC projects through the modal and over the negation; as a result, we have the projected content that you go somewhere in every world where you get good cheese.

- (33) Projected presupposition: $\Box (\phi_{NE} \vee \phi_{NY} \vee \phi_S)$

The modal quantifies over the assertion ‘you go somewhere other than the NE’ and the negation, in turn, applies to the proposition expressed in the modalized claim, resulting in the assertion that you don’t have to go to NY nor S.

- (34) Assertion: $\neg \Box (\phi_{NY} \vee \phi_S)$

Putting (33) and (34) together, (32-a) presupposes that you go somewhere in every world where you get good cheese and asserts it’s not the case that in all worlds where you get good cheese you go to NY or S. As a result, we get the desired possibility inference that at least there are some cheese-world where you do not go anywhere other than the NE ($\Diamond \text{NE}$).

3.3.2 Weakening operator AT LEAST

Contrary to von Stechow and Iatridou (2007), Alonso-Ovalle and Hirsch (2022)’s analysis preserves the semantics of *only* on which *only* presupposes its prejacent. To obtain sufficiency readings, they propose that the necessity reading is weakened by a covert scalar operator AT LEAST (Schwarz, 2004; Crnič, 2011). As shown in its lexical entry in (35), AT LEAST is sensitive to an effort-based ordering on a contextually salient set of alternatives ALT and presupposes that the prejacent p ranks the lowest on the scale. Similar to the function of the EXC, AT LEAST also introduces an existential

presupposition that its prejacent p ranks the lowest on the scale, and asserts that at least one alternative ranked at least as high as the prejacent is true in w .

$$(35) \quad \llbracket \text{AT LEAST} \rrbracket^{\text{ALT} \leq}(p) = \lambda w: \forall p' \in \text{ALT} [(p' \neq p) \rightarrow p' > p]. \exists p'' \in \text{ALT} [p'' \geq p \wedge p''(w)]$$

To illustrate, consider (36-a) discussed in Alonso-Ovalle and Hirsch (2022). Suppose NE is the least effortful place to go, and NY is less effortful than S, given that we are based in Boston. There is a contextual scale that introduces this ranking as in (36-b), and AT LEAST is sensitive to this contextual scale.

- (36) a. [AT LEAST [_{VP1} you go to [the North End]_F]]
 b. NE < NY < S

Let ϕ be ‘you go to $_$ ’. AT LEAST presupposes that going to the NE is the least effortful, as in (37-a). It further makes the assertion: you went to the NE or somewhere higher-ranked, based on the scale in (36-b). Putting together (37-a) and (37-b), we have the reading that you either go to the NE or you go somewhere more effortful than going to to the NE (i.e., ϕ_{NE} , ϕ_{S}). As a result, we obtain the weak reading that you go somewhere.

- (37) a. $\lambda w: \forall p' \in \text{ALT} [(p' \neq \phi_{\text{NE}}) \rightarrow p > \phi_{\text{NE}}]$
 b. $\lambda w: \exists p' \in \text{ALT} [(\phi_{\text{NE}} \leq p') \wedge p'(w)]$

Now let’s see how their proposal solves the prejacent problem. Consider the cheese example with the LF in (10-b). (Alonso-Ovalle and Hirsch 6:28) We had seen earlier that AT LEAST asserts that among the contextually salient options you go somewhere to get good cheese. Now adding a necessity modal on top of that, we obtain another presupposition at the level of VP_2 , as in (38-c). And, since the scalar presupposition projects through the universal modal, the projected content remains the same.

- (38) a. To get good cheese, you only have to go to the North End.
 b. [_{TP} only [_{VP2} have [[AT LEAST [_{VP1} you go to [the North End]_F]]]]
 c. Presupposition: $\Box (\phi_{\text{NY}} \vee \phi_{\text{S}} \vee \phi_{\text{NE}})$

The only element left to account for is the contribution of *only* and its asserted content. As a focus sensitive operator scoping at the top of the sentence, *only* has access to all the alternatives containing the modal and AT LEAST. The only difference among these alternatives is simply the focal element: NE, NY, and S. Hence, *only* expresses the following assertions (Alonso-Ovalle & Hirsch 6:29)

- (39) a. $\Box \llbracket \text{AT LEAST} \rrbracket_{\text{ALT}} \leq (\phi_{\text{NE}}) \Leftrightarrow \Box (\phi_{\text{NY}} \vee \phi_{\text{S}} \vee \phi_{\text{NE}})$
 b. $\Box \llbracket \text{AT LEAST} \rrbracket_{\text{ALT}} \leq (\phi_{\text{NY}}) \Leftrightarrow \Box (\phi_{\text{NY}} \vee \phi_{\text{S}})$
 c. $\Box \llbracket \text{AT LEAST} \rrbracket_{\text{ALT}} \leq (\phi_{\text{S}}) \Leftrightarrow \Box (\phi_{\text{S}})$

Only then functions to negate the alternatives that are not the prejacent, namely, (39-b) and (39-c). As a result, we have the assertion that you do not have to go to either NY or S in all worlds where you get good cheese, as in (40-a):

- (40) a. Assertion: $\neg \Box (\phi_{\text{NY}} \vee \phi_{\text{S}}) \wedge \neg \Box \phi_{\text{S}}$
 b. Presupposition: $\Box (\phi_{\text{NY}} \vee \phi_{\text{S}} \vee \phi_{\text{NE}})$

Combining the asserted content of *only* and the presupposed content, we can obtain the reading that you go to either NY, NE or S in every world where you get good cheese, but it's not the case that in all of those cheese worlds, you go to NY or S. As a result, we get the weakened modal inference that in some of those cheese world, you go to the NE.

3.3.3 Weakening via domain restriction

In this section, I will discuss how Condoravdi and Francez (2022) derive the prejacent inference via domain restriction. Let's first consider an example without the *only*.

- (41) a. To get good cheese, you have to go to the NE.
 b. In all w' compatible with the relevant facts in w and best satisfy your goals in w , you go to the NE at w' .

Assuming the standard Kratzerian analysis for teleological modality, *have to* in (41-b) is evaluated

relative to a circumstantial modal base, which includes relevant facts about geography, getting good cheese, etc, and an ordering source consisted of your goals. Condoravdi and Francez then take the purpose clause to modify the the *ordering source*, as specified in (42). Essentially, (42) states that the content p is distributively added to each proposition in the ordering source. That is, for an ordering source g that includes propositions $\{a, b, c\}$, g^+ with the addition of p is $\{p \wedge a, p \wedge b, p \wedge c\}$. This guarantees that all of the best worlds delivered by $\mathcal{M}_{f,g^+}^p$ are all p -worlds (i.e., all the best worlds are worlds where you get good cheese for (41-a)). (41-a) has the truth conditions in (41-b).

$$(42) \quad \text{A modal } \mathcal{M}_{f,g} \text{ modified by a purpose clause with content } p \text{ is } \mathcal{M}_{f,g^+}^p, \text{ where for any } w, \\ g^+(w) = \{p \wedge r \mid r \in g(w)\} \text{ Condoravdi and Francez (2022)}$$

Now let's turn to their analysis of the sufficiency modal constructions. Following Coppock and Beaver (2014)'s scalar analysis of *only*, Condoravdi and Francez assume that *only* involves two operators: MIN and MAX. These operators are associated with a *single* question under discussion (Roberts, 1996) supplied by context. This question yields a set of alternative propositional answers ranked based on strength. MIN encodes the presuppositional content that there is a true answer in the alternative set that is at least as strong as the prejacent p holds in w (Coppock and Beaver 2014:394). And, the asserted content, specified by MAX, is that for all propositions in the alternative set, if they are true, then they rank equally or lower than the prejacent: (Condoravdi and Francez 2022:3)

$$(43) \quad \begin{aligned} \text{a.} \quad & \text{MIN}(p, \text{Alt}) = \lambda w. \exists p' \in \text{Alt}(p) [p'(w) \wedge p \leq p'] \\ \text{b.} \quad & \text{MAX}(p, \text{Alt}) = \lambda w. \forall p' \in \text{Alt}(p) [p'(w) \rightarrow p' \leq p] \end{aligned}$$

To illustrate, suppose there are three places to get good cheese: New York, Switzerland, and the North End, and that given our location (Boston), going to the NE is easier than going to NY, which is easier than going to Switzerland. Here the focus alternatives in ALT include $\{\Box_{\text{NE}}, \Box_{\text{NY}}, \Box_{\text{S}}\}$. They assume that these focus alternatives are ordered by how easy it is to achieve the at-issue goal. In this context, (44-a) yields the ordering in (44-b). *Only* presupposes 'at least p ' and asserts 'at most p ' where p is the prejacent. In the cheese example, *Only* presupposes that you at least go to the NE in every cheese-world, and asserts that you at most go to the NE at in every cheese-worlds. Together, it captures the

prejacent inference that you go to the NE in every cheese-world.

- (44) a. To get good cheese, you only have to go to the NE.
 b. $\Box_{f,g^+}^{\text{cheese}}(\text{you go to NE}) < \Box_{f,g^+}^{\text{cheese}}(\text{you go to NY}) < \Box_{f,g^+}^{\text{cheese}}(\text{you go to S})$

In order to obtain the reading that going to the NE is the least effortful, the domain of quantification needs to be restricted. To do so, Condoravdi and Francez propose to encode a “preference to minimize the cost of goal realization” component to the ordering source of a sufficiency modal. They do so by imposing the condition “the agent incurs no more than d -amount of cost” unto the ordering source. By doing so, the propositions in the ordering source are ‘ranked’ in the sense that they stand in an entailment relation to each other. For example, if a world w_1 where you achieve the goal and incur at most the degree of cost, d_1 is better than a world w_2 where d_2 amount of cost is incurred, then $d_1 < d_2$.

Via the implementation of ‘a preference for cost minimization’, Condoravdi and Francez induce an ordering on the propositions in the contextually determined ordering source. This ordering source in turn restricts the modal base worlds. Given that the NE is the easiest of the places that have good cheese, the worlds where the most propositions in the ordering source are true are worlds where you go to the NE for good cheese. That is, these are the worlds where you get good cheese with the least effort possible and thus, the set of best worlds. In other words, this domain constraint rules out worlds where you get good cheese and incur more than the cost associated with going to the NE (i.e. worlds where you going to NY or S), resulting in worlds where you go to NE (or somewhere that costs less than the cost for NE). As a result, even though the natural reading of the sentence is compatible with there being other ways to achieve the suggested goal, semantically, the modal’s domain of quantification is manipulated to one where the best worlds only include the prejacent worlds. In short, on their analysis ‘to get good cheese, you only have to go to the NE’ is effectively construed, as in (45). This guarantees that all the best cheese worlds are worlds where you go to the NE, and that going to the NE is the easiest/least costly means, and hence, solving the prejacent problem.

- (45) To get good cheese *most easily/with the least amount of effort*, you only have to go to the NE.

The cheese example, repeated here as (46-a), in this framework, has the presupposition that the best

worlds are such that you go to the NE or somewhere, and the cost for it is not more than that of going to the NE. And the assertion as in (46-c) is such that in all the best worlds you go no where but the NE and incurs at most the cost for going to the NE.

- (46)
- a. To get good cheese, you only have to go to the NE.
 - b. Presupposition: $\lambda w. \exists p' \in \text{Alt} (\Box^{\text{cheese}} f, g+ (\text{you go to the NE}) [p'(w) \wedge \Box^{\text{cheese}} f, g+ (\text{you go to the NE}) \leq p'])$
 - c. Assertion: $\lambda w. \forall p' \in \text{Alt} (\Box^{\text{cheese}} f, g+ (\text{you go to the NE})) [p'(w) \rightarrow p' \leq \Box^{\text{cheese}} f, g+ (\text{you go to the NE})]$

Putting (46-b) and (46-c) together, we get the prejacent inference that in all the best worlds where you get good cheese, you go to the NE.

3.3.4 Interim summary

So far, I have presented an overall empirical landscape for when a sufficiency reading is available and when it's not. As discussed, the availability of sufficiency seems to be constrained by three conditions:

1. The modal in sufficiency constructions expresses universal force.
2. The necessity modal obligatorily scopes under negation.
3. The necessity modal has a teleological flavor.

Then, I have reviewed three prevalent proposals for deriving sufficiency readings. In the following section I will show how each of those proposals can/cannot account for the empirical constraints of sufficiency.

3.4 Deriving the empirical constraints

3.4.1 Condition 1: Sufficiency with possibility

Starting with condition 1: the modal has to express universal quantification over worlds. As we have seen before, with any possibility modal, such as *may* and *can*, under the scope of *only*, we seem to get the reading on which *only* presupposes its prejacent:

- (47) a. To get good cheese, you only *may/can* go to the NE.
b. $\Rightarrow$ To get good cheese, you can go to the NE.

Here the intuition seems to be to get good cheese, you can go to the NE, and there is no where else to go. That is, you *have to* go to the NE. Hence, for any theory to capture this empirical fact, it should be able to derive the necessity inference ‘you have to go to the NE’. For von Stechow and Iatridou (2007) to derive the necessity reading, (48-a) would have to have the LF in (48-b), with *can* scoping under NEG. (48-a) would have the presupposition ‘You can go NY, NE or S’ (i.e., you can go somewhere) in (48-b) and the assertion ‘you can’t go to NY or S’. Since you can go somewhere to get good cheese, but you can’t go to NY or S, we can get the inference that you can only go to the NE (i.e., you have to go to the NE). Hence, their account designed to capture sufficiency readings with necessity modals still gets the correct meaning with possibility modals

- (48) a. To get good cheese, you only can go to the NE.
b. $[_{TP} \text{ NEG } [_{VP_2} \text{ can } [[_{EXC} [\text{the NE}]_F] \lambda_1 [_{VP_1} \text{ you go to } t_1]]]]$
c. Presupposition: $\diamond (\phi_{NE} \vee \phi_{NY} \vee \phi_S)$
d. Assertion: $\neg \diamond (\phi_{NY} \vee \phi_S)$

For Alonso-Ovalle and Hirsch (2022), (49-a) has the LF in (49-b). *Only* presupposes that to get good cheese, you can go somewhere, and it asserts that you can’t go anywhere that’s further than the NE. Since you can go somewhere and cannot go anywhere further than the NE, we can obtain the reading that you have to go to the NE. Thus, their analysis can capture the reading ‘You have to go to the NE

when used with a possibility modal.

- (49) a. To get good cheese, you only can go to the North End.
 b. $[_{TP} \text{ only } [_{VP_2} \text{ can } [[_{AT LEAST} [_{VP_1} \text{ you go to [the North End]}_F]]]]]$
 c. $P: \Diamond (\phi_{NE} \vee \phi_{NY} \vee \phi_S)$
 d. $A: \neg \Diamond (\phi_{NY} \vee \phi_S)$

The necessity inference in sufficiency constructions with possibility modals can't be captured within Condoravdi and Francez (2022)'s framework (Bai et al., ms.). If there is domain restriction with necessity modals, in principle, one can expect domain restriction to be applicable with possibility modals. As a result, (49-a) will end up presupposing that to get good cheese *most easily* you can go to the NE, and can't go anywhere else. So, it follows that in every *easy* cheese-world, you go to the NE. However, this reading is too weak, since the sentence actually says that in every single cheese world, regardless of whether it's easy or not, you go there. Hence, Condoravdi and Francez's account doesn't capture the reading 'you have to go to the NE'.

3.4.2 Condition 2: Scope relative to negation

The second condition for sufficiency is the scope position relative to negation; namely, the necessity modal has to obligatorily scope under negation. Based on both English and cross-linguistic data showing that *must* and *should* obligatorily scope above negation, the negative split analysis directly predicts that to obtain sufficiency, the negation has to take high scope over the modal. Recall that sufficiency constructions as in (50-a), on such construal, has the following LF in (50-b):

- (50) a. To get good cheese, you only have to go to the NE.
 b. $[_{TP} \text{ NEG } [_{VP_2} \text{ have } [[_{EXC} [\text{the NE}]_F] \lambda_1 [_{VP_1} \text{ you go to } t_1]]]]]$

Since *must* and *should* both scope over negation, as in (51-c) and (51-d), they can't give rise to a LF like (51-b). As a result, sufficiency constructions with *must* and *should* can't give rise to weakening:

- (51) a. To get good cheese, you only must/should go to the NE.

- b. ? [_{TP} NEG [_{VP₂} must/should [[EXC [the NE]_F] λ_1 [_{VP₁} you go to t_1]]]]
- c. You must not go to the NE. $\Box_{NE} > NEG$
- d. You should not go to the NE. $\Box_{NE} > NEG$

Prima facie, weakening via a scalar operator AT LEAST appears to be able to account for this scope relative to negation. For Alonso-Ovalle and Hirsch, (52-a) has the LF in (52-b). Contrary to the negative split analysis where *only* is decomposed into EXC and NEG, which scopes at the top of the LF, there is no overt negation in (52-b).

- (52) a. To get good cheese, you only have to go to the North End.
- b. [_{TP} only [_{VP₂} have [[AT LEAST [_{VP₁} you go to [the North End]_F]]]]]

Nevertheless, one might think that *only* in (52-b) has widest scope, and the negation packed into the meaning of *only* thus scopes over the modal. However, empirical facts on weak versus strong NPI licensing with *only* suggest otherwise.⁵ Specifically, *only* does license weak NPIs like *any* as in (53-a) (von Stechow, 1999b) but not strong NPIs, such as *in years* in (53-b) (Gajewski, 2008; Giannakidou, 2011). If the negation packed into the semantics of *only* behaves the same as sentential negation, one should expect both strong and weak NPIs to be licensed in the cases of (53-a) and (53-b), however, we do not. Hence, even though there is a negative component in Alonso-Ovalle and Hirsch (2022)’s proposal, it’s unclear if its syntactic properties and various licensing conditions pattern the same as sentential negation and as a result, their proposal can’t capture the scope constraint, as acknowledged by Alonso-Ovalle and Hirsch (2022).

- (53) a. Only Mary has read any books written by Magda Szabó.
- b. ? Only Mary has been to Hungary in years.

In a similar vein, Condoravdi and Francez assume a scalar analysis of *only* on which *only* is specified with regard to MIN and MAX:

- (54) a. $\text{MIN}(p, \text{Alt}) = \lambda w. \exists p' \in \text{Alt}(p) [p'(w) \wedge p \leq p']$

⁵Thanks to Aron Hirsch for pointing this out.

$$b. \quad \text{MAX}(p, \text{Alt}) = \lambda w. \forall p' \in \text{Alt}(p) [p'(w) \rightarrow p' \leq p]$$

Here the semantics for *only* is stated in a way that does not involve negation. However, by contraposing the material conditional inside the statement of *only* we can get a definition of *only* involving negation that's truth-conditionally equivalent to the one without negation, as in (55-a) and (55-b):

- (55) a. $\llbracket \text{only} \rrbracket(\text{ALT})(p)(w) = 1$ iff $\forall p' \in \text{ALT}: [p'(w) \rightarrow (p \subseteq p')]$
 b. $\llbracket \text{only} \rrbracket(\text{ALT})(p)(w) = 1$ iff $\forall p' \in \text{ALT}: [\neg(p \subseteq p') \rightarrow \neg p'(w)]$

However, just like what we have seen with Alonso-Ovalle and Hirsch's proposal, here it's unclear whether a negative component packed into the meaning of *only* is sufficient to function as sentential negation that scopes over the modal. Hence, among the three approaches, only von Fintel and Iatridou's analysis straight-forwardly accounts for the condition on the scope relative to negation.

3.4.3 Condition 3: Flavor constraint

The third condition for sufficiency is the flavor constraint, a condition acknowledged by some but accounted for by none. von Fintel and Iatridou (2007) explicitly state that the modal itself is not responsible for the goal-orientation in sufficiency constructions. The teleological component, they argue, comes from the purpose clause (von Fintel and Iatridou. pg. 448) This seems to convey the idea that whenever you have a '**to** *p*, you only **MOD** *q*' construction, the modal receives a teleological interpretation given the purpose clause. However, as we have seen in §2, there are sufficiency constructions sharing the same *to p, you only MOD q* structure where the modal has a deontic flavor instead, and no sufficiency is observed; there are also cases where weakening arises with no purpose clause. Moreover, their account derives sufficiency through decomposing *only* into EXC and NEG — the account itself doesn't require nor interact with the presence of a purpose clause in any way. Therefore, von Fintel and Iatridou's proposal doesn't explain why a weakened modal inference is only available with a teleological necessity modal.

Alonso-Ovalle and Hirsch make no remarks on the restriction on modal flavor. Similar to the von Fintel and Iatridou's analysis, they derive weakening by postulating special LFs where weakening

is derived via a scalar operator, AT LEAST. This crucial ingredient in their account bears no influence on the modal's flavor, as AT LEAST nor any other component in their account actually interacts with the modal to have an influence on its flavor.

In addition to the flavor constraint, some accounts over-generate weakening when there is none. Since von Fintel and Iatridou (2007) and Alonso-Ovalle and Hirsch (2022) take weakening to be contingent upon the modal's ability to scope under negation, they would predict that, in principle, one could get weakening if one has the negation over *any* intensional operator, **OP**, that scopes under negation and expresses universal quantification. For von Fintel and Iatridou, such sentences would have the LF in (56-b); and for Alonso-Ovalle and Hirsch, they will have the LF in (56-c):

- (56) a. To get good cheese, you only **OP** go to the North End.
 b. $[_{TP} \text{ NEG } [_{VP_2} \text{ **OP** } [[_{EXC} [\text{the NE}]_F] \lambda_1 [_{VP_1} \text{ you go to } t_1]]]]$
 c. $[_{TP} \text{ only } [_{VP_2} \text{ **OP** } [[_{AT LEAST} [_{VP_1} \text{ you go to } [\text{the North End}]_F]]]]]]$

One of the undesirable outcomes is both accounts now predict that weakening should arise with non-neg-raising attitude verbs of *any* flavor. Consider *certain* for epistemic and *require* for deontic:

- (57) a. Sue isn't certain that it's raining tomorrow.
 b. ?Sue is certain that it's not raining tomorrow.
 (58) a. You are not required to submit a W2.
 b. ?You are required to not submit a W2.

Both seem to obligatorily scope under negation and have universal quantification over worlds. Under the negative split analysis of *only*, they have the LFs in (59-b) and (65-b). On the *at least* construal, they have the LFs in (59-c) and (65-c).

- (59) a. If Sara is this upset, it's only **certain** that she had just seen Sue.
 b. $[_{TP} \text{ NEG } [_{VP_2} \text{ **CERTAIN** } [[_{EXC} [\text{she had just seen Sue}]_F] \lambda_1 [_{VP_1} \text{ it's certain } t_1]]]]$
 c. $[_{TP} \text{ only } [_{VP_2} \text{ **CERTAIN** } [[_{AT LEAST} [_{VP_1} \text{ she [had just seen Sue]}_F]]]]]]$

- (60) a. To file for a tax return, you're only **required** to submit a W2.
- b. $[_{TP} \text{ NEG } [_{VP_2} \text{ REQUIRED } [[_{EXC} [a \text{ W2}]_F] \lambda_1 [_{VP_1} \text{ you submit } t_1]]]]$
- c. $[_{TP} \text{ only } [_{VP_2} \text{ REQUIRED } [[_{AT LEAST} [_{VP_1} \text{ you submit } [a \text{ W2}]_F]]]]]]$

Given that nothing is in place to prevent such LFs to be generated, both accounts incorrectly predict weakening to arise in sufficiency constructions with epistemic and deontic attitude verbs when in reality, there is none.

Contrary to the syntactic approaches where weakening is achieved either via decomposing *only* or by introducing a weakening operator in the LF, Condoravdi and Francez's proposal derives weakening via manipulating with the ordering source and doesn't postulate anything special about the LF and thus, it doesn't suffer from the same over-generation issue.

Prima facie, Condoravdi and Francez's account seems to be able to account for the flavor constraint, as their proposal seems to be sensitive to the modal flavor, given that weakening is obtained partially by manipulating the modal's ordering source. However, if all that's required for restricting the modal domain is a ranked ordering source, then, whenever there is an ordering source one should in principle be able to induce a ranking on that ordering source, restrict its modal domain and thus, derive sufficiency. In other words, no principles seem to be in place to prevent one from inducing an ordering on, for example, a deontic ordering source, which then could then lead to an existential reading of deontic necessity modal. As a result, we might expect weakening to arise in sufficiency constructions with epistemic and deontic modals. Hence, it's unclear why, on their construal, sufficiency readings can only arise with teleological modals, and not with epistemic or deontic modals.

3.5 Conclusion

In this chapter, I have presented three conditions for licensing sufficiency readings, focusing on the restriction of flavor:

- Condition 1: The modal in sufficiency constructions expresses universal force.
- Condition 2: The necessity modal obligatorily scopes under negation.

- Condition 3: The necessity modal has a teleological flavor.

I have also discussed how each of the previous accounts can/cannot account for the licensing conditions for sufficiency. To sum up:

Analysis	Condition 1: force	Condition 2: negation	Condition 3: flavor
von Fintel & Iatridou	✓	✓	✗
Alonso-Ovalle & Hirsch	✓	✗	✗
Condoravdi & Francez	✗	✗	✗

By doing so, I have shown that:

- None of the previous accounts can account for the flavor restriction.
- All of them over-generate and predict weakening when there is none.

The next chapter is dedicated to solving the following questions: *why* are sufficiency readings only available with teleological flavor and *where* does this flavor constraint come from? I will show that there is another empirical domain with a restriction to teleological modality; namely, mention-some interpretations on which a question can be resolved by providing one true answer as opposed to all true answers, is only available in a goal-oriented context. By establishing the fact that mention-some interpretations and sufficiency constructions are subject to the same flavor constraint, I propose a pragmatic account for the flavor exclusivity puzzle in sufficiency constructions. Specifically, I argue that sufficiency statements are answers to mention-some questions, which are themselves flavor-restricted. This proposal ultimately reduces the flavor constraint in sufficiency constructions to that in mention-some questions.

Chapter 4: Deriving the flavor constraint

4.1 Introduction

As we have seen in Chapter 3, it remains an open puzzle why the sufficiency reading is only available with teleological necessity modals, as opposed to other flavors. Specifically, on the one hand, the domain restriction proposal, *prima facie*, seems to be sensitive to the flavor constraint as weakening is obtained partially via manipulating the modal’s ordering source. However, nothing in Condoravdi and Francez’s system seems to prevent one from tampering with the ordering sources of epistemic and deontic modals and thus, deriving weakening when there is none, leading to potential over-generation issues. On the other hand, under the structural views, the weakened inference is derived either via introducing a scalar operator *AT LEAST* at the LF or via splitting the scope of *only* to negation and exceptive – none of which actually interacts with the modal to have an influence on its flavor. How may one draw a meaningful connection between these structural accounts to the necessity modal in sufficiency constructions such that the flavor constraint can be accounted for? In this chapter, I attempt to offer an explanation for the flavor constraint in sufficiency constructions. In particular, I aim to answer the following questions:

- Why is sufficiency only available with teleological flavor?
- Where does this flavor constraint come from?

The overarching insight pursued in this chapter is that there seems to be something special about teleological necessity modals — teleological necessity claims involve specifying a goal that needs to be met, but there can still be multiple ways of achieving that goal, while deontic and epistemic necessities state the absolute. This distinction, I argue, is essentially why a weakened modal inference is only available when the necessity modal in a sufficiency construction expresses a teleological flavor.

In this chapter, I consider two routes to implement this insight: a semantic route for accounts that derive sufficiency readings as weak necessity inferences, like Condoravdi and Francez (2022), and a pragmatic route for accounts that derive sufficiency readings as possibility inferences, like von Stechow and Iatridou (2007) and Alonso-Ovalle and Hirsch (2022). In both cases, I will consider how

to augment an existing account of sufficiency to capture the flavor restriction. The semantic account follows insights from von Fintel and Iatridou (2008) and Condoravdi and Francez (2022). In particular, I consider the possibility that there is a fundamental *grammatical* difference between teleological modality and epistemic and deontic modalities: while the latter involves a modal base and a single ordering source, teleological modals involve a modal base and *two* ordering sources — a primary one containing a designated goal contributed by the purpose clause, and a secondary one where other considerations help pick out the best way to achieve the designated goal. While this route captures the intuition that in a goal-oriented context, one often has a goal that must be achieved, along with some other goals and considerations one would like to take into consideration, as it stands, the semantic route faces some significant challenges. Given the non-trivial problems of the semantic route, I will ultimately be pursuing the pragmatic route to the flavor constraint.

The pragmatic route accounts the flavor constraint in sufficiency by connecting sufficiency statements with the questions they address. Specifically, I argue that an occurrence of a sufficiency statement requires the presence of a mention-some question, which themselves must contain a possibility modal of teleological flavor (George, 2011; Fox, 2013; Xiang, 2023). If mention-some questions are themselves restricted based on modal flavor, then by establishing the parallel that mention-some interpretations and sufficiency constructions are subject to the same flavor constraint and that sufficiency statements must be answers to mention-some questions, I suggest that the flavor constraint in sufficiency constructions can be reduced to that in mention-some questions. I take the felicity of teleological modals in both environments to come from the fact that goals can be satisfied in many ways, but do not need to be satisfied exhaustively — fulfilling the goal in one way suffices.

4.2 A semantic route to deriving the flavor constraint

In this section, I consider a semantic route to the flavor constraint in sufficiency constructions for accounts that derive weakening via domain restriction. Specifically, I suggest that a domain restriction account like Condoravdi and Francez (2022) could derive both weakening and the flavor constraint in sufficiency constructions by assuming two ordering sources for teleological necessity modals, à la

von Fintel and Iatridou (2008). A teleological *have to* has a primary ordering source containing a designated goal contributed by the purpose clause (von Fintel and Iatridou, 2008) which trumps all other goals, and a secondary one where other considerations help pick out the best way to achieve the designated goal.

The rest of the section goes as follows. I will first briefly review how Condoravdi and Francez (2022) derives weakening from domain restriction in §2.1, along with potential issues of their proposal in §2.2. Given the potential concerns, I offer an alternative strategy that appeals to a secondary ordering source for teleological necessity modals. I will adopt the analysis on secondary ordering sources for teleological strong necessity modal offered in von Fintel and Iatridou (2008) in §4.2.3.1. In §4.3, I suggest that a weak necessity interpretation of a strong necessity modal is only available when the modal expresses a teleological flavor. In §4.4, I show that assuming a secondary ordering source for teleological *have to* in the context of sufficiency constructions can not only derive the prejacent inference through domain restriction, it also captures, albeit by stipulation, that weakening does not arise with epistemic nor deontic necessity modals and thus, accounting for the flavor constraint. I will compare and contrast my suggestion to Condoravdi and Francez (2022) and show that while mine can perhaps avoid some problems encountered in Condoravdi and Francez (2022), both accounts suffer from the fact that it's unclear why the weakening mechanism wouldn't be more freely available with other modals, and why *only* is required for weakening.

4.2.1 Weakening via domain restriction

In this section, I will briefly review the key ingredients to Condoravdi and Francez (2022)'s account in deriving a weakened modal inference.

4.2.1.1 Ingredient 1: from purpose clause to ordering source

Let's first consider an example without the *only*. Assuming the standard Kratzerian analysis for teleological modality, *have to* in (1-b) is evaluated relative to a circumstantial modal base, which includes relevant facts about geography, getting good cheese, etc, and an ordering source consisting of

your goals.

- (1) a. To get good cheese, you have to go to the NE.
- b. In all w' compatible with the relevant facts in w and best satisfy your goals in w , you go to the NE at w' .

Condoravdi and Francez (2022) then take the purpose clause to modify the the *ordering source* in the following way:

- (2) A modal $\mathcal{M}_{f,g}$ modified by a purpose clause with content p is $\mathcal{M}_{f,g^+}^p$, where for any w ,
 $g^+(w) = \{p \wedge r \mid r \in g(w)\}$

Essentially, (2) states that the content of the purpose clause is distributively added to each of the proposition in the ordering source of the teleological modal. That is, for an ordering source g that includes propositions $\{a, b, c\}$, g^+ with the addition of p is $\{p \wedge a, p \wedge b, p \wedge c\}$. This guarantees that all of the best worlds delivered by $\mathcal{M}_{f,g^+}^p$ are all p -worlds (i.e., all the best worlds are worlds where you get good cheese for (1-a)). (1-a) has the truth conditions in (1-b).

4.2.1.2 Ingredient 2: a scalar analysis of *only*

Now let's turn to their analysis of the sufficiency modal constructions, as in (3):

- (3) To get good cheese, you only have to go to the NE.

As discussed in Chapter 3, they follow Coppock and Beaver's (2014) scalar analysis of *only* on which it involves two operators: MIN and MAX. (Condoravdi and Francez 2022:3)

- (4) a. $\text{MIN}(p, \text{Alt}) = \lambda w. \exists p' \in \text{Alt}(p) [p'(w) \wedge p \leq p']$
- b. $\text{MAX}(p, \text{Alt}) = \lambda w. \forall p' \in \text{Alt}(p) [p'(w) \rightarrow p' \leq p]$

MIN encodes the presuppositional content that there is a true answer in the alternative set that is at least as high as the prejacent p holds in w (Coppock and Beaver, 2014). And, the asserted content, specified by MAX, is that for all propositions in the alternative set, if they are true, then they rank equally or

lower than the prejacent. For instance, suppose there are three places to get good cheese: New York, Switzerland, and the North End, and that given our location (Boston), the NE is the easiest destination. The focus alternatives in ALT include $\{\Box_{f,g^+} \text{NE}, \Box_{f,g^+} \text{NY}, \Box_{f,g^+} \text{S}\}$. They assume that these focus alternatives are ordered by how easy it is to achieve the at issue goal. (5-a) yields the ordering in (5-b). *Only* presupposes ‘at least p’ and asserts ‘at most p’ where p is the prejacent. In the cheese example, *only* presupposes that you at least go to the NE in every cheese-world, and asserts that you at most go to the NE at in every cheese-worlds. Together, it captures the prejacent inference that you go to the NE in every cheese-world. In order to obtain the reading that going to the NE is the least effortful, the domain of quantification needs to be restricted, which means one has to add more propositions into the ordering source. Hence, Ingredient 3.

- (5) a. To get good cheese, you only have to go to the NE.
b. $\Box_{f,g^+}^{\text{cheese}}(\text{you go to NE}) < \Box_{f,g^+}^{\text{cheese}}(\text{you go to NY}) < \Box_{f,g^+}^{\text{cheese}}(\text{you go to S})$

4.2.1.3 Ingredient 3: cost minimization condition

Lastly, Condoravdi and Francez implement ‘a preference for cost minimization’ to the ordering source, where ‘cost’ is interpreted as ‘effort’ or ‘easiness’. For instance, if a world w_1 where you achieve the goal and incur at most the degree of cost d_1 is better than a world w_2 where d_2 amount of cost is incurred, then $d_1 < d_2$. Since the ordering source encodes the preference to minimize cost in achieving the goal, in the context of getting good cheese, this implementation yields a set of best worlds where you get good cheese and incur no more than the cost for going to the NE. That is, the domain of quantification is restricted to worlds in which you get good cheese with the least amount of effort, and all of those worlds are ones where you go to the NE and incur cost d_{NE} , the cost associated with going to the NE. Putting (6-b) and (6-c) together, we can that the prejacent inference that in all the best worlds where you get good cheese with, you go to the NE.

- (6) a. To get good cheese, you only have to go to the NE.

- b. Presupposition: $\lambda w. \exists p' \in \text{Alt} (\Box^{\text{cheese}f,g+} (\text{you go to the NE}) [p'(w) \wedge \Box^{\text{cheese}f,g+} (\text{you go to the NE}) \leq p']$
- c. Assertion: $\lambda w. \forall p' \in \text{Alt} (\Box^{\text{cheese}f,g+} (\text{you go to the NE})) [p'(w) \rightarrow p' \leq \Box^{\text{cheese}f,g+} (\text{you go to the NE})]$

4.2.2 Potential issues for Condoravdi and Francez (2022)

First, on Condoravdi and Francez (2022)'s analysis, weakening seems to be a result of restricting the domain of quantification of the modal. If it's correct, then we could, in principle, restrict the quantificational domain of the modal in (7-b) and thus, derive a weakened modal inference when it's absent. Why can we have domain restriction in (7-a) but not (7-b)? If weakening is about restricting the modal, it seem hard to explain why *only* is required to enable restriction.

- (7) a. To get good cheese, we only have to go to the NE.
- b. To get good cheese, we have to go to the NE.

Most importantly, Condoravdi and Francez (2022) faces another potential problem. As briefly discussed in Chapter 3, there is nothing in their framework that prevents one from inducing an ordering on the ordering source of an epistemic or deontic modal. So, in principle, one might expect weakening to arise with epistemic and deontic modals where no weakening is observed.

How might one capture the flavor constraint on a domain restriction analysis to sufficiency constructions like Condoravdi and Francez (2022)? First, one might try to link the flavor constraint to the purpose clause. Suppose that purpose clauses were an obligatory feature of sufficiency constructions. Then, one could require that the purpose clause only be licit with a teleological modal. Indeed, purpose clauses have been used to describe goals and thus, convey a teleological flavor (Nissenbaum, 2005; von Stechow et al., 2006). Stipulating that purpose clauses can only occur with teleological modality, thus, rules out the possibilities that the necessity modal in sufficiency constructions expresses epistemic or deontic flavors. While it may capture the flavor constraint in the most canonical cases of sufficiency constructions with purpose clauses, its application is not straightforward when it comes to cases with-

out a purpose clause — as discussed in Chapter 2, weakened modal inferences can be observed in anankastic sufficiency constructions and casual conjunctions as well. It would also call for further explanation as why a purpose clause is needed for sufficiency constructions.

In what follows, I suggest a semantic route to derive weakening and capture the flavor constraint in sufficiency constructions. Just like Condoravdi and Francez (2022), this route derives weakening via domain restriction; unlike Condoravdi and Francez (2022), it suggests that there is a *grammatical* difference between teleological modality and other modalities.

4.2.3 A secondary ordering source

Here I suggest a semantic account to derive weakening and the flavor constraint in sufficiency constructions by arguing for two ordering sources for the teleological necessity modal, *have to*. I do so by first adopting the analysis on secondary ordering source for strong necessity modals offered by von Fintel and Iatridou (2008), which I will discuss below. The core idea of the suggestion is that priorities come in tiers and are often interconnected — it's natural to have a goal one must achieve and other subsidiary goals that one would like to take into consideration. As we will see, a secondary ordering source for teleological modality captures this intuition.

4.2.3.1 The motivation

von Fintel and Iatridou (2008) observes that there is a difference in modal strength between the modal *ought* and *have to/must*:

- (8) Customers ought to wear masks indoors; employees have to.

This contrast in strength can be further brought out with a contradiction test. While it is completely felicitous to follow an *ought*-claim with *but you don't have to*, as in (9-a), it is contradictory to do so when the former modal claim expresses the same degree of force, as in (9-b):

- (9) a. You ought to wear a mask indoors, but you don't have to.

- b. ? You have to/must wear a mask indoors, but you don't have to.

More evidence showing that *ought* is weaker than *must* can also be found via a strengthening test. Specifically it's natural to strengthen a weaker claim to a stronger claim, as in (10-a), but the reverse order appears to be infelicitous, as in (10-b):

- (10) a. You ought to wear a mask indoors; in fact, you have to.
- b. ? You have to wear a mask indoors; in fact, you ought to.

To account for the contrast in strength between *ought* and *have to*, they argue that weak necessity modals like *ought* involves a secondary ordering source that further restricts the domain of quantification. Specifically, they take *must p/have to p* to pick out a set of best worlds in which the primary goal *p* is achieved, whereas *ought p* states that all those worlds where the primary goal is achieved and “which are optimal by an additional measure are worlds where the prejacent is true”. This idea was originally discussed in Sloman (1970), who distinguishes *must* and *ought to* by specifying that *must* picks out the *only* candidate while *ought* picks out the *best* candidate in achieving a goal. For instance, (11-a) conveys that going to the NE is the only way to get good cheese, whereas in (11-b), NE is one of the places to get good cheese, but it's the best place to go (suppose the NE is the closest to us), compared to other alternatives.

- (11) a. To get good cheese, you have to go to the NE
- b. To get good cheese, you ought to go to the NE. (von Fintel and Iatridou: 119).

The use of “an additional measure” essentially equates to the use of a secondary ordering source in which considerations other than the primary goal are taken into account. So, contrary to, for example, Horn (1972)'s analysis on which *ought-p* is true if and only if *p* is true in *most* of the best worlds, von Fintel and Iatridou argue that *ought-p* is true iff among the best worlds, all the very best worlds are where *p* is true. For instance, (12-a), on their account, would have a truth conditions in (12-b):

- (12) a. You ought to wash your hands.
- b. Among all the best worlds, all the very best ones are worlds where you wash your hands.

Essentially, the secondary ordering source distinguishes the best worlds from the very best worlds by restricting the domain of quantification in which the primary goal is achieved to a smaller domain to a set of very best worlds ranked by the secondary ordering source. In a goal-oriented context, von Fintel and Iatridou take the purpose clause to contribute to the primary goal in the first ordering source; the secondary ordering source consists of considerations related to how the primary goal is achieved (e.g. to get good cheese most easily, with the least amount of money, etc.). For instance, suppose there are many places to go for good cheese, but the NE has the cheapest good cheese comparatively. The speaker not only wants to get good cheese, she doesn't want to break the bank. In the case of (13-b), the purpose clause yields the primary goal, 'getting good cheese', which trumps all other goals in the secondary ordering source. The secondary ordering source includes the proposition "spend the least amount of money".

- (13) a. To get good cheese, you ought to go to the NE
b. In all worlds w' compatible with relevant facts in w that best fit your goals in w and where you spend the least amount of money, you go to the NE in w' .

4.2.3.2 Sequence of ordering sources

von Fintel and Iatridou observe that in languages like Greek, by combining a strong necessity modal with counterfactual morphology, one ends up getting a weakened meaning as expressed in an *ought*-claim. To incorporate this empirical insight, they propose an account that can compositionally derive a weaker meaning from a strong necessity modal with counterfactual morphological markings. Specifically, they argue that modals involve a bipartitioned sequence of ordering sources provided by context, as shown in (14). $max_{g(w)}$ specifies the function that delivers the best worlds based on the ordering source. $\langle g_1, \dots, g_i \rangle$ represents the primary ordering source which is accessible to strong necessity modals, and $\langle g_{i+1}, \dots, g_k \rangle$ represents the second ordering source that is accessible to weak necessity modals.

- (14) The context provides for each modal, a modal base f and a bipartitioned sequence of ordering

sources $\langle\langle g_1, \dots, g_i \rangle, \langle g_{i+1}, \dots, g_k \rangle\rangle$.

- a. Strong necessity modals say that the prejacent is true in all worlds in:

$$\max_{g_i(w)}(\dots(\max_{g_1(w)}(f(w))))).$$

- b. Weak necessity modals say the prejacent is true in all worlds in:

$$\max_{g_k(w)}(\dots(\max_{g_{i+1}(w)}(\max_{g_i(w)}(\dots(\max_{g_1(w)}(f(w)))))))$$

(von Fintel and Iatridou 2008: fn. 35)

Strong necessity modal states that the prejacent is true in all worlds determined by the modal base and the ordering source $\langle g_1, \dots, g_i \rangle$. The domain of quantification of a weak necessity modal, on the other hand, is further restricted – among the best worlds delivered by the modal base and the primary ordering source, the prejacent is true in all of the very best worlds that best fits the secondary ordering source. Essentially, the domain of quantification for a weak necessity claim and a strong necessity claim stand in a subset relation, where the former is a subset of the latter.

The strong necessity modal appears to be interpreted as a weak necessity modal when the “ordering source promotion” happens. This promotion procedure allows a proposition from the secondary ordering source to be “promoted” to the primary ordering source and thus, becomes accessible for the interpretation of the strong necessity modal. Crucially, a proposition in the secondary ordering source is promoted “without making it count at the same level as the primary ordering source” (von Fintel and Iatridou 2008:138). They do so by “making strong necessity modals sensitive to ordering sources in a designated initial segment of that consequence, and treat promotion as moving an ordering source into that initial segment” (von Fintel and Iatridou 2008:138). When a proposition from the latter gets promoted to the former, the bipartitioned ordering source is reformulated to $\langle\langle g_1, \dots, g_i, g_{i+1} \rangle, \langle g_{i+2}, \dots, g_k \rangle\rangle$. That is, the set of best worlds is determined not only by the primary ordering source $\langle g_1, \dots, g_i \rangle$, but also the promoted proposition, g_{i+1} from the secondary ordering source. As a result, a strong necessity claim seems to be interpreted as a weak necessity claim – the prejacent is true in the very best worlds delivered by the primary ordering source plus an additional goal from the secondary ordering source.

4.3 The suggestion

In this section, I will show how analyses that derive weakening via domain restriction can account for both weakening and the flavor constraint. Following von Fintel and Iatridou (2008), I adopt the view that strong necessity modals can be interpreted like weak necessity modals via a bipartitioned sequence of ordering sources. However, contrary to von Fintel and Iatridou, I consider the possibility only strong teleological modals can have weak necessity interpretations. Then, I illustrate how my suggestion can derive the weakened readings and the flavor constraint in sufficiency constructions.

4.3.1 Two ordering sources for goals

I suggest that *only* teleological modality have secondary ordering sources because teleological modals have designated goals; epistemic and deontic modality don't have secondary sources because there are no "designated laws" or "designated information". The idea behind this suggestion is that in a goal-oriented context, it's intuitive to have a goal that you absolutely have to achieve and some other goals and considerations that you would like to take into consideration. This intuition can be grammaticized so that only teleological modals have a secondary ordering source that's used to rank the worlds where the designated goal is achieved in different ways.

The overarching insight here is supported by the observation that purpose clauses can only express goals (Nissenbaum, 2005; von Fintel and Iatridou, 2007, 2008) and can't seem to express laws and information. For instance, suppose the city council mandates that street cleaning starts at 7am on every Monday. In this case, even though the purpose clause roughly expresses the content of the regulation made by the city council, 'move your car every Monday before 7am for street cleaning', it seems that the weak necessity modal *should* here still receives a teleological interpretation – given your goal to obey the street cleaning regulation, you should set an alarm at 6:50am.

- (15) To move your car every Monday before 7am for street cleaning, you should set an alarm for 6:50am.

Similarly, when used to take a piece of information, purpose clause still can't seem to signal that the modal is epistemic. Suppose Sue calls to report that she witnessed someone committing murder, and the agent utters (16). Technically, the information that Sue witnessed someone committing murder is under the purpose clause; however, it doesn't seem to suggest that the necessity modal has an epistemic interpretation at all. Instead, the most natural interpretation of the modal still seems to be teleological — given your goal to report that you saw someone committing murder, you have to come in to the station in person.

- (16) To report that you saw someone committing murder, you have to come to the police station in person.

I take (15) and (16) to suggest that only teleological modality have designated goals and a secondary ordering source. Epistemic and deontic modals don't have a secondary ordering source because the propositions in the ordering sources of these modalities are on a par — there are no “designated laws” for deontic modals or “designated information” for epistemic modals that takes precedence over other laws and information.

These empirical observations seem to align with the general intuition as well. In a goal-oriented context, it's intuitive to have a goal that you absolutely have to achieve and some other goals and considerations that you would like to take into consideration. Very often, these subsidiary goals have an effect in terms of how you go about in achieving your main goal — you might want to do it in the least costly way, or the most comfortable way, or the safest way, etc. Assuming a secondary ordering source for teleological modality thus captures and accommodates this intuition that priorities come in tiers and that they are often interconnected. However, it's unclear what the motivations for having secondary ordering sources for deontic and epistemic modals would be. Specifically, there are often many ways to specify how a goal can be achieved, but laws, for example, state the absolute.

Nevertheless, it's not completely inconceivable that sometimes there could be multiple ways to abide by a law. For instance, suppose the laws about filing taxes require one to submit either a W2 or a W9; submitting a W2 is easier. In this case, there are multiple ways to comply with the laws, does that

mean deontic modals can have two ordering sources and thus, deontic necessity modals can receive weak necessity readings? I will argue that while these may seem to involve deontic modals, they are teleological modals in disguise; for instance, (17) could naturally be interpreted as ‘to fulfill the goal of filing for taxes, you only have to submit a W2’. I will come back and discuss more of these cases in §4.6.1.

(17) To file for taxes, you only have to submit a W2.

4.3.2 Deriving the prejacent inference

Now that we have all the pieces together, I will show how the flavor constraint can be accounted for by assuming a secondary ordering source for teleological *have to*.

I take the purpose clause to contribute to the primary goal in the primary ordering source¹. Specifically, the modal base and the primary ordering source together deliver a set of best worlds where the primary goal is true. The secondary ordering source then further restricts the set of p-worlds, yielding a set of very best worlds that satisfy not only p, but some other goals from the secondary ordering source.

To derive the reading that the complement of the necessity modal *have to* is desirable by certain measure in the context (e.g. the measure is ‘easiness’ in the case of getting good cheese), I assume that the teleological necessity modal has a secondary ordering source, which contains considerations other than the primary goal. Specifically, the ordering source can contain goals like ‘to save time’, ‘to get good cheese sourced in France’, etc. To illustrate, consider the cheese example again. Suppose there are three places to get good cheese: New York, Switzerland, and the North End, and that given our location (Boston), the NE is the easiest destination. Here the purpose clause dictates what the primary ordering source is – ‘to get good cheese’, and the secondary ordering source contains one additional goal, which is ‘to get good cheese most easily’. Assuming von Stechow and Iatridou’s analysis on which

¹Both my suggestion and Condoravdi and Francez (2022) derive sufficiency as weak necessity claims via domain restriction. Here the purpose clause contributes the designated goal in the primary ordering source, while they take the purpose clause to modify the ordering source. Both, in effect, achieve the same result — to ensure that the domain of quantification for the necessity modal is such that the goal expressed in the purpose clause is achieved.

strong necessity modals can receive weak necessity interpretation, the modal receives bipartitioned ordering sources formulated as the following: $\langle \langle \text{to get good cheese} \rangle, \langle \text{to get good cheese most easily} \rangle \rangle$. Then, the goal of ‘To get good cheese most easily’ would be promoted to the primary ordering source, resulting in an ordering source that looks like the following $\langle \langle \text{to get good cheese, to get good cheese most easily} \rangle, \langle \rangle \rangle$.

(18) To get good cheese, you only have to go to the NE.

The modal base and the primary goal together deliver a set of best worlds where you get good cheese; the secondary ordering source further restricts that set of worlds in which the primary goal is achieved, yielding a set of very best worlds that best fit your primary and secondary goals. Given that the domain of quantification is restricted to a set of worlds that best fit your goals and where you get good cheese most easily, and that you get good cheese most easily in the NE, it is true that in all those worlds, you go to the NE. As a result, the prejacent inference is derived.

(19) a. To get good cheese, you only have to go to the NE.
b. In all w' compatible with the relevant facts in w that best fit your goals in w and where you get good cheese most easily, you go to the NE in w' .

My suggestion in using a secondary ordering source to restrict the quantificational domain circumvents the potential over-generation problem encountered by Condoravdi and Francez (2022). Specifically, on my suggestion, only teleological modals can have secondary ordering sources as only teleological modals can have designated goals, which can be expressed via, for example, purpose clauses or antecedents of anankastic conditionals. Given the lack of secondary ordering sources in epistemic and deontic modals, one cannot further restrict the domain of quantification of an epistemic or a deontic modal. As a result, we would not expect to see a weak necessity interpretation of a strong necessity modal in sufficiency constructions with epistemic or deontic modals. Hence, assuming that only teleological modality has secondary ordering sources can, albeit by stipulation, derive weakening and capture the flavor constraint in sufficiency constructions.

4.4 Potential complications of the semantic route

In this section, I will discuss the challenges to the semantic route for deriving the flavor constraint.

The first potential problem is that since strong necessity modals can be interpreted as weak necessity modals through weakening the modal domain via a secondary ordering source, I predict that there is no difference between a necessity claim in (20-a) and a weak necessity claim in (20-b) when intuitively, there is. To keep the analysis that strong necessity modals have two ordering sources and to distinguish (20-a) from (20-b), one could argue that weakening of weak necessity modals does not come from a secondary ordering source, but something else (For instance, see Agha and Jeretič (2022), which takes weak necessity modals to denote definite pluralities of worlds.) Since two different mechanisms are employed in achieving weakening in both strong and weak necessity claims, we could draw a meaningful distinction between the two.

- (20) a. To get good cheese, you have to go to the NE.
 b. To get good cheese, you ought to/should go to the NE.

Secondly, there is a potential problem that concerns the idea of ordering source promotion. In the relevant discussion by von Fintel and Iatridou, it was never explicitly spelled out when we can promote a proposition from the secondary ordering source to the primary ordering source and thus, obtain a weak necessity reading of, for example, the strong necessity modal *have to* in (21). In other words, without any regulations, it seems that a proposition gets promoted on an ad hoc basis.

- (21) To get good cheese, you have to go to the NE.

This poses an issue for my idea in using a secondary ordering source to derive weakening. Specifically, without any constraints, we might be able to obtain a weakened modal inference in scenarios where no weakening can be found. For instance, the intuitive reading of the example below is one where *only* presupposes its prejacent; that is, you have to write a qualifying paper. There is no weakened reading of this necessity inference in this case. Following von Fintel and Iatridou (2008) in assuming

that the purpose clause contributes a designated goal in the primary ordering source, as it stands, there is nothing in the ordering source promotion system that prevents one from promoting a proposition from the secondary ordering source to the first and thus, over-generating weakened inferences that are absent.

- (22) a. To advance to PhD candidacy, you only have to write a qualifying paper.
b. $\Rightarrow$ To advance to PhD candidacy, you have to write a qualifying paper.

Perhaps one could argue that ordering source promotion is unavailable here because cases like (22-a) are intrinsically different from sufficiency modal constructions where we can obtain a weakened modal inference. Specifically, here we know that there are not usually multiple ways to advance to candidacy, so a weakened modal inference is pragmatically not warranted.

Relatedly, another significant challenge is the distribution of weakening; that is, why can we obtain weakening via domain restriction in the case of (23-a) but not (23-b)? The only difference between the two is the presence of *only*. So, why we can't observe weakening without *only*? In other words, why is *only* needed for weakening?

- (23) a. To get good cheese, you only have to go to the NE.
b. To get good cheese, you have to go to the NE.

There are also some worries in terms of von Stechow and Iatridou (2008) and of whether weak necessity reading are only available with teleological modals. I will discuss those potential issues in the appendix.

4.4.1 Interim summary

In this section, I have suggested a semantic route to deriving the flavor constraint in sufficiency constructions. I explored a view where there is a fundamental grammatical difference that sets teleological modals apart from epistemic and deontic modals. While the latter involve a modal base and a single ordering source, teleological modals involve a modal base and two ordering sources – one with

a primary goal contributed by the purpose clause, and another consisted of subsidiary considerations that help pick out the best way to achieve the primary goal. This route derives the prejacent inference via domain restriction, akin to the mechanism used in Condoravdi and Francez’s framework.

This semantic route to deriving the flavor constraint, nevertheless, faces some serious challenges, as delineated in the last section. As a result, I don’t think it is easily viable without significant modifications. In the rest of this chapter, I will pursue a pragmatic route instead. Specifically, I will spell out a pragmatic route that derives the flavor constraint in sufficiency constructions by appealing to mention-some questions, which allow speakers to felicitously give one true answer to settle the question. I take the felicity of teleological constructions and mention-some environments from the fact that goals can be satisfied in many ways, but do not need to be satisfied exhaustively. Hence, I argue that teleological modality is pragmatically, but not grammatically special.

4.5 A pragmatic route to deriving the flavor constraint

In this section, I offer a pragmatic account that explains the flavor puzzle in sufficiency constructions by relating sufficiency statements to the questions they address. Specifically, I suggest that an occurrence of a sufficiency statement requires the presence of a mention-some question, which allows speakers to give one true answer to settle the question, as opposed to all true answers. For instance, suppose there are two places to get good cheese: Whole Foods and Trader Joe’s. The speaker asks the question in (24-a) and I provide the answer in (24-b). Here, saying “Whole Foods” doesn’t mean that it is the only place where one can get good cheese; instead, it’s compatible with there being other places where one can get good cheese, and I’m simply giving one of those places.

- (24) a. Where can I get good cheese?
 b. Whole Foods.

When it’s felicitous to settle the question by giving one true answer, the question then receives a mention-some interpretation. The availability of a mention-some reading, as we will see, is surprisingly subject to the same flavor constraint as we have seen in sufficiency constructions; that is, a ques-

tion can only receive a mention-some answer if it contains a possibility modal of teleological flavor. I will exploit this flavor parallel between mention-some interpretations and sufficiency constructions by proposing that a sufficiency statement must answer a mention-some question. For example, a sufficiency statement as in (25-b) cannot occur without a mention-some question as in (25-a), which in itself contains a modal expressing a teleological flavor.

- (25) a. Where can I get good cheese?
 b. To get good cheese, you only have to go to Whole Foods.

By establishing the parallel that mention-some interpretations and sufficiency constructions are subject to the same flavor constraint and that sufficiency statements are answers to mention-some questions, I ultimately reduce the flavor constraint in sufficiency constructions to that in mention-some questions in the sense that the former inherits the flavor constraint from the latter.

The remainder of the chapter proceeds as follow: in §5.1 I give a brief introduction to the mention-some, mention-all distinction. In §5.2 and §5.3, I describe the environment in which mention-some interpretations are available and when they are not. In particular, I focus on the canonical cases in which a mention-some interpretation is available, namely, when the questions involve a teleological possibility modal. I take the presence of a teleological possibility modal to be a necessary requirement for the availability of mention-some, emphasizing the fact that the modal must express teleological flavor (George, 2011; Fox, 2013; Xiang, 2023). In the course of doing so, I highlight a novel parallel in §5.5: the availability of mention-some interpretation is surprisingly subject to the same flavor constraint found in sufficiency constructions, as we have seen earlier in Chapter 2. Building upon this parallel, in §5.6 I first argue sufficiency statements can felicitously address mention-some questions. Then, given an explicit theory of mention-some and mention-all questions, I will show that a sufficiency statement is only guaranteed to resolve a mention-some question. Lastly, I will present some potential problems to the pragmatic approach offered in this chapter.

4.5.1 The Mention-some, Mention-all Ambiguity

Mention-some answers are answers to questions that allow speakers to felicitously give only one true answer that settles the question. Suppose I'm embarking on a cross country road trip and I, someone who has no particular preference for coffee, simply want to be caffeinated before the drive. In this scenario it seems that naming one coffee shop adequately addresses the question in (26-a). That is, the question can be felicitously resolved with a *non-exhaustive* answer. Here the question receives a mention-some interpretation that amounts to (26-b).

(26) **Mention-some**

- a. Where can I get coffee?
- b. 'Tell me *some* place to get coffee'.

The same question can also receive a mention-all interpretation, where the resolution of the question calls for listing all true answers to the question, as opposed to some answers. That is, the question must be resolved *exhaustively*. Suppose I'm a coffee fanatic working on a blog in which I rank the coffee spots in a foreign neighborhood. In this case, merely providing one place to get coffee doesn't seem to address the question fully; instead, to know where I can get coffee, for the purpose of my goal, is to know *every* coffee spots. In this scenario we say the question receives a mention-all interpretation where (26-a) can be construed as (27-b).

(27) **Mention-all**

- a. Where can I get coffee?
- b. 'Tell me *every* place to get coffee'

So, when do questions admit a mention-some reading and when do they require a mention-all reading? Some rely on certain linguistic features to license or block these readings – to obtain a mention-some reading, the question has to involve a possibility modal (George, 2011; Fox, 2013) and moreover, the modal must express a teleological flavor (Xiang, 2023). Other argue that the presence of a possibility modal in the question is not necessary – people seem to get a mention-some reading with only a

conversational goal in the discourse (Dayal, 1996; van Rooy, 2004). The goal for this section isn't to provide a new account for distinguishing the mention-some, mention-all interpretations, but to use the phenomena of mention-some readings as a medium to explain the flavor constraint in sufficiency constructions. In what follows, I will first survey these canonical cases in which non-exhaustivity arises.

4.5.2 The presence of a possibility modal

The canonical cases in which a mention-some interpretation arises are ones where the question involves a possibility modal (Xiang, 2023; Fox, 2013; George, 2011). Consider the following example. The speaker can perfectly address the question by giving a non-exhaustive answer, as in (28-b). Uttering (28-b) with a falling intonation, which signals complete answer (indicated by the \) here doesn't amount to saying Trader Joe's is the only place where one can get good cheese in this context. That is, an answer like (28-b) suffices to resolve the question and is compatible with there being other places where one can get good cheese.

- (28) Context: suppose there are only two places where one can get good cheese in this neighborhood: Trader Joe's and Whole Foods. The goal is to get good cheese.
- a. Where **can** I get good cheese?
 - b. Trader Joe's. \
 - c. $\rightarrow$ You can only get good cheese at Trader Joe's.

The availability of non-exhaustive answer is also observed in other question types with a possibility modal. For instance, to address a *who*-questions with a possibility modal as in (29-a), listing one person who is driving to the party is sufficient to fulfill the goal of getting a ride. The utterance of (29-b) is still compatible with there being other people who are driving to the party and can give me a ride.

- (29) Context: Suppose I need a ride to the department party. Lisa, Matt, and Brennen are driving to the party and willing to give rides to those in need.

- a. Who **can** drive me to the party?
- b. Lisa. \
- c. $\rightarrow$ Only Lisa can drive me to the party.

One can also felicitously address a *how*-question containing a possibility modal by giving a mention-some answer, as in (30-b). Again, uttering (30-b) with a falling intonation doesn't mean taking route A is the only way to get to the department. Instead, it simply lists *one* way to fulfill the goal expressed in the question and it is compatible with there being other means to achieve that goal.

- (30) Context: There are two equally easy routes to get to the department: route A and route B.
- a. How **can** I get to the department?
 - b. You can take route A. \
 - c. $\rightarrow$ You can only take route A to get to the department.

Notice that the presence of a possibility modal doesn't necessarily force a mention-some interpretation (Groenendijk and Stokhof, 1984). One way to make the intuition clear is to put in *all*, which then disambiguates in favor of a mention-all interpretation. Consider (31-a) where the *wh*-phrase contains *all*. Despite the presence of a possibility modal, here it seems like the only acceptable answer is one where the speaker provides every good cheese place.

- (31)
- a. Where **all** can I get good cheese?
 - b. Trader Joe's and Whole Foods.

As we have seen, it seems that various types of questions can uniformly give rise to mention-some interpretation when they contain a possibility modal. While the presence of a possibility modal can allow for mention-some reading, not just any possibility modal can – it seems that the modal must be teleological.

4.5.2.1 The flavor of the possibility modal

While questions containing a possibility modal commonly admit mention-some interpretations, not all questions with a possibility modal do. Specifically, questions with epistemic, deontic or ability possibility modals do not give rise to mention-some interpretation, at least not straightforwardly and consistently — it is only available when the modal flavor is teleological (Xiang, 2023).

To see that mention-some reading is only available with goal-oriented modality, consider a question with an epistemic modal, as in (32-a). When the modal in the question is epistemic, a mention-some answer with falling intonation like (32-b) seems infelicitous, as it suggests that Amy is the only person who knows John’s secret, contrary to fact. Instead, it requires a mention-all answer as in (32-c) that lists out both Amy and Carl.

- (32) Context: As far as I know, John shared a secret with Amy and Carl.
- a. Who might know John’s secret?
 - b. ? Amy. \
 - c. Amy or Carl. \

Contrasting (32-a) with (33-a), which contains a teleological possibility modal, a mention-some interpretation is made significantly more available in the case of (33-a). Here, uttering (33-b) with a falling prosody doesn’t indicate that Amy is the only person who we can ask to find out about John’s secret – it’s compatible with there being other people who we can ask.

- (33) Context: John shared a secret about himself with Amy and Carl.
- a. Who can we ask to find out about John’s secret?
 - b. Amy. \

The unavailability of a mention-some interpretation can also be observed when an epistemic auxiliary modal *might* is replaced with an epistemic attitude verb, like *believe*. Uttering in a falling intonation here seems to convey the meaning that Ty thinks Carl was the only person Al invited. In other words, in this context with an epistemic attitude verb *believe*, (34-b) can only be read exhaustively.

- (34) Context: Suppose Al hosted a party while his husband Ty is away. Al invited Amy, Carl, and Sue. When his husband returned, Al asked the question in (34-a).
- a. Who do you believe I invited to the party?
 - b. Carl. \

The same inferential pattern seems to hold in embedded contexts as well. It seems that a mention-all reading persists when the question is embedded under a matrix verb, like *know*. That is, (35-a) seems to convey the meaning that I know every person who you believe I invited to the party.

- (35) a. I know who you believe I invited to the party.
- b. $\leadsto$ For every x such that x is a person who you believe I invited to the party, I know x .

A mention-some interpretation is also not readily available when the modal is deontic. Consider another example from Xiang (2023). The modal in the question could potentially be interpreted in two ways.

- (36) Context: Alice needs someone to sign a document for her. According to the regulations, this document can be signed by either her mentor, the program director, or the department chair. One signature is sufficient. Bob knows the regulations well.
- a. Alice: Who can I ask to sign this document?
 - b. Your mentor. \ (Teleological: mention-some)
 - c. ‘Your mentor, the program director, or the department chair. \’ (Deontic: mention-all)

If the goal is to help Alice get this document signed as soon as possible, it seems like the modal has a teleological flavor and providing one answer suffices to settle the question. However, if the speaker is seeking information regarding department regulations, the hearer should provide an exhaustive answer relevant to the question. In other words, on the second interpretation where the modal has a deontic flavor, a mention-some answer is not enough to keep the inquirer maximally informed.

To further bring out the intuition that deontic flavor does not license mention-some reading, consider the following example with the attitude verb *allowed*. Uttering (37-b) in a falling intonation

here suggests a passport is the only permissible ID for buying liquor; that is, (37-b) only has a mention-all interpretation and cannot be interpreted non-exhaustively. The same inferential pattern is observed in embedded contexts.

- (37) Context: Suppose the current conversational goal is to buy liquor. You are at a liquor store standing in front of the cashier holding up two IDs, your passport and your driver's license. You ask the cashier:.
- a. What am I allowed to use for an ID?
 - b. Your passport. \

When embedded under the the matrix verbs, such as *know* and *be certain of*, a mention-all interpretation is present; that is, I know/am certain of, exhaustively, the IDs that allow you to buy liquor.

- (38) a. I know what kind of ID you are allowed to use to buy liquors.
 b. $\rightsquigarrow$ For every x such that x is an ID which allows you to buy liquor, I know x .
- (39) a. I'm certain of what kind of ID you are allowed to use to buy liquor.
 b. $\rightsquigarrow$ For every x such that x is an ID which allows you to buy liquor, I'm certain of x .

Contrasting (37-a) with (40-a) where there is a teleological possibility modal in the question, the acceptability of mention-some interpretation in the presence of a modal becomes immediately available. Here (40-b) can be interpreted non-exhaustively; that is, uttering (40-b) in a falling intonation doesn't seem to convey the meaning "Your passport is the only form of ID you can use to buy liquor". Instead, it's compatible with there being other other IDs for liquor-buying and the speaker is simply listing one of the ways.

- (40) a. What ID can I use to buy liquor?
 b. Your passport. \

In a context where the question contains an ability modal, a mention-some interpretation is evidently absent, just like epistemic and deontic modals. Here, the modal *can* has an ability interpretation and to

address the (41-a) it seems to require a list of all candidates that has the ability to lift 200kg. However, uttering (41-b) with a falling intonation suggests Sam is the only weightlifter on the team who has the ability to lift 200kg. Hence, on an ability construal of the possibility modal *can*, we seem to most naturally obtain a mention-all interpretation, as opposed to mention-some.

- (41) Context: The national weightlifting team in the USA is nominating weightlifters from the team to compete in the Olympics. The minimal requirement for nomination is being able to lift 200kg.
- a. Who can lift 200kg?
 - b. Sam can.\
 - c. $\leadsto$ Among the weightlifters on the team, only Sam can lift 200kg.

Notice that not all teleological modals can give rise to a mention-some reading. The weak necessity modal *should* in (42-a) is goal-oriented; nevertheless, (42-b) seems to lack the reading that one *can* invite Al to the party. Instead, it seems to convey a speaker preference for inviting only Al to the party.

- (42) a. Who should I invite to the party?
- b. Al.\

Hence, it seems like not all modals expressing a teleological flavor can readily give rise to sufficiency readings — only goal-oriented questions with possibility modals can.

Moyer and Syrett (2019)’s experimental work shows that mention-some interpretations are available when the questions involve non-finite clauses, which have been argued to encode modality. Specifically, following Bhatt (1999) in assuming that infinitival clauses encode modality and contribute goal-oriented-ness, they show that in the absence of overt possibility modals, mention-some interpretation can be observed when the question takes non-finite clauses in embedded contexts, as in (43-a). Compared to questions with finite clauses as in (43-b), the presence of a non-finite clause significantly encourages mention-some acceptability.

- (43) a. Sam knows how to get to the philosophy department.

- b. Sam knows who came to the party.

Nevertheless, while a strong correlation is observed between non-finiteness and non-exhaustivity, questions embedding finite clauses, where no modality of any kind or form is observed, don't render absolute unacceptability of a mention-some interpretation either — mention-some answers are simply “dispreferred” compared to mention-all answers in the cases of questions embedding finite clauses. While the experimental results don't completely rule out the acceptability of mention-some interpretation in modal-less contexts, they still show there is a significant facilitation effect for mention-some interpretation in non-finite condition, which suggests that a modal may still be needed to get a mention-some reading. Thus, an undeniable fact we learned from the experiment and, in general, from the literature is that in questions with a covert modal like (43-a), the modal significantly boosts the acceptability of a non-exhaustive answer compared to a non-modalized question, as in (43-b).

In this section, I have discussed the canonical cases in which mention-some reading arises. We have seen that the prototypical cases have two characteristics; namely:

1. The question involves a possibility modal.
2. The possibility modal expresses a teleological flavor.

Whenever we have a teleological possibility modal in the question, it seems that the question allows for a mention-some interpretation on which the speaker provides one possible answer to settle the question. Given the empirical and experimental data discussed in this chapter, I take it that mention-some readings is needed the presence of a teleological possibility modal, following the grammatical accounts of mention-some:

- (44) **Licensing hypothesis for mention-some:** mention-some reading is only available in the presence of a teleological possibility modal.

Now that the empirical ground work has been presented, let's pivot back to the goal of this section – considering how a structural account might account for the flavor restriction in sufficiency statements. In §4.7, I will discuss potential challenges for the conditions in 1 and 2.

4.5.3 Two kinds of weaknesses

With the licensing hypothesis for mention-some in place, now we can see how sufficiency statements relate to mention-some questions and more importantly, how the flavor restriction in the former can be explained via that in the latter. I will attempt to address these these issues by first drawing a link between sufficiency statement and mention-some questions.

At this point, I have assumed that a mention-some reading requires a possibility modal with teleological force:

- **Condition 1:** the presence of a possibility modal.
- **Condition 2:** such possibility modal expresses teleological flavor.

If Condition 1 and Condition 2 do, in fact, hold, this flavor restriction is surprisingly found in both the availability of mention-some interpretation and in sufficiency constructions. How are these two seemingly unrelated phenomena subjected to the same availability condition? Setting aside this question for a little bit, it seems that the flavor restriction is not the only shared commonality – both phenomena seem to involve a weakening effect. On one hand, the weakness in mention-some reading is reflected as a degree of information the question is soliciting – the question is asking for *some* relevant answers as opposed to *all* relevant answers, whereas in sufficiency constructions, the weakness is a weakening of the modal force. Broadly construed, mention-some is a weakening of an answerhood condition on how much information it takes to resolve a question, and sufficiency reading is a weakening of the modal force in declarative sentences.

(45) **Mention-some questions**

- a. Where can I get good cheese?
- b. Tell me *some* places to get good cheese. (mention-some)
- c. Tell me *all* places to get good cheese. (mention-all)

(46) **Sufficiency constructions**

- a. To get good cheese, you only have to go to TJ's.
- b. $\nRightarrow$ To get good cheese, you *have to* go to TJ's.
- c. $\Rightarrow$ To get good cheese, you *can* go to the TJ's.

Given the licensing conditions for mention-some interpretations I have presented, both mention-some and sufficiency interpretations share the following commonalities:

1. Both constructions involve an overt modal.
2. Both modals express teleological flavor.

Teleological modality, for some reason, seems to favor weakening, as mention-some interpretations and sufficiency readings are not observed with any other modal flavor, except for teleological. Could the weakening seen with different clause types actually be non-accidental? Since both mention-some questions and sufficiency statements are subject to the same flavor constraint, involving weakening of interrogatives and declarative sentences, I argue that sufficiency statements must answer mention-some questions, by the maxim of *relevance* that utterances must be used relevantly (Grice, 1975). If the generalizations in Condition 1 and Condition 2 hold, the flavor constraint in sufficiency constructions can be reduced to that in mention some:

1. Both constructions require the presence of a teleological possibility modal.
2. The occurrence of a sufficiency statement requires the presence of a mention-some question

Furthermore, I argue that the flavor constraint seen in both constructions is, in fact, non-accidental; it stems from the same source — it is natural to construe different ways to achieve a goal, while it's much less natural, to construe conceptual analogies to sufficiency in the domains of rules or knowledge.

4.5.4 A pragmatic constraint

In this section I first argue that occurrences of sufficiency constructions require the presence of mention-some questions in the discourse. Then, via a grammatical account to mention-some like

Fox (2013), I illustrate that sufficiency statements can only resolve mention-some questions and not mention-all questions. Note that there are other grammatical theories to mention-some on the market, and I'm using Fox's system purely for simplicity and concreteness with no commitment to his or any other grammatical accounts on mention-some. The sole purpose for utilizing a grammatical approach is that they can account for Condition 1 for the availability of mention-some: the question has to contain a possibility modal, which is a necessary component for my account in deriving the flavor constraint in sufficiency constructions. The rest of the section goes as follows: I first show why sufficiency statements must answer mention-some questions. Then, I present Fox (2013) in deriving mention-some readings. Specifically, I adopt Fox's definition of answerhood (ANS_F) and make explicit Fox's resolution principle in disambiguating mention-some and mention-all readings. By showing the occurrences of sufficiency statements are dependent upon the presence of mention-some questions and that the former are natural answers to the latter, I reduce the flavor constraint in sufficiency to that in mention-some questions, which are themselves subjected to the same restriction.

4.5.4.1 Sufficiency statements as answers to mention-some questions

Before I show why sufficiency statements require mention-some questions, I will first support the claim that utterances must be used relevantly by appealing to Roberts' question framework. Roberts (1998) proposes the idea that discourse is revolved around an overarching goal: figuring out the answer to the Big Question "what is the way things are?". This Big Question question can be pursued with 'strategies of inquiry': a series of logically-related sub-questions that stand in entailment relation to each other. For instance, the question "What color do you like?" entails the questions "Do you like red?", "Do you like yellow?", etc. When a question Q1 entails another question Q2, Q1 is the 'superquestion' and Q2 is the 'subquestion'. Since knowing the answer to "what is the way things are?" entails knowing the answers to all its subquestions, the Big Question is the logically strongest question, and every conversation furthers our resolution of the Big Question.

While the overarching goal is to address the question "what is the way things are?", a conversation at any time has a smaller goal that the interlocutors are working towards figuring out; this is

what's dubbed 'question under discussion'. Following Carlson (1983), Roberts models the process of question-answer exchange as a language game. Specifically, questions are the 'set-up moves' that proffer sets of relevant alternatives that are potential answers to the questions. Assertions, dubbed 'payoff moves', are answers to questions; they address the questions by selecting propositions from the alternative sets denoted by the questions. In short, questions are the goals in discourse and assertions function to fulfill those goals. Every assertion, essentially, is an answer to a specific sub-question that contributes to resolving the ultimate Big Question.

Now let's switch back to the goal of this section. Assuming Roberts' insight that every assertion is an answer to a question, I suggest that sufficiency statements are assertions that address mention-some questions. Even more so, the natural occurrence of a sufficiency statement *requires* a previous mention-some question in the discourse, based on a grammatical approach on which a possibility modal is a necessary for the availability of mention-some interpretation.

(47) **Linking hypothesis:** A sufficiency statement answers a mention-some question.

For instance, a sufficiency statement like (48-b) is a felicitous answer to a mention-some question like (48-a); but the same statement sounds strange as answer to a mention-all question, which requires stating every place where one can get good cheese, as in (49-a).

- (48) a. Where can I get good cheese? (mention-some)
 b. To get good cheese, you only have to go to the North End. ✓

- (49) a. Where all can I go to get good cheese? (mention-all)
 b. To get good cheese, you only have to go to the North End. ?

Similarly, suppose there are multiple ways to get an A in the class, and scoring at least 90 on the final is the easiest way to achieve the goal. Here, a sufficiency statement like (50-b) perfectly addresses the mention-some question in (50-a); however, as a potential answer to a mention-all question in (51-a), it doesn't seem to provide adequate information to resolve the question.

- (50) a. How can I get an A in this class? (mention-some)

- b. To get an A in this class, you only have to score 90 on the final exam. ✓
- (51) a. What are all the ways to get an A in this class? (mention-all)
- b. To get an A in this class, you only have to score 90 on the final exam. ?

In the next section, I will offer an account on which sufficiency statements can only be felicitous answers to mention-some questions and not to mention-all question. To spell out the proposal, I will adopt Fox (2013)’s theory of answerhood, and use that as a medium to show why sufficiency statements must answer mention-some questions. Notice that no current account directly derives the following two conditions:

1. Condition 1: There must be a possibility modal.
2. Condition 2: The possibility modal must be teleological.

Fox’s account is one way to derive Condition 1, but it fails to derive Condition 2. Again, I’m simply adopting Fox’s account here as it accounts for half of the empirical facts. In the rest of the chapter, I will spell out Fox’s theory of answerhood in §4.2. Then, I will show why sufficiency constructions are good answers to mention-some questions, using Fox’s theory of answerhood in §4.3.

4.5.4.2 A theory of answerhood

Fox’s system takes the possibility modal to be a necessary ingredient for the availability of mention-some interpretation — questions without possibility modals only have mention-all readings; and questions with a possibility modal can receive either mention-some or mention-all interpretations, depending on the output of Fox’s answerhood operator (ANS_F), defined as the following:

- (52) a. $\llbracket ANS \rrbracket_F = \lambda Q. \lambda w: \exists p [w \in p \in Q \wedge \neg \exists p' \in Q [w \in p' \rightarrow p' \subset p]. \{p: w \in p \in Q \wedge \neg \exists p' \in Q [w \in p' \rightarrow p' \subset p]\}]$ (Fox 2013)

ANS_F presupposes that there is at least one true proposition p in the question’s denotation that’s not entailed by other true propositions in the same question denotation. The machinery then outputs the

set of all such propositions. This effectively makes any proposition output by ANS_F a true answer that resolves the question, as made explicit by the resolution principle in (53). In §4.4 we will see how this resolution condition predicts that sufficiency statements are felicitous answers to mention-some questions.

(53) **Resolution principle:** a sentence p resolves Q at w iff $\exists p' \in \llbracket ANS_F \rrbracket(Q)(w)$ [p entails p']

Now let's see how $\llbracket ANS \rrbracket_F$ works. Suppose Sue and Al are both smokers in w ; the question in (54-a) denotes a set of answers in (54-b).

- (54) a. Who smokes?
 b. $\{\text{smoke}(S), \text{smoke}(A), \mathbf{\text{smoke}(S) \wedge \text{smoke}(A)}\}$
 c. $\llbracket ANS_F \rrbracket((54-a)(w) = \{\text{smoke}(S) \wedge \text{smoke}(A)\}$

On a Hamblin semantics of questions where a question denotes a set of propositions that are possible answers to that question, (54-a) has a denotation in (54-b). Assuming that *wh*-domain contains atomic or plural entities (Dayal 1996), (54-b) is closed under conjunction², as evidenced in bold. This suggests there is a unique, logically strongest true answer, where *strength* is evaluated by the entailment relations among the propositions in the question denotation. Specifically, the logically strongest proposition entails other propositions in the same set and is not itself entailed by other propositions in the question denotation. In this example, all three propositions in (54-b) are true. Given that ANS_F outputs true propositions that are not entailed by other true propositions in the same set, here it outputs a singleton answer set, $\{\text{smoke}(S) \wedge \text{smoke}(A)\}$, as in (54-c). With ANS_F outputting the logically strongest true answer that entails all other true answers, the question receives a mention-all interpretation.

Now consider a question that contains a possibility modal, as in (55-a). Suppose you can get coffee at either Penstock or Vigilante in w . Suppose the question in (55-b) denotes the Hamblin set in (55-c). Here again, all three proposition in the Hamblin set are true, and the question denotation in (55-b) is closed under conjunction. $\llbracket ANS_F \rrbracket$ discriminates between the true answers to pick out the

²If a set S is closed under conjunction, then for any two members in the set, $p \in S$ and $q \in S$, their conjunction $(p \wedge q)$ must also be in S .

logically strongest true answer. In this case, the conjunctive proposition, $\diamond \text{coffee}(P) \wedge \diamond \text{coffee}(V)$, is the strongest answer that entails $\diamond(\text{coffee}(P))$ and $\diamond(\text{coffee}(V))$, and it's not entailed by other propositions in the same set. As a result, ANS_F outputs a singleton set containing the proposition $\{\diamond \text{coffee}(P) \wedge \diamond \text{coffee}(V)\}$, which is the logically strongest true answer and the question receives a mention-all interpretation.

- (55) a. Where can I get coffee?
 b. $\{\diamond(\text{coffee}(P)), \diamond(\text{coffee}(V)), \diamond \mathbf{coffee}(P) \wedge \diamond \mathbf{coffee}(V)\}$
 c. $\llbracket \text{ANS}_F \rrbracket((55\text{-a}))(w) = \{\diamond(\text{coffee}(P)) \wedge \diamond(\text{coffee}(V))\}$

Notice that the question in (55-a) can receive both mention-some and mention-all interpretations. Where does this ambiguity between mention-some and mention-all come from? Fox takes the ambiguity to be a result of scopal distributivity relative to the possibility modal. Specifically, Fox assumes a covert distributivity operator *EACH* combined with a *wh*-trace *X*, defined in (56), that can scope either above or below the possibility modal. Depending on which position it distributes on, one can get either the Hamblin set that's closed under conjunction or one that is not. To illustrate, the question in (55-a) has two LFs corresponding to the two positions the distributive operator can take. Repeated here as (57-b), the distributivity operator *EACH* distributes at the matrix level over the possibility modal ($\diamond \text{coffee}(V) \wedge \diamond \text{coffee}(P)$). As a result, the Hamblin set will be closed under conjunction.

$$(56) \quad \llbracket \text{EACH} \rrbracket = \lambda X. \lambda f. \forall x [x \in X \rightarrow f(x)]$$

- (57) a. Where can I get coffee?
 b. $[_{CP} \text{ where } \lambda X \dots [_{IP} [X \text{ EACH}] \lambda x [\text{can} [\text{you get coffee at } x]]]]$
 c. $\{\diamond(\text{coffee}(P)), \diamond(\text{coffee}(V)), \diamond \mathbf{coffee}(P) \wedge \diamond \mathbf{coffee}(V)\}$
 d. $\llbracket \text{ANS}_F \rrbracket((57\text{-a}))(w) = \{\diamond(\text{coffee}(P)) \wedge \diamond(\text{coffee}(V))\}$

EACH can also distribute under the possibility modal, as in (58-b), which is how mention-some interpretation is disambiguated from mention-all reading in Fox's system. Consider the same scenario where you can get coffee at either Vigilante or Penstock, and assume you don't go to more than one

place for coffee.

- (58) a. Where can I get coffee?
b. $[_{CP} \text{ where } \lambda X...[_{IP} \text{ can } [[X \text{ EACH}] \lambda x [\text{you get coffee at } x]]]]$
c. $\{\diamond(\text{coffee}(P)), \diamond(\text{coffee}(V)), \diamond(\text{coffee}(V \wedge P))\}$
d. $[[\text{ANS}_F]]((58\text{-a})) (w) = \{\diamond(\text{coffee}(P)), \diamond(\text{coffee}(V))\}$

The question in (58-a) has a Hamblin denotation in (58-c), which, crucially, is not closed under conjunction, that is, there is not a logically strongest proposition that entails other propositions in the same set, unlike what we have seen when questions receive a mention-all interpretation. Given the assumption that one does not go to more than one place for coffee, $\diamond(\text{coffee}(V \wedge P))$ is false and the question has the set of true answers: $\{\diamond(\text{coffee}(P)), \diamond(\text{coffee}(V))\}$. Recall that ANS_F outputs a set of one or more true propositions that's not entailed by other true propositions in the same question denotation. In this case, since $\diamond(\text{coffee}(P))$ and $\diamond(\text{coffee}(V))$ are logically independent answers, ANS_F would output a set of propositions containing both of them as in (58-d). Given that they are equally informative, Fox's system allows any of them to count as a true answer that resolves the question, capturing the mention-some intuition.

In short, in the absence of a closure under conjunction ANS_F returns a set of logically independent propositions, each of which counts as a true answer, and the question receives a mention-some interpretation. When there is closure under conjunction, ANS_F returns a singleton set containing the logically strongest true answer that entails all other true answers, and the question receives a mention-all interpretation. Explaining mention-some and mention-all ambiguity as a result of scopal effect, Fox's account offers a unified solution on which a resolution principle, paired with the answerhood operator ANS_F , can account for both mention-some and mention-all readings.

In the rest of the chapter, I will delineate how sufficiency statements are felicitous answers to mention-some question, using ANS_F and the resolution principle.

4.5.4.3 Deriving sufficiency statements as answers to mention-some questions

In this section, I show that sufficiency statements are felicitous answers to mention-some questions and not mention-all questions. In a nutshell, to resolve a modalized question under a mention-some interpretation, a sentence can entail any one answer that ANS_F outputs. A sufficiency statement is able to resolve a mention-some question. By contrast, on the mention-all reading, ANS_F outputs the conjunction of all true answers, so that must be entailed for the question to be resolved. Here, a sufficiency statement is too weak to resolve such a question. I will now make this explicit by running through an example. Consider a simple case in (59-a). Suppose Sue and Al smoke. (59-a) then entails Sue and Al smoke. Here (59-a) resolves the question in (60-a) and thus, (59-a) should be an answer to (60-a).

- (59) a. Sue and Al smoke.
b. $\Rightarrow$ Sue and Al smoke and no one else smokes.

Let's see what the resolution principle predicts in this case. The question in (60-a) has a Hamblin denotation in (60-b). Given that the Hamblin set is closed under conjunction, the set output by $\llbracket ANS_F \rrbracket$ contains the logically strongest proposition, $\{\text{smoke}(S) \wedge \text{smoke}(A)\}$. Since (59-a) entails Sue and Al smoke, which is the proposition output by $\llbracket ANS_F \rrbracket$, (59-a) then resolves the question in (60-a) by the resolution principle.

- (60) a. Who smoke?
b. $\{\text{smoke}(S), \text{smoke}(A), \mathbf{\text{smoke}(S) \wedge \text{smoke}(A)}\}$
c. $\llbracket ANS_F \rrbracket(60-a) = \{\text{smoke}(S) \wedge \text{smoke}(A)\}$

Suppose the question is a mention-some question, like 'where can we get good cheese?'. One can get good cheese from New York (NY) and North End (NE) and one does not go to more than one place for good cheese.

- (61) a. Where can I get good cheese?

- b. $\{\diamond(\text{cheese}(\text{NY})), \diamond(\text{cheese}(\text{NE})), \diamond(\text{cheese}(\text{NY} \wedge \text{NE}))\}$
- c. $\llbracket \text{ANS} \rrbracket_F((61\text{-a}))(w) = \{\diamond(\text{cheese}(\text{NY})), \diamond(\text{cheese}(\text{NE}))\}$

Here (61-a) denotes the set of propositions in (61-b). Given that one does not go to more than one place for good cheese, $\diamond(\text{cheese}(\text{NY} \wedge \text{NE}))$ is false. Assuming Fox's theory of answerhood where ANS_F outputs the logically strongest true answer that entails all other true answers, here $\llbracket \text{ANS} \rrbracket_F$ would output the set of propositions, $\{\diamond(\text{cheese}(\text{NY})), \diamond(\text{cheese}(\text{NE}))\}$, because $\diamond(\text{cheese}(\text{NY}))$ and $\diamond(\text{cheese}(\text{NE}))$ are two logically independent propositions that each counts as an answer to the question.

Now, how do we check if a sufficiency statement like (62-a) is an answer to a question like (61-a)? Given the resolution principle, so long as (62-a) entails either $\diamond(\text{cheese}(\text{NY}))$ or $\diamond(\text{cheese}(\text{NE}))$, (62-a) resolves the question (61-a). On the structural analyses, both von Fintel and Iatridou (2007) and Alonso-Ovalle and Hirsch (2022) would predict (62-a) to have the presupposition in (62-b) and the assertion in (62-c). Given that you have to go somewhere for good cheese, and that it's not the case in all worlds where you get good cheese you go to NY, we can get the possibility inference that in some cheese worlds, you go to the NE as in (62-d). Since (62-a) does entail one of the propositions, $\diamond(\text{cheese}(\text{NE}))$, in the answer set delivered by $\llbracket \text{ANS} \rrbracket_F$, the resolution principle is fulfilled and thus, a sufficiency statement like (62-a) can resolve a mention-some question, (61-a).

- (62) a. To get good cheese, you only have to go to the NE.
- b. $P: \Box (\text{cheese}(\text{NY}) \vee \text{cheese}(\text{NE}))$
- c. $A: \neg \Box (\text{cheese}(\text{NY}))$
- d. $P+A \Rightarrow \diamond(\text{cheese}(\text{NE}))$
- e. $\llbracket \text{ANS} \rrbracket_F((62\text{-a})) = \{\diamond(\text{cheese}(\text{NY})), \diamond(\text{cheese}(\text{NE}))\}$

We have seen how a sufficiency statement can be a felicitous answer to a mention-some question on the structural analyses, what does it look like for structural accounts like von Fintel and Iatridou (2007) and Alonso-Ovalle and Hirsch (2022) to derive the flavor constraint? Given that the pragmatic account to the flavor constraint itself is independent of the existing accounts to sufficiency, so long as the structural analyses assume that a sufficiency statement must answer a mention-some question

containing a teleological possibility modal and that they derive the sufficiency reading as a possibility claim, they should be able to reduce the flavor constraint to that in mention-some question.

Having shown why (62-a) is a good answer to a mention-some question, now I'm going to discuss why it cannot resolve a mention-all question. Consider the same cheese scenario, but the question in (63-a) receives a mention-some reading:

- (63) a. Where all can I go to get good cheese?
 b. $\{\diamond(\text{cheese}(\text{NY})), \diamond(\text{cheese}(\text{NE})), \diamond \text{cheese}(\text{NY}) \wedge \diamond \text{cheese}(\text{NE})\}$
 c. $\llbracket \text{ANS} \rrbracket_F((63\text{-a})) = \{\diamond(\text{cheese}(\text{NY})) \wedge \diamond(\text{cheese}(\text{NE}))\}$

(63-a) has a Hamblin denotation of (63-b) that is closed under conjunction. The conjunctive proposition, $\{\diamond(\text{cheese}(\text{NY})) \wedge \diamond(\text{cheese}(\text{NE}))\}$, is the strongest answer that entails $\diamond(\text{cheese}(\text{NE}))$ and $\diamond(\text{cheese}(\text{NY}))$, and it's not entailed by other propositions in the same set. As a result, ANS_F outputs a singleton set containing the logically strongest proposition $\{\diamond(\text{cheese}(\text{NY})) \wedge \diamond(\text{cheese}(\text{NE}))\}$.

For a sufficiency statement like (64-a) to resolve a mention-all question like (63-a), (64-a) has to entail the conjunction of all true Hamblin answers output by ANS_F , based on the resolution principle.

- (64) a. To get good cheese, you only have to go to the NE.
 b. $P: \Box (\text{cheese}(\text{NY}) \vee \text{cheese}(\text{NE}))$
 c. $A: \neg \Box (\text{cheese}(\text{NY}))$
 d. $P+A \Rightarrow \diamond(\text{cheese}(\text{NE}))$
 e. $\llbracket \text{ANS} \rrbracket_F((63\text{-a})) = \{\diamond(\text{cheese}(\text{NY})) \wedge \diamond(\text{cheese}(\text{NE}))\}$

The sentence in (62-a) is repeated here in (64-a), along with its predicted meaning, according to the structural account of sufficiency. In this case, $\diamond(\text{cheese}(\text{NE}))$ does not entail $\{\diamond(\text{cheese}(\text{NY})) \wedge \diamond(\text{cheese}(\text{NE}))\}$ output by $\llbracket \text{ANS} \rrbracket_F$. In other words, the sufficiency statement entails you can go to the NE for good cheese. However, $\llbracket \text{ANS} \rrbracket_F$ has output a conjunctive answer conveying all the places you can go for good cheese. The former is too weak to entail the latter, and so the sufficiency statement would not resolve the mention-all question.

4.5.4.4 Sufficiency with other modal flavors?

Notice that on a structural analysis to sufficiency, the grammar can generate weak readings with modals of different flavors, but those possibility inferences can't be used to resolve mention-some questions as there are no such questions with different modal flavors to address. Specifically, it's argued here that a mention-some reading is subject to Condition 1 (i.e., there must be a possibility modal) and Condition 2 (i.e., that possibility modal must be teleological). If true, then there is no mention-some reading of questions with, for example, deontic and epistemic modals. Hence, even if the grammatical accounts can generate possibility inferences with deontic and epistemic modals, they can't be used to resolve questions that don't exist.

To illustrate, let's consider a deontic case first. Suppose there are two ways to file for a tax return: submit a W2 or submit a W9; and suppose that you only submit one of them and a W2 is easier to access.³ Under the negative split analysis of *only*, (65-a) have the LF in (65-b) . On the *at least* construal, (65-a) would have the LF in (65-c). Both would predict (65-a) to have the presupposition in (65-d) and the assertion in (65-e). Given that you have to submit either a W2 or a W9 in every world where you file a tax return, and that it's not true that in every world in which you file for a tax return, you submit a W9, we can derive the possibility inference that there are worlds where you submit a W2 to file for a tax return, as in (65-f).

- (65) a. To file for a tax return, you're only **required** to submit a W2.
- b. $[_{TP} \text{ NEG } [_{VP_2} \text{ REQUIRED } [[_{EXC} [\text{a W2}]_F] \lambda_1 [_{VP_1} \text{ you submit } t_1]]]]$
- c. $[_{TP} \text{ only } [_{VP_2} \text{ REQUIRED } [[_{AT LEAST} [_{VP_1} \text{ you submit } [\text{a W2}]_F]]]]]]$
- d. $P: \Box (\text{submit}(\text{W2}) \vee \text{submit}(\text{W9}))$
- e. $A: \neg \Box (\text{submit}(\text{W9}))$
- f. $P+A \Rightarrow \Diamond(\text{submit}(\text{W2}))$

Since the structural accounts can, in fact, derive a possibility inference from a sufficiency construction

³I'm distinguishing these options in terms of easiness here to match the easiness measure we see in sufficiency constructions with teleological modals.

with a deontic modal operator, we should be able to expect it to count as a felicitous answer to a mention-some question with a deontic modal, as in (66-a). Specifically, suppose (66-a) could have a mention-some reading, then (66-a) would have a Hamblin denotation in (66-b). Given that the denotation is not closed under conjunction, there is no logically strongest true answer. As a result, $\llbracket \text{ANS} \rrbracket_F$ outputs the set of propositions in (66-c) as they are two logically independent propositions that each counts as an answer to the question. As we can see, the sufficiency statement in (65-a) has the possibility inference in (65-f) ($\diamond(\text{submit}(W2))$), which does entail one of the propositions output by $\llbracket \text{ANS} \rrbracket_F$, indicated in bold. As a result, if the question in (66-a) had a mention-some reading, then the possibility inference in (65-f) could be an answer to that question. However, since a mention-some interpretation has to contain a teleological possibility question, (66-a) can't receive a mention-some interpretation after all.

- (66) a. What am I allowed to do to file a tax return?
 b. $\{\diamond(\text{submit}(W2)), \diamond(\text{submit}(W9)), \diamond(\text{submit}(W9 \wedge W2))\}$
 c. $\llbracket \text{ANS} \rrbracket_F((66-a))(w) = \{\diamond(\textbf{submit}(W2)), \diamond(\text{submit}(W9))\}$

One might try to come up with explicit mention-some questions that sufficiency statements with a deontic or epistemic modal could potentially address. For instance, the existential quantifier *some* in (67-a) indicates that the question is soliciting some true answers and not all true answers; if true, shouldn't (67-b) be a good answer to (67-a)? Indeed, it does seem like (67-b) is a felicitous response to (67-a). However, I suggest that in this case, the modal *can* in the question is actually a teleological modal, as opposed to a deontic modal. Specifically, (67-a) can be interpreted as 'What can I do to realize my goal of filing a tax return?' Since the modal in the question can receive a teleological reading, it's no surprise that (67-b) can sufficiently address (67-a).

- (67) a. What are some ways that I can file a tax return?
 b. To file a tax return, you are only required to submit a W2.

The same problem can be observed with sufficiency constructions with epistemic modal operators, as in (68-a). Suppose Sara gets really upset whenever she sees either Sue or Al, and Sara is more

likely to see Sue than Al, and suppose it's not possible that Sara sees both of them. Under the negative split analysis of *only*, (68-a) has the LF in (68-b). On the *at least* construal, (68-a) has the LF in (68-c). Both would predict (68-a) to have the presupposition in (68-d) and the assertion in (68-e). Given that Sara had either just seen Sue or just seen Al in every world where she is this upset, and that it's not true that in every world in which she is this upset, she see Al, we can derive the possibility inference that there worlds where she is this upset and she had just seen Sue, as in (68-f).

- (68) a. If Sara is this upset, it's only **certain** that she had just seen Sue.
 b. $[_{TP} \text{ NEG } [_{VP_2} \text{ CERTAIN } [[_{EXC} [\text{she had just seen Sue}]_F] \lambda_1 [_{VP_1} \text{ it's certain } t_1]]]]$
 c. $[_{TP} \text{ only } [_{VP_2} \text{ CERTAIN } [[_{AT LEAST} [_{VP_1} \text{ she } [\text{had just seen Sue}]_F]]]]]]$
 d. $P: \Box (\text{seen}(\text{SUE}) \vee (\text{seen}(\text{AL})))$
 e. $A: \neg \Box (\text{seen}(\text{AL}))$
 f. $P+A \Rightarrow \Diamond(\text{seen}(\text{SUE}))$

Here again, suppose (69-a) could have a mention-some reading, then it would have a Hamblin denotation in (69-b). Since the set is not closed under conjunction, $\llbracket \text{ANS} \rrbracket_F$ outputs the set of propositions in (69-c). The sufficiency statement in (68-a) has the possibility inference in (68-f), which does entail one of the propositions output by $\llbracket \text{ANS} \rrbracket_F$. Hence, (68-a) could resolve the question in (69-a) if it had a mention-some interpretation. However, since the assumption here is that mention-some reading is only available with teleological possibility modal, (69-a) with an epistemic modal operator can't receive a non-exhaustive interpretation. Thus, even though a epistemic possibility inference can be generated on a structural analysis, it can't be an answer to a mention-some question with epistemic modal, since mention-some readings don't seem to arise even with an epistemic possibility modal.

- (69) a. What might be the case if Sara is this upset?
 b. $\{\Diamond(\text{seen}(\text{SUE})), \Diamond(\text{seen}(\text{AL})), \Diamond(\text{seen}(\text{SUE} \wedge \text{AL}))\}$
 c. $\llbracket \text{ANS} \rrbracket_F((69-a))(w) = \{\Diamond(\text{seen}(\text{SUE})), \Diamond(\text{seen}(\text{AL}))\}$

Again, one might try to force a mention-some answer by asking an explicit mention-some question, as in (70). If true, then on a structural analysis of sufficiency, (70) should be a felicitous answer to

(69-a), which causes over-generation issues. I don't have a good response to this issue — perhaps one could argue that the presence of a lexical modal expressing existential quantification in a question may suffice for a non-exhaustive reading of the question, but it doesn't suffice for the kinds of questions that sufficiency statements address. Specifically, on the pragmatic route sketched in this chapter, both the flavor and the quantification come from the auxiliary modal, *can*; without it, one can't predict that sufficiency statements are answers to mention-some questions, nor can one reduce the flavor constraint in sufficiency to that in mention-some.

- (70) What is one possible scenario that would get Sara upset? If Sara is this upset, it's only certain that she had just seen Sue.

4.5.4.5 Interim summary

In this section, I have offered a pragmatic solution for accounting for the flavor constraint in sufficiency constructions. Specifically, I have argued that the occurrence of a sufficiency statement requires the presence of a mention-some question in the discourse, which are themselves flavor restricted. I have shown that sufficiency statements are felicitous answers to mention-some questions, but not to mention-all questions. Given that both constructions involve overt modals that are subject to the same flavor constraint, that the occurrence of sufficiency relies on that of the mention-some question, and that sufficiency statements are answers to mention-some questions, I argue that the flavor restriction in a sufficiency construction essentially follows from that in the mention-some question it answers.

1. Mention-some questions require a teleological possibility modal.
2. Sufficiency statements must answer mention-some questions
3. Sufficiency statements can only occur with teleological modals.

While both mention-some readings and weakened modal inferences are restrained by the modal being teleological, I argued that the flavor constraint in these constructions actually stems from the same

place. Specifically, we are able to see weakening in these goal-oriented environments for the reason that we conceptualize teleological necessity differently than necessity claims of other flavors — teleological necessities are compatible with multiple possibility to achieve a goal, while deontic and epistemic necessities state the absolute.

4.6 Potential problems of the pragmatic route

In the previous section, I have offered a pragmatic proposal to account for the flavor constraint in sufficiency constructions by relating sufficiency statements to the questions they address. The success of this proposal, crucially, depends on two premises:

1. There must be a possibility modal in the question.
2. The possibility modal must be teleological.

If both are true, then by arguing that the occurrence of a sufficiency statement requires the presence of a mention-some question in the discourse, which are themselves flavor restricted, we could make the claim that the flavor constraint in sufficiency is inherited from that in mention-some questions. In this section, I will discuss some potential problems to this pragmatic approach sketched above. I will first discuss some empirical challenges to the two premises above.

4.6.1 Conversational goals

While a mention-some interpretation is canonically observed in questions with a teleological possibility modal, van Rooy (2004) shows that questions without teleological/bouletic possibility modals can, under certain circumstances, allow for non-exhaustive answers as well. In particular, when there is a lack of overt teleological possibility modal, the goal-oriented-ness can be supplemented by the context (see Dayal (1996) for more discussion). (71-a) and (72-a) illustrate this point in contexts where mention-some interpretation appears to be available in the absence of an overt teleological possibility modal in the question. In this example there is a conversational goal of lighting a

cigarette. Given the presence of such goal in the discourse, providing one answer seems sufficient to address the question. That is, to realize the goal of lighting a cigarette, the smoker only needs one person with a lighter, as oppose to *everyone* who has a light. Here, it seems as though (71-b) can receive a mention-some interpretation even without an overt teleological possibility modal in the question.

(71) Context: suppose a smoker is looking to light a cigarette.

- a. Who has a light? (Schulz and van Rooij, 2006)
- b. Valentine.

Similarly, in the absence of an overt possibility modal as in (72-a), the goal of needing a ride seems to make up for the lack of a teleological modal. One doesn't need to list out everyone that's going to the party to achieve the goal of getting a ride, naming one person would suffice and yet, (72-b) is compatible with there being other people driving to the party.

(72) Context: I need a ride to the party tonight.

- a. Who's driving? (Xiang, 2023)
- b. Bill is. \ (He could give you a ride.)
→ Only Bill is driving.

Now, let's consider an example from Xiang (2023) where the question *does* contain an overt possibility modal, but such modal expresses an epistemic flavor. The overt modal in (73-a) is epistemic, yet Xiang (2023) reports that (73-b) can still be read as a mention-some response due to the goal of getting help established in the context⁴. Given this goal, it suffices to only mention Bill as someone who might be in the office that can help. This mention-some answer is compatible with there being other people who might be in the office and thus could be of help. In other words, (73-b) doesn't convey the meaning that only Bill might be at the office and no one else might be in.

- (73) a. I need someone to help me. Who might be in the office at this time?
- b. Bill might be in. \ (He could help you.)

⁴The judgment here isn't as sharp as with other examples: some report the unavailability of mention-some reading in this case, while others find it acceptable, as discussed in Xiang (2023)

→ *The available evidence only suggests that Bill might be in.*

Without an explicit conversational goal, a mention-some response in a similar context as in (74-a), adapted from Xiang (2023), with an epistemic modal *can*’t be used to convey the meaning that Bill, among other people, might be in the office. Intuitively, (74-b) conveys that the speaker can only predict that Bill is in the office. However, in the context, this seems unnatural. Since there are two lights on, it should be the case that both Bill and someone else are in the office. This suggests that (74-b) is most naturally interpreted as an non-exhaustive answer, rather than an exhaustive one.

(74) Context: I need someone to help me. I see two lights on in the offices.

a. Who might be in at this time?

b. Bill might be in.\

→ *The available evidence only suggests that Bill might be in.*

In short, we see that a mention-some interpretation is possible in the absence of an overt question with a teleological possibility modal if the conversation makes salient an implicit conversational goal. Once goal-orientation is made explicit in the context, it appears as though *neither* Condition 1 nor Condition 2 holds; that is, the availability of mention-some doesn’t need a possibility modal, and it doesn’t need the possibility modal to be teleological — all it needs is a conversational goal. These data, if true, pose significant challenge to the empirical premises of the pragmatic solution I proposed.

Fox (2018) suggests that the alleged mention-some interpretations observed in contexts with conversational goals, as in (75-a), are not actual mention-some readings — they receive a mention-all reading that’s weakened by a covert domain restriction, leading to a “mention-some illusion”. Consider the following example. Fox suggests that (75-a) can be interpreted as a “request to specify all of the people going to the party whose plans the addressee is aware of” (Fox 2018:23), “request to name the party goers who have room in their cars”, or “request to name the party goers who we know wouldn’t mind giving rides”, etc. The answer in (75-c) might be the result of one of these covert domain restrictions, leading to the appearance of mention-some interpretation.

- (75) a. Who is going to the party (by car)? (Fox 2018)
 b. $\leadsto$ *who among the people whose plans for the party you know is going?*
 c. Al.

The same covert domain restriction analysis can be used to explain why (71-a), repeated here as (76-a), seem to have a mention-some reading. Here (76-a) can be a request of “specifying smokers that have electric lighters” or “naming smokers that are the most friendly to talk to”, etc, giving rise to the seemingly non-exhaustive reading of (76-b).

- (76) Context: suppose a smoker is looking to light a cigarette.
 a. Who has a light?
 b. Valentine.

As for cases where the question involves an epistemic modal, as in (73-a), the appearing non-exhaustivity, again, could be a result of covert restrictions like “who among the people that we know might be in the office”, or “who among the people that are most likely to pick up the phone might be in the office”, etc.

Fox further supports the idea that mention-some reading requires a possibility modal by testing whether there is co-variance between the subject universal and the answers they know. The idea is that when there is more than one true answer in the set output by ANS_F , that is, when the question receives a mention-some interpretation, there could be variation in which answer the subject knows. Here, with the presence of the possibility modal, (77-a) can receive a mention-some interpretation with everyone knowing some place where one can get gas, but that place may vary from person to person. That is, there is co-variation between the subject universal and the answers output by ANS_F . The same co-variance pattern is observed in (77-b) as well. With there being multiple ways to get to the party, (77-b) can have a mention-some interpretation where everyone knows a different way to get to the party. However, there is no co-variance observed in (77-c). Specifically, without a possibility modal, (77-c) would receive a mention-all interpretation on which ANS_F outputs one answer. Given that the answer set contains a single answer, there would be no variation between the subject universal and the

answer.

- (77)
- a. Everyone here knows where we/one can get gas.
 - b. Everyone here knows how we/one can get to the party
 - c. Everyone here knows who is going to the party.

While a covert domain restriction may offer some explanation, could this be too permissive? Even without a conversational goal in the discourse, it seems that we can, in theory, find covert domain restrictions and thus, a mention-some-like reading in cases with deontic and epistemic modals where we do not observe non-exhaustivity.

4.6.2 Sufficiency beyond teleological

The second problem revolves around the possibility of weakened modal inferences in deontic cases where there are multiple ways to abide by the law. In particular, it appears that deontic necessity claims don't necessarily dictate the absolute; that is, sometimes there could be multiple ways to satisfy a law. If true deontic mention-some readings actually exist, one should expect to observe weakened modal inferences in those special deontic cases, which pose a significant challenge to the empirical observation of this thesis.

To illustrate: suppose there are three parking lots on campus: A, B, and C. The parking regulation states that parking in Lot A is prohibited on Mondays.⁵ In this context, it seems that one can comply with the parking regulation by either parking in Lot B or Lot C, and Lot B is more convenient for you — both of which satisfy the necessity of not parking in Lot A on Mondays. My informants observe that when there are multiple ways to comply with the regulation, (78-a) seems to presuppose (78-b), as opposed to (78-c). That is, a weakened modal inference seems to be available with deontic modals when there are multiple ways to abide by the law. While the given context is about regulations and the modal should be deontic, it may not be a genuine deontic modal. Specifically, with the presence of the purpose clause, the modal could naturally be teleological, and (78-a) could be interpreted as 'To

⁵This example is set to have three options: one of them is prohibited, and it's important to have two other options to test whether a weakened modal inference is available when there are multiple possibilities to comply with the law.

fulfill the goal of abiding by the parking regulation, you only have to park in Lot B'. Given that there are multiple ways to achieve the goal of abiding by the parking regulation, it explains why a weakened modal inference seems to be available here.

- (78) a. To abide by the parking regulation, you only have to park in Lot B.
 b. $\Rightarrow$ To abide by the parking regulation, you can park in Lot B.
 c. $\nRightarrow$ To abide by the parking regulation, you have to park in Lot B.

To control for a deontic reading, let's consider the same scenario but replace the purpose clause in (78-a) with 'according to the parking regulations' in (78-b). Here it seems that *have to* is unambiguously deontic. Even with the multiple possibilities to abide by the parking regulation, it still seems easy to get the reading that (79-a) presupposes its prejacent (79-b), 'you have to to park in Lot B', and asserts that you cannot park anywhere else.

- (79) a. According to the parking regulation, you only have to park in Lot B
 b. $\Rightarrow$ According to the parking regulation, you have to park in Lot B.

The case that elicits the clearest judgment might be one where the auxiliary modal *have to* is replaced with a lexical deontic modal, like *require* in (80-a). In this case, (80-a) undoubtedly presupposes that you are required to park in Lot B. This case shows that even when there are multiple ways to comply with a law, sufficiency constructions with deontic modals still don't render weakened modal inferences as we observe in teleological cases.

- (80) a. According to the parking regulation, you are only required to park in Lot B
 b. $\Rightarrow$ According to the parking regulation, you are only required to park in Lot B.

4.7 Conclusion

In this chapter, I have spelled out two routes to derive the flavor constraint in sufficiency construction: a semantic route for accounts that derive sufficiency readings as weak necessity inferences, and a pragmatic route for accounts that derive sufficiency readings as possibility inferences. While

the routes to the flavor constraint differ in many ways, the underlying insight that motivated both proposals stays the same — there is something special about teleological modality. That is, teleological necessities can be satisfied with different possibilities, while deontic and epistemic necessities state the absolute. The semantic route to the flavor constraint implements this insight by arguing that unlike epistemic and deontic modals, teleological modals involve a modal base and *two* ordering sources — a primary one containing a designated goal contributed by the purpose clause (von Fintel and Iatridou 2008), and a secondary one where other considerations help pick out the best way to achieve the designated goal. As discussed, this route faces some non-trivial problems. These problems ultimately motivated the pursuit of a pragmatic route instead.

The pragmatic route accounts for the flavor constraint by connecting sufficiency statements to mention-some questions, which themselves must contain a possibility modal of teleological flavor. By establishing the parallel that mention-some interpretations and sufficiency constructions are subject to the same flavor constraint and that sufficiency statements must be answers to mention-some questions, I reduce the flavor constraint in sufficiency constructions to that in mention-some questions. I take the felicity of teleological modals in sufficiency constructions and mention-some environments to both come from the fact that goals can be satisfied in many ways, but do not need to be satisfied exhaustively — fulfilling the goal in one way suffices. Hence, I argue that teleological modality is conceptually, but not grammatically special.

APPENDIX A: Additional problems of the semantic route to the flavor constraint

A.1 Deontic *ought*

von Fintel and Iatridou (2008) claim that epistemic and deontic *ought* signal the existence of a secondary ordering source that can induce weakening. For instance, they argue that *ought* in the following example can appear to have a deontic reading. As discussed in the paper, the authors disagree on whether the *ought* in both cases actually has a deontic flavor. One takes it to express a teleological

flavor – to satisfy my desires or “rules of politeness”, you ought to do the dishes. The other takes it to have a deontic flavor and signals the existence of a secondary ordering source. Despite the disagreement in judgment, they argue deontic *ought* has a secondary ordering source and that the difference between the primary and secondary ordering sources for deontic *ought* is a matter of strictness. The primary ordering source contains laws and regulations that are strict, and the regulations in the secondary ordering source are less so. For them, a weak deontic necessity modal means that “*ought* might be sensitive to less coercive set of rules and principles in addition to the laws and regulations that strong necessity modals would be interpreted with respect to”.

- (1) a. You ought to do the dishes.
 - b. It ought to be the case that bullying is/be illegal.
- (von Fintel and Iatridou: 128)

I share the intuition that a deontic interpretation of *ought* is ambiguous between deontic and teleological. Nevertheless, setting aside the flavor ambiguity, I find the more imperative issue is that a weak necessity interpretation of a deontic strong necessity modal doesn’t align with how laws are actually stated. After all, laws don’t state what *should* be legal or illegal, or what we should or should not do – they mandate what *has to* be the case:

- (2) a. ? Arson should be illegal.
- b. ? People should not steal.

A.2 Epistemic *ought*

von Fintel and Iatridou also claim that *ought* can be used epistemically. Consider the following example (von Fintel and Iatridou: 126). The authors observe that (3-a) is ambiguous between an epistemic and deontic reading. To bring out the epistemic interpretation, they add the *given*-clause so that *ought* is evaluated based on an epistemic ordering source consisted of my knowledge about Morris, as in (3-b). They further argue that just like teleological and deontic *ought*, epistemic *ought*

has a secondary ordering source as well. Specifically, they take epistemic *ought* to have primary ordering source composed of “hard and fast evidence” and a secondary ordering source that contains propositions expressing “what is *normally* the case”.

- (3) a. It’s 3pm. He ought to be in his office.
- b. It’s 3pm. Given what I know about Morris’s habits, he ought to be in his office.

There is some debate on whether an epistemic interpretation is ever possible for weak necessity modals like *ought* and *should*. For one, Yalcin (2016) denies the effect of *given*-clauses/*in view of*-phrases in disambiguating modal flavors. For instance, consider the following examples from Yalcin (2016:236). Even with the *in view of*-phrase specifying that the modal *can* is evaluated against a body of information (i.e., what we know), a deontic interpretation of the modal is still available in (4-a). Similarly, in (4-b) the necessity modal *must* should have a deontic reading, as it’s evaluated relative to a set of laws specified ; however, it seems that an epistemic interpretation is available as well.

- (4) a. In view of/given what we know, you can’t be parked here.
- b. In view of/given what the tribal laws are, the guy performing the ceremony must be the chief.

These examples suggest that the *in view of*-/*given*-test might not work as well in controlling the interpretation of a modal as one hopes. This, in turn, raises concerns in the interpretation of the modal in (3-b) – does *ought* in (3-b) actually expresses an epistemic flavor? Yalcin (2016) argues that weak necessity modals like *should* and *ought* never receive an epistemic interpretation. To illustrate, consider the example, with abridged context, from Yalcin (2016:231). It seems clear that the weak necessity modals in both cases do not express deontic nor teleological flavor. *Prima facie*, they seem to have an epistemic flavor; however, Yalcin argues that they are not epistemic either. Specifically, if *ought* and *should* were truly epistemic, we should be able to replace it with an unambiguously epistemic modal, like *probably*, as in (6-a); however, the meaning expressed after the modal replacement seems infelicitous.

- (5) Context: Suppose John is in a crowded office building when a severe earthquake hits. The building topples. By sheer accident, nothing falls upon Jones. He emerges from the rubble as the only survivor and utters one of the following.
- a. I should be dead right now.
 - b. I ought to be dead right now.

Yalcin further notes that if those weak necessity modals were epistemic, they should entail epistemic possibility modals by strength, as in (6-b) and (6-c), but they don't. Yalcin takes these examples to suggest that weak necessity modals like *ought* and *should* are never epistemic (For more relevant data, see Copley (2006) and Thomson (2008)). If these data were true and that weak necessity modals are never epistemic, it might serve as an empirical support for why epistemic weak necessity modals may not have a secondary ordering source.

- (6)
- a. # I'm probably dead right now.
 - b. # I might be dead right now.
 - c. # I may be dead right now.

A.3 The nature of the secondary ordering source

The last issue, raised in Rubinstein (2013), regards the distinction between the primary and secondary ordering sources. Specifically, while von Fintel and Iatridou specifies that the primary goal is supplied by either a purpose clause or by the conditional antecedent of an anankastic conditional and that the contents of the secondary ordering source come purely from contexts, Rubinstein (2013) notes that it is a non-trivial problem deciding exactly what goes into which the primary ordering source and what goes into the secondary one.¹

¹Even though this problem is posited as a challenge to von Fintel and Iatridou's analysis, it is a problem for every account that utilizes a secondary ordering source without a full fledged story on what goes into the primary ordering source and what goes into the secondary one, and why. Since I follow, roughly, von Fintel and Iatridou's analysis, I will discuss Rubinstein's worries here.

Rubinstein (2013) points out that a “linguistic approach” pursued by von Fintel and Iatridou, on which a purpose clause designates the primary goal, in differentiating these two ordering sources has its problems – it seem to either encode too much or too little information². Consider the following example, attributed to Wolfgang Klein and later discussed in von Fintel and Iatridou and Rubinstein (2013), where it’s argued that the purpose clause contains too little information. Here the purpose clause provides the primary goal – getting to Vladivostok. The context specifies that taking the Chinese train is necessary if one wants to get there comfortably. Intuitively, (7-a) is false as the Chinese train is not the only train that goes to Vladivostok. However, evidently, some speakers find the strong necessity claim in this scenario to be true, as reported in von Stechow et al. (2006). Rubinstein takes this to suggest that even in situations where secondary priorities aren’t explicitly spelled out in the purpose clause, they can still play an effect in how people evaluate strong necessity claims. In such cases, she argues that the purpose clause encodes too little information.

- (7) Contexts: Two trains serve the city of Vladivostok: a Russian train and a Chinese train. The Chinese train is more comfortable.
- a. To go to Vladivostok, you have to take the Chinese train.
 - b. To go to Vladivostok, you ought to take the Chinese train.

There are also scenarios in which the purpose clause allegedly encodes too much information for evaluating a strong necessity claim. Consider the following example (Rubinstein 2013:174). If one takes the purpose clause to contribute to the primary goal, then in this example, it seems that the primary goal is not only getting to Vladivostok, but also getting there comfortably. Rubinstein argues these cases are problematic for the idea that “weak necessity modals are sensitive to unspoken priorities”. Specifically, she argues that the *ought*-claim in (8-a) can be naturally understood as a necessity claim as the Chinese train is the only way to get to Vladivostok comfortably. Since both preferences are “spoken” via the purpose clause, she claims that there aren’t additional preferences that come to play

²Rubinstein (2013) also discusses some drawbacks for a “conceptual approach”, which assumes greater importance for the primary goal and lesser importance for the secondary goal, in distinguishing the primary and secondary ordering sources. Since I will ultimately be adopting the linguistic approach, I will only discuss the potential complications for this route here.

in how the modal claim is evaluated.

(8) Contexts: Two trains serve the city of Vladivostok: a Russian train and a Chinese train. The Chinese train is more comfortable.

a. To go to Vladivostok comfortably, you ought to take the Chinese train.

While I share the intuition that a strong necessity interpretation of (8-a) is available, an elaborated purpose clause doesn't indicate an empty secondary ordering source. It could be the case that the speaker's primary goal is to get to Vladivostok comfortably, but in the meantime, she still holds other subsidiary preferences (e.g., getting there safely), which is sensitive to the secondary ordering source and does have an effect on how the modal is interpreted.

Chapter 5: Deriving anankastic sufficiency constructions

5.1 Introduction

This chapter is devoted to deriving weakened modal inferences from anankastic sufficiency constructions, using the pragmatic account to anankastic conditionals proposed in Chapter 2. Before doing so, I will briefly review the problem with anankastic conditionals and our solution to it.

Recall that the classical semantics of modals and conditionals wrongly predict anankastic conditionals, like (1-a), should be false in scenarios where you don't actually want to get good cheese, or worse, you want to do something else that does not require going to the NE. Suppose that, in the actual world, going to the NE is the only way to get good cheese, but you do not want to get good cheese or anything that requires going to the NE. In this scenario, (1-a) is still intuitively true, since going to the NE is necessary for getting good cheese, regardless of whether you want to get good cheese or not. The truth conditions in (2-a), however, predict that it should be false, because (2-a) requires that you go to the NE in all of the worlds most ideal given your *actual* goals. In this scenario, the most ideal worlds are not worlds where you go to the NE, since your actual goals do not include getting good cheese or anything that requires going to the NE.

- (1) a. If you want to get good cheese, you have to/must go to the NE.
- b. In all w' compatible with the relevant facts in w that best fit your goals in w , and where *you want to* get good cheese in w' , you go to the NE.

Now recall that we derive the anankastic, or what we call, harmonizing reading, where the consequent modal seems to be restricted by the complement of the attitude verb as opposed to the entire antecedent, via a pragmatic inference which guarantees that the consequent modal quantifies over worlds in which the complement of the attitude verb holds (i.e., you get good cheese). Specifically, our solution to the problem in anankastic conditionals relies on three ingredients: a double modal structure, Necessitation by Attitude (NBA), and Flavor Matching:

(2) A Double Modal Structure

- a. If you want to get good cheese, you have to go to the NE.

b. NEC [You want to get good cheese] **HAVE TO** [you go to the NE]

(3) **Necessitation by Attitude (NBA)**

Subject ATTITUDE $p \Rightarrow \text{have to/must}_F p$ where F is some modal flavor

(4) **Flavor Matching**

The consequent modal flavor F matches flavor of NBA $\text{must}_F p$

On a double modal structure, (2-a) has the LF in (5-a). The antecedent restricts the higher epistemic modal NEC. This allows the worlds w'' quantified over by *have to* to be anchored to your goals in w' where you want to get good cheese, instead of your goals in the actual world, where you may not have the goal to get good cheese or anything that require you to go to the NE:

(5) a. NEC [You want to get good cheese] **HAVE TO** [you go to the NE]

b. In all w' compatible with what we know in w and where you want to get good cheese in w' , all w'' compatible with the facts in w' that best fit your goals in w' are such that you go to the NE in w'' .

NBA posits that whenever one takes the subject of an attitude as the authority of the relevant modality, then one can get the modal inference HAVE TO p . For instance, consider (6-a). Let T_{YOU} stand for the teleological modal flavor anchored to your goals. Since we take ourselves to be the authorities of our own goals, from (6-a), we can get the modal inference in (6-b) by NBA.

(6) a. You want to get good cheese.

b. $\Rightarrow \text{have to}_{T_{\text{you}}}$ You get good cheese.

This inference, crucially, does not follow through if the subject of the attitude was, for example, a stranger on the street who does not have authority of your goals. When a modal inference is triggered by the NBA, a harmonizing reading of the conditional, where the consequent modal seems to be restricted by the *complement of want* as opposed to the *entire* antecedent, becomes possible if the modal flavor in the modal inference matches that of the consequent modal of the conditional. For instance,

the consequent modal *have to* in (7-a) has a teleological flavor, which is the same as the modal flavor of *have to* in (7-b). In this case, the condition of flavor matching is fulfilled.

- (7) a. A stranger wants you to get good cheese.
 b. $\Rightarrow$ have to_{T_{stranger}} You get good cheese.

Putting the pieces together: with the double modal structure, the enrichment of the modal inference derived from the NBA (as indicated in bold), and the flavor matching condition, (8-a) is construed as (8-b) and has the truth-conditions in (8-c), simplified in (8-d). In other words, since you want to get good cheese in w' , getting good cheese is taken to hold in all worlds quantified over by the consequent modal. Specifically, the conditional is enriched with the inference that in all worlds compatible with is known where you want to get good cheese, you have to_T get good cheese.

- (8) a. If you want to get good cheese, you have to go to the NE
 b. If you want to get good cheese, (**you have to_T get good cheese**), you have to go to the NE.
 c. In all w' compatible with the facts in w and where you want to get good cheese in w' and such that in all w'' compatible with the facts in w' that best fit your goals in w' you get good cheese in w'' , **all w''' compatible with the facts in w' that best fit your goals in w' are such that you get good cheese**, and all w''' compatible with the facts in w' that best fit your goals in w' are such that you go to the NE.
 d. In all w' compatible with the facts in w and where you want to get good cheese in w' and such that in all w'' compatible with the facts in w' that best fit your goals in w' you get good cheese in w'' , all w''' compatible with the facts in w' that best fit your goals in w' are such that you get good cheese and go to the NE in w''' .

Now that all the relevant pieces are in place, I'm going to show how our account to anankastic conditionals can derive a weakened modal inference in anankastic sufficiency modal constructions. As discussed in §2.3.3 of Chapter 2 and in von Fintel and Iatridou (2007), the presence of a purpose clause is not necessary for the availability of a sufficiency reading, as such readings can arise with anankastic conditionals and causal conjunctions. Suppose in the actual world w , there are three places

to get good cheese: the North End, NY, S and that given our location (Boston), the NE is the easiest destination. Let $NE <_{NY} S$ stand for the easiness ranking for getting good cheese. Just like canonical sufficiency constructions with a purpose clause, from an anankastic sufficiency construction like (9-a), we can obtain the inference that it is sufficient to go to the NE to get good cheese, but you can also go elsewhere. That is, anankastic sufficiency constructions lack the necessity inference, as in (9-c), aligning with the entailment pattern observed in canonical sufficiency cases.

(9) *Anankastic sufficiency construction*

- a. If you want to get good cheese, you only have to go to the NE.
- b. $\Rightarrow$ If you want to get good cheese, you can go to the NE.
- c. $\nRightarrow$ If you want to get good cheese, you have to go to the NE.

The rest of the chapter proceeds as follows: I will present how the ingredients for solving the problems with anankastic conditionals can be applied to anankastic sufficiency constructions. Then I will derive the weakened modal inference in anankastic sufficiency using those ingredients.

5.2 Anankastic sufficiency constructions

5.2.1 Weakening the modal inference

Just like canonical sufficiency constructions, we observe a weakened modal inference from anankastic sufficiency constructions as well, as we have seen in (9-a). How do we derive this weakened modal inference? There are at least two options regarding the mechanism for weakening: one can assume that weakening comes from a covert operator, AT LEAST (Alonso-Ovalle and Hirsch, 2022; Schwarz, 2004; Crnič, 2011) or through domain restriction (Condoravdi and Francez, 2022). The choice point here isn't crucial, as any mechanism that derives a weakened modal inference would do.

Here I will adopt a structural analysis like Alonso-Ovalle and Hirsch (2022) to sufficiency constructions on which weakening is derived by introducing a covert operator AT LEAST at the the LF, as

in (10-b). In the case of (10-a), AT LEAST is sensitive to an effort-based ordering on a contextually salient set of alternatives. AT LEAST presupposes that the prejacent p ranks the lowest on the scale, and expresses that p or a higher-ranked alternative is true. In the LF in (10-b), AT LEAST scopes under the modal, while *only* scopes above. The result is that (10-b) presupposes that you at least have to go to the NE or somewhere further, and it asserts that you don't have to go somewhere further. So, if you have to go to the NE and you don't have to go further than the NE, we can get the inference that you can go to the NE.

(10) *Alonso-Ovalle and Hirsch (2022)*

- a. If you want to get good cheese, you only have to go to the North End.
- b. $[_{TP} \text{ only } [_{VP_2} \text{ have to } [\text{AT LEAST } [_{VP_1} \text{ you go to } [\text{the North End}]_F]]]]$
- c. $P: \Box (\phi_{NY} \vee \phi_S \vee \phi_{NE})$
- d. $A: \neg\Box(\phi_{NY} \vee \phi_S) \wedge \neg\Box \phi_S$
- e. $P + A: \Diamond\phi_{NE}$

(11) $\llbracket \text{AT LEAST} \rrbracket^{\text{ALT} \leq} (p) = \lambda w: \forall p' \in \text{ALT} [(p' \neq p) \rightarrow p' > p]. \exists p'' \in \text{ALT} [p'' \geq p \wedge p''(w)]$

5.2.2 A double modal structure

The second piece of the proposal is to assume that there is an unpronounced epistemic modal in an anankastic sufficiency statement. In (12-a), the antecedent then restricts a higher modal NEC. The conditional in (12-a) has the LF in (12-b). Notice that the existential force in (12-c), as indicated in bold, is the result of weakening from both *only* and AT LEAST.

- (12) a. If you want to get good cheese, you only have to go to the NE.
- b. $\text{NEC} [\text{you want to get good cheese}] [\text{only } [\text{have to } [\text{AT LEAST } [\text{you go to } [\text{the NE}]]]]]$
- c. In all w' compatible with relevant facts (e.g. $\text{NE} < \text{NY} < \text{S}$) in w and where you want to get good cheese in w' , **some** w'' compatible with the facts in w' that best fit your goals in w' are such that you go to the NE in w'' .

The antecedent restricts the higher epistemic modal. The lower modal *have to* is then evaluated relative to those worlds w' in which you want to get good cheese. It can then pick out the best circumstantial worlds given your goals in w' . Given that you want to get good cheese in w' , by having you getting good cheese in all worlds quantified over by the consequent modal, getting good cheese can now be one of the goals that make up *have to*'s ordering source. The double modal analysis thus provides a way for the desire expressed in the antecedent (getting good cheese) to be part of the ordering source of the modal in the consequent.

5.2.3 Necessitation by attitude + Flavor matching

Once we add the goal of getting good cheese to the ordering source of the necessity modal, we need to ensure that the goal of getting good cheese trumps all other goals. The reason for doing so is because anankastic sufficiency constructions can run into the problem of conflicting goals that we have seen with standard anankastic conditionals. Specifically, suppose you also have the goal of getting good cannoli, which requires going to Sicily. In this case, since the propositions in the ordering source are unranked, the best worlds are divided to ones where you get good cheese (and go to the NE) and ones where you get good cannoli (and go to Sicily). Given that you don't go to the NE in all the best worlds, (12-a) is wrongly predicted to be false.

We can avoid the problem of conflicting goals by deriving a modal inference from through Necessitation by Attitude (NBA). Specifically, since we take ourselves to be the authorities of our own goals, we can obtain the teleological necessity inference in (13-a) via NBA. Given that the NBA holds across all epistemically accessible worlds, it will hold in the worlds w' quantified over by NEC:

- (13) a. $\llbracket \text{You want to get good cheese} \rrbracket^{w'} \Rightarrow \llbracket \text{You have to}_{\text{You}} \text{ get good cheese} \rrbracket^{w'}$
 b. In all w'' compatible with your goals in w' you get good cheese $\Rightarrow$ In all w'' compatible with the facts in w' that best fit your goals in w' , you get good cheese.

Given that the NBA derives a teleological necessity, Flavor Matching holds: both the NBA modal and the teleological modal in the consequent quantify over worlds compatible with your goals in the same

world of evaluation w' , namely, the worlds quantified over by the epistemic modal NEC in which the antecedent holds. Thus, we obtain that in all relevant teleological worlds, you go to get good cheese (from NBA), and in some of these worlds, you go to the NE (from the consequent). (14-c) shows the truth conditions in (12-c) enriched with the NBA inference in (13-b) (in boldface), and simplified in (14-d):

- (14)
- a. $\llbracket \text{If you want to get good cheese, you only have to}_T \text{ AT LEAST go to the NE} \rrbracket^w$
 - b. NEC [you want to get good cheese] [only [have to [AT LEAST [you go to [the NE]]]]]
 - c. In all w' compatible with what is known in w and such that in all w'' compatible with your desires in w' you get good cheese, **some w''' compatible with the facts in w' that best fit your goals in w' are such that you get good cheese** and some w''' compatible with the facts in w' that best fit your goals in w' are such that you at least go to the NE
 - d. In all w' compatible with what is known in w and such that in all w'' compatible with your desires in w' you get good cheese, some w''' compatible with the facts in w' that best fit your goals in w' are such that **you get good cheese** and you at least go to the NE.

5.3 Conclusion

In this chapter, I have shown that discussed how weakened modal inferences from anankastic sufficiency constructions can be derived using our account to anankastic conditionals proposed in Chapter 2 and the domain restriction mechanism from Alonso-Ovalle and Hirsch (2022).

Chapter 6: Conclusion

6.1 Summary

This dissertation examined two highly specific constructions in which teleological modality triggers unexpected readings that seem to be absent with other modal flavors — anankastic conditionals and sufficiency modal constructions. In it, I probed the following questions: is teleological modality responsible for the problems in anankastic conditionals? How can their meanings be derived compositionally? Is a weakened modal inference in a sufficiency modal construction dependent upon the modal being teleological? If so, why is the availability of a weakened modal inference subject to a flavor constraint? and where does the flavor constraint come from? Does the flavor constraint in sufficiency suggest that teleological modality is fundamentally different from modals expressing other flavors?

I argued that teleological modality is not responsible for the problems in anankastic conditionals, as the problems are more general and can be replicated with other modal flavors. Unlike previous accounts tailored to teleological modality, I offered a pragmatic approach that can predict when anankastic readings are possible with when they are not without relying on any flavor-specific idiosyncrasies. Contrary to anankastic conditionals, I showed that the availability of weakened modal inferences in sufficiency constructions *is* dependent upon the modal being teleological, an empirical observation that previous proposals to sufficiency either fail to recognize or to account for. I explored two routes to account for this flavor constraints, and argued for the pragmatic route. While their mechanisms may differ, the motivating insight is the same: there is something special about teleological necessity modals — teleological necessities can be satisfied with different possibilities, while deontic and epistemic necessities state the absolute.

In Chapter 2, I presented two long-standing problems of anankastic conditionals, like (1-a): the problem of conditioning on norms and the problem of conflicting goals.

- (1) a. If you want to get good cheese, you have to go to the NE.
- b. To get good cheese, you have to go to the NE.

While previous accounts treat these puzzles as exclusive to teleological modality, I showed that they are actually more general and can be replicated with epistemic and deontic necessity modals. For instance, (2-a) seems to express the meaning in (2-b), on which the complement of the attitude verb (i.e., the grades be posted on Monday) seems to restrict the deontic modal in the consequent. Same with (3-a), on which the complement of the attitude verb (i.e., the crime occurred at 6pm), as opposed to the whole antecedent (i.e., Sherlock Holmes thinks that the crime occurred at 6pm), seems to restrict the epistemic modal in the consequent.

- (2) a. If the Provost requests that grades be posted on Monday, Al must_D finish grading now.
- b. If grades are to be posted on Monday, Al must_D finish grading now.
- (3) a. If Sherlock Holmes thinks that the crime occurred at 6pm, Al must_E be the culprit.
- b. If the crime occurred at 6pm, Al must_E be the culprit.

I proposed a pragmatic approach to anankastic conditionals that contains three ingredients: a double modal structure, as evidenced in the LF in (4-b), Necessitation by Attitude (NBA), and Flavor Matching:

(4) **A Double Modal Structure**

- a. If you want to go to get good cheese, you have to go to the NE.
- b. NEC [You want to get good cheese] **HAVE TO** [you go to the NE]

(5) **Necessitation by Attitude (NBA)**

Subject ATTITUDE $p \Rightarrow have\ to/must_F p$ where F is some modal flavor

(6) **Flavor Matching**

The consequent modal flavor F matches flavor of NBA $must_F p$

NBA posits that whenever one takes the subject of an attitude as the authority of the relevant modality, then one can get the modal inference HAVE TO p . For example, it allows us to obtain the modal inference in (7-b) from (7-a), provided that we take ourselves to be the authority of our own goals.

- (7) a. You want to get good cheese.
 b. $\Rightarrow$ have to_{T_{you}} You get good cheese.

The Flavor Matching condition requires the flavor of the modal inference derived from NBA to match that of the consequent modal. When the meaning of the conditional is enriched with the modal inference that matches in flavor with the consequent modal, we obtain that in all worlds compatible with your goals—those in which you want to get good cheese—you do get good cheese and you go to the NE. Our general pragmatic solution to anankastic conditionals and their kin can predict when harmonizing readings are possible, when they are not, and the highly context-sensitive nature of the process. And it does so without relying on any flavor-specific idiosyncrasies.

In Chapter 3, I first showed that there is a flavor constraint in sufficiency modal constructions, namely, a weakened modal inference is only available when the necessity modal expresses a teleological flavor; they are not available with neither deontic nor epistemic necessity modals. For instance, when the modal flavor is deontic, *only* does appear to entail its prejacent (i.e. ‘you have to submit your W2’ in (8-b)). That is, (8-a) doesn’t lack the necessity inference that’s absent in sufficiency constructions, as shown in (8-b).

- (8) a. To file for a tax return, you only have to submit your W2.
 b. $\Rightarrow$ To file for a tax return, you *have to* submit your W2.

The same inferential pattern can be observed with epistemic modals, as in (9-a). Here again, *only* seems to presuppose its prejacent (i.e. she has to have just seen Sue), as in (9-a).

- (9) Context: Suppose Sara really dislikes Sue and whenever she encounters Sue, she gets frustrated and acts irrationally.
 a. If Sara is this upset, she only has to have just seen Sue.
 b. $\Rightarrow$ If Sara is this upset, she has to have just seen Sue.

Then, I reviewed three previous accounts to sufficiency. I showed that while previous accounts derive sufficiency reading in one way or another, an empirical premise that is assumed by all, but accounted

for by none is that the sufficiency reading is only available with teleological necessity modals. Specifically, on the one hand, the domain restriction proposal, *prima facie*, seems to be sensitive to the flavor constraint as weakening is obtained partially via manipulating the modal's ordering source. However, nothing in Condoravdi and Francez's system seems to prevent one from tempering with the ordering sources of epistemic and deontic modals and thus, deriving weakening when there is none, leading to potential over-generalization issues. On the other hand, under the structural views the weakened inference is derived either via introducing a scalar operator AT LEAST at the LF or via splitting the scope of *only* to NEG and EXC – none of which actually interacts with the modal to have an influence on its flavor.

In Chapter 4, I considered two routes to account for the flavor constraint in sufficiency: a semantic route for accounts that derive sufficiency readings as weak necessity inferences, and a pragmatic route for accounts that derive sufficiency readings as possibility inferences. In particular, I suggested that there is a fundamental way in which teleological modality differs from epistemic and deontic modalities: while the latter involve a modal base and a single ordering source, teleological modals involve a modal base and *two* ordering sources – a primary one containing a designated goal contributed by the purpose clause (von Stechow and Iatridou, 2008), and a secondary one where other considerations help pick out the best way to achieve the designated goal. I ultimately pursued a pragmatic route to the flavor constraint because of the non-trivial challenges the semantic route faces. The pragmatic route directly connects sufficiency statement to mention-some questions. Specifically, I argued that an occurrence of a sufficiency statement requires the presence of a mention-some question, which themselves must contain a possibility modal of teleological flavor. By establishing the parallel that mention-some interpretations and sufficiency constructions are subjected to the same flavor constraint and that sufficiency statements must be answers to mention-some questions, I reduced the flavor constraint in sufficiency constructions to that in mention-some questions. I took the felicity of teleological modals in sufficiency constructions and mention-some environments from the fact that goals can be satisfied in many ways, but do not need to be satisfied exhaustively: fulfilling the goal in one way suffices. Hence, I argued that teleological modality is pragmatically, but not grammatically special.

6.2 Future research

Conceptual difference between teleological and other modal flavors It has been reported that it's much more natural to obtain a harmonizing reading with teleological modals compared to deontic and epistemic modals. I do not deny this intuition. While people routinely take ourselves to be the authority of our own goals, we perhaps think much less about epistemic and legal authorities in a way that assimilates the harmonizing process proposed in this dissertation. As a result, it can feel somewhat unnatural to derive harmonizing readings with epistemic and deontic modals initially. This intuition, if true, may suggest that there are some conceptual differences between teleological and other modalities.

The presence of *only* One of the most significant challenges that the domain restriction accounts encounter is the distribution of weakening. Specifically, why can we obtain weakening via domain restriction in the case of (10-a) but not (10-b)? The only difference between the two is the presence of *only*. So, why is *only* mandatory for weakening?

- (10) a. To get good cheese, you *only* have to go to the NE.
 b. To get good cheese, you have to go to the NE.

Experiments on mention-some readings with epistemic and deontic modals In Chapter 4 I presented data suggesting that a non-exhaustive answer is only felicitous if the question contains a *teleological* possibility modal. While the literature agrees on the participation of goal-orientation, the judgments on whether a mention-some reading is available when the possibility modal has an *epistemic* or *deontic* flavor are not crystal clear. Therefore, the flavor constraint on mention-some readings should be worked out more thoroughly, and one interesting direction to do so is to run experiments that manipulate modal flavors in questions to probe if non-exhaustivity is available when the modal expresses epistemic, deontic, or ability flavor.

6.2.1 Conclusion

In this dissertation I examined two constructions in which teleological modality gives rise to unexpected readings that seem to be absent with any other modal flavors. The first one is so called *anankastic conditionals*; the second one is dubbed *sufficiency modal constructions*. I argued that in both environments, the apparent restriction to teleological modality is not a grammatical constraint, but an indirect consequence of the fact that we conceptualize teleological necessity differently than necessity claims of other flavors. In particular, teleological necessity claims are compatible with multiple possibilities to achieve a goal, while deontic and epistemic necessities state the absolute.

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