A pragmatic solution to anankastic conditionals[1]

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Abstract. Standard accounts of modals and conditionals fail to derive the correct meaning of anankastic conditionals like 'If you want to go to Harlem, you have to take the A train', where it seems as if the modal in the consequent is restricted by the embedded complement of *want* (you go to Harlem), rather than by the whole antecedent (you *want* to go to Harlem). This has led to proposals for a special semantics for *want* (Condoravdi and Lauer, 2016) or a covert purpose clause associated with teleological (goal-oriented) modality (von Fintel and Iatridou, 2005). In this paper, we show that the apparent non-compositionality of anankastic conditionals is more general, and can be replicated with other modal flavors and attitude verbs: all can trigger what we call "harmonizing readings". We offer a pragmatic account that generalizes across modal flavors and attitudes. Specifically, we argue that harmonizing arises when the meaning of the antecedent together with background assumptions gives rise to a modal inference that matches in flavor with the consequent modal. Our account predicts when harmonizing is possible and when it isn't, without relying on any lexical or syntactic idiosyncrasies.

Keywords: conditionals, modals, anankastic, pragmatics, semantics.

1. Introduction

A speaker can use (1a) to convey that getting to Harlem requires taking the A train, as in (1b). On this "anankastic" reading of the conditional (von Wright, 1963), it seems irrelevant whether you do 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) a. If you want to go to Harlem, you {must/have to} take the A train.
b. If you go to Harlem, you {must/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 the conditional with teleological modality (von Fintel and Iatridou, 2005; von Stechow et al. 2006). These propohsals, 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 much broader pattern. For any number of attitudes A, not just desire, and modal flavors F, not just bouletic (i.e., desire-based) or teleological (i.e., goal-based), when the antecedent expresses "$x\ A\ p$", 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 B, D, and E for bouletic, deontic, and epistemic, respectively:

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(2) a. If the law mandates that street cleaning is on Thursdays, Al must$_{\text{D}}$ move her car (on Thursday).
b. If street cleaning is on Thursdays, Al must$_{\text{D}}$ move her car (on Thursday).

(3) a. If Sherlock thinks the crime occurred at 6pm, Al must$_{\text{E}}$ be the culprit.
b. If the crime occurred at 6pm, Al must$_{\text{E}}$ be the culprit.

We refer to these anankastic-like interpretations as "harmonizing". Crucially, we will see that harmonizing seems to be highly context-sensitive: when we replace the attitude holder in (1)-(3), with a subject whose authority in the relevant modality the speaker doesn't trust, the harmonizing reading seems to disappear. For instance, when we replace 'you' by 'Mary' in (1a), as in "If Mary wants you to go to Harlem, you have to take the A train", the anankastic reading, whereby going to Harlem requires taking the A train, seems to disappear.

In this paper, we provide a broader account for anankastic conditionals that captures the generality of the pattern across modal and attitude flavors. We first observe that harmonizing obtains only when "*x A p*" would warrant the defeasible inference "*x must$_F$ p*", where the modal flavor *F* happens to match the flavor of the consequent modal. This happens in examples (1)-(3): in (1a), the attitude report 'You want to go to Harlem' warrants the bouletic claim 'you must$_{\text{B}}$ go to Harlem', in (2a), the attitude report 'The law mandates that street cleaning is on Thursdays' warrants the deontic claim 'street cleaning must$_{\text{D}}$ be on Thursdays', and in (3a), the attitude report 'Sherlock thinks the crime occurred at 6pm' warrants the epistemic claim 'the crime must$_{\text{E}}$ have occurred at 6pm'. However, when the speaker is not assumed to trust the attitude holder as an authority in the relevant modality, the harmonizing reading disappears: from "Mary wants you to go to Harlem", we do not naturally infer that 'you must$_{\text{B}}$ go to Harlem', where the bouletic modal *must$_{B\,you}$* is anchored to *your* desires.

We propose that harmonizing arises from this pragmatic necessity inference, which is derived from the meaning of the attitude report in the antecedent together with uncontroversial background assumptions. When the flavor of the modal inference happens to match the flavor of the modal in the conditional's consequent, "harmonizing" occurs: Given that 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 holds. To illustrate, the desire report in (1a), '*You want to go to Harlem*', invites the inference that '*You must$_B$ go to Harlem*'. The bouletic necessity modal in this inference matches in flavor with the consequent modal: both quantify over the same worlds, namely those compatible with your desires (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 desires (in those worlds in which you want to go to Harlem), *you go to Harlem* and you take the A train.

Thus, unlike previous proposals, which postulate lexical or syntactic stipulations, we provide a pragmatic explanation to anankastic conditionals, free of idiosyncrasies, and which can easily capture the context-sensitive nature of when harmonizing is possible.

We first review the problem and prevailing prior analyses in section §2. In section §3, we show how the apparent non-compositionality problem of anankastic conditionals is more general,

and can be replicated with other attitudes and modal flavors, though the availability of such readings is importantly constrained. In section §4, we describe our pragmatic proposal, based on our empirical generalization for when harmonizing readings are available. In section §5, we show that harmonizing is a pragmatic, and not semantic or syntactic, phenomenon. We conclude in section §6.

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* {*must/have to*} *q* have the same means-to-an-end, anankastic reading, as noted by Hare (1968). The conditional in (4), for instance, does not mean that scratching your eyes requires getting tested for mpox, but rather that the *desire* to scratch your eyes does.

(4) If you want to scratch your eyes, you {must/have to} get tested for mpox.

Standard accounts of modals and conditionals (e.g., Kratzer, 1981; Kratzer, 1986) predict the right truth-conditions for ordinary *want*-conditionals like (4). But, contrary to intuitions, they predict that (1a) should be false in scenarios where you do not *actually* want to go to Harlem, or worse, you want to go somewhere that requires, for example, taking another train.[2]

To see why, let's briefly consider a classic Kratzerian semantics for modals and for conditionals. In the Kratzer (1981, 1991) framework, 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: propositions that express facts in the world of evaluation w for the modal base, and ideals in w, for the ordering source (e.g., desires, goals, laws). The modal base first restricts the set of worlds to those compatible with certain facts. 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* is true if and only if the prejacent p is true in all of these most ideal worlds, given *must*'s lexical entry in (5) (von Fintel and Heim, 2011):

(5) $[\![\text{must}]\!]^w = \lambda f_{<s,<s,t>>}.\lambda g_{<s,<s,t>>}.\lambda p_{<s,t>}.\forall w' \in o_{<g(w)}(\bigcap f(w))$: $p(w')=1$ *where* $o_{<\rho}(X) = \{w \in X: \neg\exists w'\ (w' <_\rho w)\}$

Since anankastic conditionals express necessities given a desire or goal, we can assume that the consequent modal in an anankastic conditional is bouletic (desire) or teleological (goal). It has a circumstantial modal base f that consists of relevant facts in the world of evaluation, including those involved in traveling to Harlem, and a bouletic or teleological ordering source g that contains yours desires or goals in the world of evaluation (i.e., the actual world).

[2]Condoravdi 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.

(6) $f(w) = \{p\text{: } p \text{ is a relevant circumstance in } w\}$
$g(w) = \{p\text{: } p \text{ is one of your desires in } w\}$

A bouletic modal ends up quantifying over worlds compatible with the relevant circumstances that best obey some relevant desires (*your* desires 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 desires. She wants to go to Harlem and she also wants to go to Hoboken, but cannot do both. Because the two desires cannot be ranked, the worlds that best fit them are not all of one sort: they include both Harlem worlds and Hoboken worlds. And since these worlds are not all Harlem worlds, the theory predicts that it is false to say "Al must$_B$ go to Harlem" using *must* bouletically–evidently a correct prediction: it is not true that Al must$_B$ got to Harlem, if she also wants to go to Hoboken, and cannot do both. But what allows the theory to make the right predictions in this scenario will turn out to be its downfall in anankastic conditionals, as we will see.

Turning to the semantics of conditionals, we assume a classical restrictor analysis of conditionals Kratzer (1986), according to which the antecedent restricts the modal in the consequent. For instance, the antecedent in (1) restricts the modal base to only worlds where you have the desire to go to Harlem. The ordering source then ranks those antecedent-worlds according to your desires in the actual world. On this analysis, (1) is true just in case:

(7) In all *w'* compatible with relevant circumstances in *w* that best fit your desires 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 that you do not want to go to Harlem or anywhere requiring taking the A train. In this scenario, (1a) is intuitively true, given that 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. Indeed, (7) requires that you take the A train in all worlds most ideal given your *actual* desires. But in this scenario, your actual desires do not include going to Harlem or anywhere requiring taking the A train. Hence, the most ideal worlds are not worlds where you take the A train.

The problem, as pointed out by Sæbø (2001), is that this semantics doesn't allow the hypothetical desire in an anankastic conditional to be added to the ordering source for the modal in the consequent. But based on our intuitions, this modal does seem to be restricted to worlds that best obey this desire. Sæbø proposes to fix the problem by forcing the complement of *want* (in (1a), *you go to Harlem*) to be directly added to the ordering source. However, this solution is non-compositional in using just 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, many subsequent accounts take the full antecedent to restrict a covert epistemic modal, as opposed to the modal in the consequent (Huitink, 2005; von Fintel and Iatridou, 2005; von Stechow et al. 2006), associated with conditionals. Thus (1a) tells us what you must do just in worlds compatible with what is known where you actually do want to go to Harlem. In just those worlds, you have to take the A-train. This "double modal" analysis[3] was first proposed by Frank (1996), for the more general problem of "conditioning on norms" (Condoravdi and Lauer, 2016), which arises whenever a hypothetical assumption made in the

[3]For an account that does not assume a double modal structure, see Cariani (2024).

antecedent seems to influence the contents of the ordering source of the consequent modal. To see this, consider the conditional in (8) adapted from von Fintel and Iatridou (2005):

(8) If jaywalking is a crime, then (in view of the laws) Mary must$_{\text{D}}$ get a fine.

The antecedent expresses a hypothetical law (here, that jaywalking is a crime), and the consequent modal is interpreted deontically. A standard, single modal, restrictor analysis for conditionals has the antecedent restrict the consequent modal's *modal base* to worlds where jaywalking is a crime. The modal's *ordering source* then ranks these worlds based on how well they satisfy the propositions of the ordering source, that is, the laws in the world of evaluation, namely, the *actual* world. Restricting the modal base worlds with the antecedent 'jaywalking is a crime' rules out worlds where jaywalking is not a crime. However, the ordering source of the consequent modal is still anchored to the actual laws. If jaywalking is legal in the actual world, then (8) comes out false, as it is not true that in all the best deontic worlds given by the *actual* laws, Mary gets a fine.

A double modal analysis fixes the problem by postulating that a conditional like (1a) has two layers of modality: the overt modal in the consequent, *must*, and a higher epistemic necessity modal, NEC, which the antecedent restricts. Given this, (1a) has the structure in (9a), and the truth conditions in (9b). Adding an extra layer of modality allows the worlds *w"* quantified over by *must* to be anchored to your desires in *w'*, where you want to go to Harlem, instead of your desires in the *actual world*. This solution guarantees that the hypothetical desire orders the worlds of the consequent modal.

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

But while the double modal analysis helps solve the problem of conditioning on norms, it still makes the wrong predictions in scenarios where your actual desires *conflict* with the hypothetical desire (what Condoravdi & Lauer dub the problem of "conflicting desires"). Suppose, as before, that going to Harlem requires taking the A train, but that you actually want to go to Hoboken, and that taking the PATH train is the only way to get to Hoboken. Assuming a double modal structure, the ordering source of the consequent modal will contain both desires of going to Harlem and going to Hoboken.[4] Since you can't go to both places at once, the most ideal worlds given your desires are 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). Given that you don't take the A train in all the most ideal worlds (some are worlds where you take the PATH train), (1a) is predicted to be false, contrary to intuitions.

To sum up, anankastic conditionals give rise to two issues: first, the hypothetical desire (*you go to Harlem*) needs to hold *qua* desire in the consequent modal worlds; second, this desire needs to somehow trump any other potentially conflicting desires (e.g., *you go to Hoboken*). Effectively, what is needed to get the right truth conditions for a conditional like (1a) is for

[4]This problem arises under the reasonable assumption, which all proponents of a double modal analysis seem to make, that, modulo the hypothetical desire, your desires in the actual world get carried over in the worlds quantified over by the epistemic modal. We make the same assumption here.

the consequent modal to quantify only over worlds in which the complement of *want* in the antecedent holds (*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 approach derives anankastic readings from a special interpretation of the verb *want*. Specifically, Condoravdi and Lauer (2016) argue that *want* can express both pure and "action-directed" desire, that is, a desire that trumps all others. According to them, action-directed *want* is the *want* involved in anankastic conditionals, guaranteeing that the desire expressed in the antecedent outranks all others. The other type of approach derives anankastic readings via a syntactic stipulation, according to which anankastic conditionals contain a covert purpose clause: *if want p, then [to p] must q* (von Fintel and Iatridou, 2005; von Stechow et al. 2006). According to von Fintel and Iatridou, this purpose clause is associated with teleological (goal-oriented) modality, and can sometimes be pronounced overtly ((1a) can be paraphrased as "*To go to Harlem, you have to take the A train*"). These accounts circumvent the problem of conflicting desires by forcing the modal base to only contain worlds where you go to Harlem, via the purpose clause.

Thus, the previous literature either assumes a special semantics for *want* or a special syntax for teleological modality. In this paper, however, we show that the apparent non-compositionality problem of anankastic conditionals can be replicated with attitude verbs beyond *want*, and modals beyond teleological or bouletic ones. Thus, the problem is much more general, and so, we argue, must its solution be. We propose that there is nothing lexically, semantically, nor syntactically special about anankastic conditionals: like Condoravdi and Lauer, we take anankastic conditionals to be regular conditionals. However, we show that anankastic conditionals extend beyond *want*, and we propose a general account that 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. We provide our pragmatic account in section 4, according to which 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 that of the consequent modal. We defend this pragmatic approach over alternative, semantic implementations in section 5.

3. Harmonizing beyond anankastics

In this section we show 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 or bouletic modality. First, and as already noted by Sæbø (2001) and Condoravdi and Lauer (2016), desire predicates other than *want* also give rise to anankastic readings, as illustrated in (10):

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

As with (1a), (10) can be true, even in situations where your actual plans or desires conflict

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

with going to Harlem.

The apparent non-compositionality of anankastic conditionals is also not confined to desire predicates and teleological/bouletic modality. It can be replicated with other modal flavors and attitude predicates. As we saw in the introduction, the example in (2a) illustrates the same phenomenon with deontic *must*. Standard accounts for modals and conditionals predict that (2a), repeated in (11a) should have the truth conditions in (11b).

(11) a. If the law mandates that street cleaning is on Thursdays, Al must$_{\text{D}}$ move her car.
b. In all *w'* compatible with the circumstances in *w* that best obey the law in *w* and where the law in *w'* mandates that street cleaning is Thursday, Al moves her car

Yet, it seems that (11a) can have a harmonizing reading, according to which, 'If street cleaning is on Thursdays, Al has to move her car', where the complement of *mandate* (*street cleaning is on Thursdays*), seems to restrict the deontic modal *have to* in the consequent. Just as with anankastic conditionals, (11a) illustrates the problem of conditioning on norms: (11a) should be false in case the laws in the actual world do not include 'street cleaning is on Thursdays', as the best worlds given the actual laws wouldn't be those where Al moves her car on Thursday. Like other conditioning-on-norms problems, this can be fixed by assuming a double modal structure to allow the hypothetical law to be added to the consequent modal's ordering source. On this approach, (11a) would have the LF in (12a), and the truth conditions in (12b):

(12) a. NEC [the law mandates street cleaning is Thursday] [must$_{\text{D}}$ [Al moves car]]
b. In all *w'* compatible with what we know in *w*, where the law in *w'* mandates that street cleaning is Thursday, all *w"* compatible with the circumstances in *w'* that best obey the law in *w'* are such that Al moves her car

Here again, however, a double modal analysis doesn't get us the right truth conditions in cases where the actual laws *conflict* with the hypothetical law, leading to a "conflicting law" counterpart to the conflicting desire problem. To see this, suppose that the actual laws mandate that street cleaning is on Mondays, not Thursdays. The modal's ordering source (consisting of the set of laws in *w'*) will now contain the propositions that street cleaning is on Thursdays, and that street cleaning is on Mondays. The highest-ranked worlds, given this ordering source, will be divided into worlds where street cleaning is on Mondays (and where Al doesn't move her car on Thursday), and worlds where street cleaning is on Thursdays (and where Al does move her car). Given this, it should be false that Al moves her car in *all* deontic worlds. Therefore, even if we can add the hypothetical law to the modal's ordering source by adopting a double modal structure, we still face the problem of conflicting laws, as simply adding the hypothetical law to the ordering source does not guarantee that it outranks all others.

Harmonizing readings can also be found with epistemic modality. To see this, consider the epistemic conditional in (3a), repeated in (13a), which standard accounts predict should have the truth conditions in (13b):

(13) a. If Sherlock thinks the crime occurred at 6pm, Al must$_{\text{E}}$ 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'*

The truth conditions in (13b) predict that (13a) should be 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). Here again, given standard accounts 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 (13a) can have a harmonizing reading, expressing that Al must 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 *must* in the consequent.

To sum up, in all of these cases, it appears as if the complement of the attitude verb in the antecedent directly restricts the modal in the complement. Thus, the apparent non compositionality of anankastic conditionals is not confined to *want*, nor to teleological or bouletic modality, but can be replicated with other attitude verbs, and modal flavors, in ways that can't be captured by solutions tailored to *want* or teleological modality.

Importantly, 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 (13a), shown in (14a):

(14) a. If Watson thinks the crime occurred at 6pm, Al must$_{\text{E}}$ be the culprit.
b. If the crime occurred at 6pm, Al must$_{\text{E}}$ be the culprit.

The harmonizing reading in (13a), which conveys (14b), 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 (14a), when the subject is replaced by silly Watson, whose epistemic authority the speaker does not trust.

Similarly, (11a) can convey (15b), when the subject of *mandate* is *the law*, which, uncontroversially is viewed as a legal authority on street cleaning. This harmonizing reading, however, seems to disappear when the subject is replaced by a random individual, say Jo, who has no legal authority, or knowledge about the current laws, as in (15a).

(15) a. If Jo mandates that street cleaning is Thursdays, Al must$_{\text{D}}$ move her car.
b. If street cleaning is Thursdays, Al must$_{\text{D}}$ move her car.

And returning finally to bouletic modality, we can see that even with *want*, the anankastic reading seems to disappear when the wanter is a random individual, say, Mary, whose desires are irrelevant to yours, as in (16):

(16) If Mary wants you to go to Harlem, you must$_{\text{B}}$ take the A train.

One would not as readily interpret (16) as expressing that going to Harlem requires taking the A train. Rather, (16) seems to simply express that Mary's *desire* for you to go to Harlem requires that you take the A train. This conditional could be true, for instance, in a situation where Harlem is unreachable by train, and you happen to want the *opposite* of what Mary wants: taking the A train would be a way for you to avoid going to Harlem. (16) only gets a harmonizing or anankastic interpretation, if Mary's desires dictate your own, that is, if 'Mary wants p' implies that p is bouletically necessary given *your* desires, i.e., must$_{\text{B you}}$ p'.

What we see, then, is that attitude verbs and modals of *any* flavor can, in principle, give rise to harmonizing readings. However, the availability of these readings seems to be context-sensitive: it depends on whether the speaker can be assumed to take the subject of the attitude to be an authority in the relevant modality: Sherlock Holmes, but not Watson, for epistemic modality; the law, but not random Jo, for deontic modality; you, but not random Mary, for bouletic modality anchored 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, and harmonizing conditionals more generally, whereby 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.

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 directly 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 consequent modal. In this section, we spell out this proposal, and show how to derive harmonizing readings, and how to prevent them. We derive harmonizing readings in two steps: the first is the modal inference, which we dub "Necessitation by Attitude" (NBA), derived from the meaning of the attitude report in the antecedent; the second, which we dub "Flavor Matching", is the matching of flavors between the modal in the NBA inference and the modal in the consequent, resulting in the apparent restriction of the consequent modal with the complement of the antecedent's attitude report.

4.1. Two Ingredients for Harmonization

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 bouletic necessity that you $must_{\mathrm{B}}$ go to Harlem. In (2a), we can infer from the attitude report 'The law mandates that street cleaning is on Thursdays' the deontic necessity that street cleaning $must_{\mathrm{D}}$ be on Thursdays. And in (3a), we can infer from the attitude report '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:

(17) **Necessitation by Attitude** (NBA)
Subject ATTITUDE $p \Rightarrow must_F\ p$ *where* F *is some modal flavor*

In all cases where harmonizing goes through, the subject of the attitude report can be viewed as an authority in the relevant modality. With bouletic modality, as in (1a), we routinely take people to be authorities in enacting their own desires, thus *you* are an authority on bouletic modality anchored to *your* desires: We readily infer from 'you want *p*' that it is necessary given *your* desires that *p* ($must_{Byou}$ *p*). When we change the subject from *you* to *Mary* in (16), however, the NBA inference fails to go through without further assumptions. This is because we don't readily infer from '*Mary wants p*' that *p* is bouletically necessary for *you*, unless we know that Mary's desires somehow dictates your desires. If we enrich the context with the assumption that Mary is your boss, whom you feel compelled to please, a harmonizing reading becomes possible.

With deontic modality, as in (2a), we take laws to be legal authorities by definition. Thus, we can infer from '*the law mandates that p*' that it is deontically necessary wherever the law prevails that *p* ($must_D$ *p*): the NBA inference goes through. However, this inference disappears in (15a), when the subject *the law* is replaced with *Jo*, a random individual with no authority or knowledge on street cleaning.

Lastly, with epistemic modality, as in (3a), we easily take the revered detective to be an epistemic authority, and when we do, we infer from '*Sherlock Holmes thinks p*', that it is epistemically necessary that *p* ($must_E$ *p*): the NBA inference goes through. However, in (14a), this inference 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 a necessity 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 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 as flavor matching:

(18) **Flavor Matching**: consequent modal flavor F matches flavor of NBA $must_F$ *p*

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

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 modal indirectly, from the fact that the two modals happen to quantify over the same sets of worlds. This is a defeasible inference one draws about the worlds characterized by the antecedent, akin to inferring from hearing "*If Al is a basketball player...*" that the interpretation of the consequent should be restricted to worlds where Al is tall, something one would not infer with "*If Al is a skateboarder...*".

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, via flavor matching. We sketch this here with the canonical Harlem sentence, re-

peated here as (19a). We first obtain the modal inference in (19b) via NBA. Then, given that the bouletic flavor of the modal inference matches that of the consequent modal, we obtain flavor matching, as in (19c). Since both NBA and FLAVOR MATCHING are fulfilled, a harmonizing reading arises, as in (19d), where the meaning of (19a) is enriched with the NBA inference, indicated in boldface. Since both the NBA and consequent modal quantify over the same set of worlds, (19d) can be simplified as (19e), giving rise to the illusion that the consequent modal is directly restricted by the complement of the attitude verb, namely, worlds where you go to Harlem:

(19) a. If you want to go to Harlem, you must$_{\text{B you}}$ take the A train.
b. **NBA**: You want to go to Harlem ⇒ You *must*$_{B you}$ go to Harlem.
c. **Flavor matching**: B_{you} in (b) matches B_{you} in (a)
d. If you want to go to Harlem, **you must$_{\text{B you}}$ go to Harlem** and you must$_{\text{B you}}$ take the A train
e. If you want to go to Harlem, you must$_{\text{B you}}$ **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, *Mary* may not be an authority on your desires, and thus it may not follow that you must$_{\text{B you}}$ go to Harlem from the fact that Mary wants you to go. Harmonizing can also be prevented when Flavor Matching fails to hold, for instance, if the consequent modal in (1a) is interpreted deontically, rather than bouletically. In the next section, we show how to derive harmonizing readings in more formal detail.

4.2. Deriving harmonizing conditionals

As in previous accounts, we assume the independently motivated double modal structure for conditionals (Frank, 1996; Huitink, 2005; Condoravdi and Lauer, 2016; von Fintel and Iatridou, 2005), 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, bouletic) in the consequent, 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 readings arise.

Assuming a double modal structure, the Harlem conditional has the LF in (20a), where the antecedent restricts NEC. We obtain the truth conditions in (20b), assuming the lexical entry for *want* in (20c):

(20) a. **NEC** [You want to go to Harlem] [**must**$_{\text{B you}}$ [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 in *w"*, all *w"'* compatible with circumstances in *w'* that best fit your desires in *w'* are such that you take the A train in *w"'*
c. $[\![\text{want}]\!]^{w} = \lambda p.\ \lambda x.$ in all worlds *w'* compatible with *x*'s desires in *w*, *p(w')*=1

Through NBA, we obtain the bouletic necessity inference in (21a):

(21) a. $[\![\text{You want to go to Harlem}]\!]^{w'} \Rightarrow [\![\text{You must}_{\text{B you}} \text{ go to Harlem}]\!]^{w'}$

b. In all *w"* compatible with your desires in *w'* you go to Harlem ⇒ In all *w"* compatible with the circumstances in *w'* that best fit your desires in *w'*, you go to Harlem

Given that NBA derives a bouletic necessity, flavor matching holds: both the NBA modal and the bouletic modal in the consequent quantify over worlds compatible with your desires 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 bouletic worlds, you go to Harlem (from NBA), and in all of these worlds, you take the A train (from the consequent). (22b) shows the truth conditions in (20b) enriched with the NBA inference in (21b) (in boldface), and simplified in (22c):

(22) a. ⟦If you want to go to Harlem, you must$_B$ take the A train⟧^{w}
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 circumstances in *w'* that best fit your desires in *w'* are such that you go to Harlem** and all *w"'* compatible with circumstances in *w'* that best fit your desires 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 circumstances in *w'* that best fit your desires 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., you are an authority on enacting your own desires).

Note that the non-anankastic readings of ordinary *want* conditionals like the one in (4) arise straightforwardly by failing to derive the NBA inference.

The harmonizing reading of the deontic conditional repeated in (23a) works the same way. Again, we assume a double modal structure, such that the antecedent restricts NEC, as shown in (23b), with the standard truth conditions in (23c), using the denotation for *mandate* in (23d):

(23) a. If the law mandates street cleaning is on Thursdays, Al must$_D$ move her car.
b. NEC [the law mandates street cleaning Thursday][**must$_D$** [Al moves car]]
c. In all *w'* compatible with what is known in *w*, and such that in all *w"* compatible with what the law mandates in *w'*, street cleaning is Thursday, all *w"'* compatible with circumstances in *w'* that best fit the law in *w'* are such that Al moves her car
d. ⟦mandate⟧^{w} = $\lambda p.\ \lambda x.$ in all *w'* compatible with what *x* mandates in *w*, $p(w')$=1

Through NBA, we obtain the deontic necessity inference in (24a):

(24) a. ⟦The law mandates street cleaning is on Thursday⟧$^{w'}$⇒⟦Street cleaning must$_D$ be on Thursday⟧$^{w'}$
b. In all *w"* compatible with what the law mandates in *w'*, street cleaning is Thursday ⇒ In all *w"* compatible with circumstances in *w'* that best fit the law in *w'*,

street cleaning is Thursday

Since the flavors of the NBA modal and the consequent modal are both deontic, Flavor Matching obtains. (25a) shows the truth conditions in (23c) enriched with the (boldfaced) NBA inference in (24b), and simplified in (25b):

(25) a. In all *w'* compatible with what is known in *w*, and such that in all *w"* compatible with what the law mandates in *w'*, street cleaning is Thurs, **in all *w"'* compatible with circumstances in *w'* that best fit the law in *w'*, street cleaning is Thursday** and in all *w"'* compatible with circumstances in *w'* that best fit the law in *w'*, Mary moves her car.

b. In all *w'* compatible with what is known in *w*, and such that in all *w"* compatible with what the law mandates in *w'*, street cleaning is Thurs, in all *w"'* compatible with circumstances in *w'* that best fit the law in *w'*, **street cleaning is Thursday** and Mary moves her car.

Here again, the complement of the attitude report in the antecedent seems to restrict the consequent modal directly, but it does so via the addition of the defeasible NBA inference.

We finally turn to epistemic conditionals, as in (3a), repeated in (26a) below. Here again, we assume a double modal structure for conditionals, so that (26a) has the LF in (26b). This assumption is crucial for us, so that the NBA inference can be anchored to the same worlds as the consequent modal.[6], and that *think* has the lexical entry in (26d). The truth conditions for (26a) are given in (26d):

(26) 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**$_{\text{E}}$ [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. $[\![\text{think}]\!]^{\text{w}} = \lambda p.\ \lambda x.$ in all *w'* compatible with *x*'s beliefs in *w*, $p(w')=1$

The NBA inference goes through, assuming that we take Sherlock Holmes to be an epistemic authority:

(27) a. $[\![\text{Sherlock thinks crime was at 6}]\!]^{\text{w'}} \Rightarrow [\![\text{the crime must}_{\text{E}} \text{ have been at 6}]\!]^{\text{w}}$'

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

We can enrich the truth conditions in (26c) with the NBA inference in (27b), as in (28a). Given that the NBA modal and the consequent modal quantify over the same worlds (i.e., epistemic worlds anchored to the worlds quantified over by NEC), (28a) can be simplified as in (28b), once again giving the illusion that the complement of the antecedent's attitude verb directly restricts the consequent modal.

[6]For independent evidence for a double modal structure with epistemics modals, see Geurts (2004) We assume that epistemic modals like *must* take an epistemic modal base and an optional stereotypical ordering source (Kratzer 1981).

(28) 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"'* compatible with what is known in w' most stereotypical from the perspective of w', Al 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 Al is the culprit

In sum, we propose that anankastic conditionals, and harmonizing conditionals more generally, are the result of a modal inference derived from the meaning of an attitude verb in the antecedent, whose flavor matches the modal in the consequent. Our pragmatic account derives these readings without postulating any 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 whether the attitude holder can be viewed as an authority in the relevant modality.

5. Harmonizing is pragmatic

We've offered a pragmatic account of anankastic conditionals that generalizes across modal flavors and attitudes. In this section, we discuss the empirical advantages of this approach over alternative, semantic implementations, which would derive harmonizing either via modal subordination, or through the presence of a covert clause, which would generalize von Fintel and Iatridou (2005)'s account to all modal flavors.

A modal subordination treatment would adopt the idea that attitude verbs like *want* can introduce a set of worlds that a subsequent modal could be anaphoric to (e.g., Stone, 1999; Sudo, 2014). The consequent modal *must* could then either inherit its domain of quantification from the *if*-clause, resulting in the ordinary *want* reading, or it could be anaphoric to the *want*-worlds, giving rise to the anankastic reading. Under this view, (1a) would express that you take the A train in all of *those* worlds compatible with the circumstances and your desires where you go to Harlem.

A modal subordination account would easily extend to the other harmonizing cases we have seen. However, it would also generate possible harmonizing readings where they do not seem to be attested. Indeed, we would expect that a modal could be anaphoric to *any* attitude verb present in context, including in cases where the speaker doesn't trust the subject as an authority in the relevant modality (recall, for instance, the contrast in harmonization when the thinker is Sherlock vs. Watson with epistemic harmonizing). It is not clear why speaker endorsement should matter for anaphoricity.

A more syntactic alternative could postulate a covert *given*-clause, which would essentially encode the Necessitation by Attitude inference syntactically, as illustrated in (29). The content of the *given*-clause would have to somehow be inherited from the antecedent through ellipsis, which would require that there be a linguistic antecedent.

(29) If you want *p*, then given *must p*, you must *q*.

Importantly, however, we can come up with harmonizing readings where there is no clear linguistic antecedent[7]. This can be seen, for instance, in a scenario involving a pathological liar, who only says the opposite of what is true. Imagine such a person, Al, who claims that Bill stole your money. With a pragmatic account, we can infer '$\textbf{MUST}_{\textbf{E}}$ ***not*** *p*' from '*Al says p*':

(30) If Al said Bill stole your money, then someone else MUST_E have stolen your money.

This implication cannot be captured by any account that would require a linguistic antecedent to derive harmonizing readings, given the lack of a previous linguistic constituent "Bill didn't steal your money".

All things considered, we believe that anankastic conditionals, and harmonizing more generally, is a pragmatic phenomenon. Our pragmatic account derives the correct readings without overgeneralizing, and it does so without relying on any syntactic or semantic idiosyncrasy.

6. Conclusion

Anankastic conditionals give rise to an apparent non-compositionality problem, where the comnplement of *want* in the conditional seems to restrict the consequent modal. 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 led to highly idiosyncratic accounts that miss the bigger picture. Indeed, we find that the apparent non compositionality seen in anankastic conditionals can be replicated with attitude verbs beyond desire verbs like *want,* and beyond teleological or bouletic modality.

We have offered a pragmatic account of anankastic conditionals that generalizes across modal flavors and attitude verbs through all cases of what we call harmoninzing conditionals. Specifically, we argued that harmonizing readings arise when the antecedent and background assumptions trigger a modal inference that matches in flavor with the consequent modal; as a result, the consequent modal is restricted to worlds in which the complement of the attitude verb in the antecedent holds. This general solution to anankastic conditionals and their kin can predict when harmonizing readings are possible, when they are not, and how they can be derived without relying on any flavor-specific idiosyncrasies.

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