

Modal Concord as Modal Modification

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Abstract

Modal concord is the phenomenon by which certain modal adverbs seem to become semantically vacuous in the presence of modal auxiliaries if the adverb and the auxiliary match in quantificational force (e.g., universal vs existential) and modal flavor (e.g., epistemic vs deontic). We propose that neither concord adverbs nor modal auxiliaries are vacuous: concord adverbs are modal-auxiliary modifiers and the compositional process ensures that both auxiliary and modifying adverb comment on the same proposition (contributed by the same radical), with respect to the same modal base. Agreement in flavor between the two distinct modal claims follows directly, while agreement in force is indirectly derived via the interaction between the assertion contributed by one of the modal claims and the implicatures triggered by the other. Finally, we outline a typology of interactions between modals and their modifiers and study the behavior of three adverbs – *absolutely*, *legitimately* and *legally* – from this perspective.

1 Introduction

The starting point of this paper is the putative *lack* of contrast between the sentences in (1) – while *definitely* seems to provide a modal force on its own, in conjunction with a modal, it seems to lose this force:

- (1) a. John is definitely home.
b. John (definitely) must be home.

This phenomenon of certain adverbs (often speaker-oriented) losing their force in the presence of modal auxiliaries has been dubbed *modal concord* by Geurts and Huitink (2006), who identify two identity conditions that must hold between the auxiliary and the adverb. They must match in quantificational FORCE (as *must* and *legitimately* do not) as well as FLAVOR (as *might* and *legitimately* do not):

- (2) a. We can legitimately deny your request.
b. #We must / have to legitimately deny your request.¹

¹We use # to indicate the unavailability of a concord reading (i.e., a single modal force, not two), while allowing

- (3) a. *John must_E obligatorily_D be home.² *E*: epistemic; *D*: deontic
 b. #John might_E legitimately_D be home.

Three kinds of analyses have been offered for FORCE and FLAVOR, split between the syntax-semantics divide. Geurts and Huitink (2006) propose a compositional primitive that absorbs two adjacent modals under identity. In contrast, Zeijlstra (2008), building on the syntactic approach to negative concord in Zeijlstra (2004), proposes that modal concord is simply a species of syntactic agreement between a probing modal operator (the adverb) and an expletive goal (the modal). Finally, Huitink (2008) offers a mixed approach: concord adverbs specify ordering source properties for the modal, thereby directly encoding FLAVOR; FORCE is a matter of morphosyntactic featural identity (as for the syntactic concord account). The proposals are schematized below:

- (4) a. SEMANTIC ABSORPTION: $[[\text{adv modal}]] = [\text{adv}]$ iff $[\text{adv}] = [\text{modal}]$
 b. SYNTACTIC AGREEMENT: $[\text{OP}_{i\forall, iDeon} \text{ must}_{u\forall, uDeon} [\text{John be home}]]$
 c. ORDERING+FEATURES (O+F): $[\text{obligatorily}_{u\forall}]$ requires deontic ordering source

Two additional properties of modal concord variously challenge the above proposals. First, certain modal adverbs show a form of STRENGTHENING of the auxiliaries' force (cf. Zeijlstra 2008, Grosz to appear). Thus, the uses of *absolutely* below seem to, respectively, make the obligation stronger and the possibility more remote.

- (5) a. There is no choice, he absolutely must stay in the lineup.
 b. It probably wouldn't make sense for a college professor, but absolutely might make sense for a bus driver.

While AGREEMENT permits this (the strengthening adverb is the semantically active modal element), ABSORPTION and O+F accounts do not. However, the formal feature account of concord in AGREEMENT (and, in part, O+F) is problematic for FORCE, which shows sensitivity to NEGATION (cf. Grosz 2008). Thus, in (6), acceptable concord adverbs are universal above $\neg\exists$ and existential below.

- (6) a. John $\left\{ \begin{array}{l} \text{obligatorily} \\ \text{\#legitimately} \end{array} \right\}$ cannot be home.
 b. John cannot $\left\{ \begin{array}{l} \text{*obligatorily} \\ \text{legitimately} \end{array} \right\}$ be home.

Under a purely formal account, this is difficult to capture without recourse to reification of the compositional interpretive process.³

for a felicitous non-concord reading is felicitous. In (2-b), a manner reading in which the denial has to be done in a legitimate manner is available.

²This is grammatical only insofar as being home is understood habitually.

³Strictly speaking, it is also a problem for the lexical account in Geurts and Huitink (2006), but not for ABSORPTION in general.

In view of these constraints, we propose that modal concord be analyzed not as a specific interaction between two modal lexical items, but as an interaction of two separate modal *assertions*. In sum, we argue that modal concord is a species of modification by the modal adverb, which contributes its own modal quantification parasitic on the auxiliary's modal domain.

$$(7) \quad \llbracket \text{adverb modal} \rrbracket (f_{\text{modal base}})(p_{\text{sentence radical}}) = 1 \text{ iff } \llbracket \text{adverb} \rrbracket (f)(p) = 1 \text{ and } \llbracket \text{modal} \rrbracket (f)(p) = 1$$

This will serve to capture all of the constraints, save FORCE, which we will claim arises from a conflict between a universal assertion and a non-universal implicature. We discuss the details of this proposal in Section 2.

In section 3 we turn to a more general concern, namely, the typology of interactions between modals and their modifiers in general. We argue that the empirical picture in English suggests the following restriction possibilities along the FORCE and FLAVOR dimensions:

- (8) a. ATTESTED restrictions: FORCE \wedge FLAVOR, FLAVOR only, neither
 b. UNATTESTED so far: FORCE only

We close with a discussion of the behavior of three adverbs – *absolutely*, *legitimately* and *legally* – which is just a first step towards a more systematic investigation of modal adverbs and their interactions with modal verbs.

2 A first take on modal concord

2.1 The Basic Facts

As noted at the outset, modal concord has been argued to be sensitive to both modal flavor and force (Geurts and Huitink 2006). Thus, the force mismatch between *perhaps* and *must* yields ungrammaticality in (9).

$$(9) \quad \text{John} \left\{ \begin{array}{l} \text{perhaps}_E \text{ might}_E \\ * \text{perhaps}_E \text{ must}_E \end{array} \right\} \text{ be home.}$$

Modal flavor mismatches – in particular, *E*(pistemic) and *D*(eontic) – are grammatical only when the adverb is epistemic, in line with observations about the scoping of epistemic and deontic modals in English (see, for example, Nauze 2006).

$$(10) \quad \begin{array}{l} \text{a. John} \left\{ \begin{array}{l} \# \text{must}_E \text{ obligatorily}_D \\ \text{definitely}_E \text{ must}_D \end{array} \right\} \text{ be home.} \\ \text{b. John} \left\{ \begin{array}{l} \# \text{might}_E \text{ allowably}_D \\ \text{possibly}_E \text{ may}_D \end{array} \right\} \text{ be home.} \end{array}$$

Thus, when the adverb is epistemic and auxiliary is deontic, there exists a non-concord reading where the operators stack; demarcating modal concord readings thus will entail demonstration

that the reading in question could not arise via stacking. One case in point is that of two epistemics, as in (9). Given that the putative concord readings are derivable from the introspection principles on two epistemics (Geurts and Huitink 2006), it is unclear if concord mechanisms are necessary. We will therefore focus on deontics and circumstantials.⁴

The three pre-existing analyses deal with the facts above as follows. ABSORPTION posits that when two semantically identical modals are sisters, one is deleted. As we noted in the introduction, this assumes logical equivalence of concord and non-concord readings, which is unclear.

- (11) a. $[[\text{adv modal}]] = [[F(\text{adv}) \text{ modal}]] = [[\text{adv}]]$
 b. $[F] = \lambda M'_{st,st} \lambda M_{st,st} : M = M'. M'$

SYNTACTIC AGREEMENT instead proposes that modal auxiliaries are semantically trivial syntactic formatives, while modal adverbs are the true semantic locus of modality. FORCE and FLAVOR matching is then accomplished purely in the syntax, which ensures agreement with respect to the morphosyntactic features modal elements bear (i.e., force and flavor features).

- (12) $[OP_{i\forall,iDeon} \text{ must}_{u\forall,uDeon} [\text{John be home}]]$

The mixed O+F analysis begins from the observation that flavor matching is straightforwardly expressible in terms of constraints on a modal's ordering source (below, represented as an argument). However, there is no analogous way of accounting for force matching, and so this account assumes syntactic feature matching for FORCE:

- (13) a. $[[\text{modal modal-base}]] \text{ obligatorily } p]$
 b. $[\text{obligatorily}_{u\forall}] = \lambda w \lambda p. p \text{ is obligatory in } w$

However, as we noted in the introduction, negation inverts FORCE. Thus, the adverbs licit above an auxiliary and its negation are duals, as we see for *cannot* ($\neg\exists$) and *need not* ($\neg\forall$). In contrast, the adverbs allowed below the scope of negation are precisely the same in both negated and non-negated cases, suggesting that negation compositionally changes FORCE.⁵

- (14) a. John $\left\{ \begin{array}{l} \text{obligatorily} \\ * \text{legitimately} \end{array} \right\}$ cannot be home.
 b. John cannot $\left\{ \begin{array}{l} * \text{obligatorily} \\ \text{legitimately} \end{array} \right\}$ be home.

⁴It is entirely possible that epistemics likewise have cases of genuine concord; in such cases our analysis will require modification, since epistemic adverbs are non-verdical.

⁵This is the reason for the contrast from Høye (1997) that Huitink (2008) discusses:

- (i) a. I can't possibly eat any more. *concord*
 b. You possibly can't eat any more. *stacking*

- (15) a. John $\left\{ \begin{array}{l} \text{*obligatorily} \\ \text{legitimately} \end{array} \right\}$ need not be home.
 b. John need not $\left\{ \begin{array}{l} \text{obligatorily} \\ \text{*legitimately} \end{array} \right\}$ be home.
- (16) a. $adv_{\{\checkmark Q, *DUALQ\}} modal_Q adv_{\{\checkmark Q, *DUALQ\}}$
 b. $adv_{\{*Q, \checkmark DUALQ\}} \neg modal_Q adv_{\{\checkmark Q, *DUALQ\}}$

The distributional reversal above negation is unsurprising under a semantic account, but it is difficult to see how formal feature analyses can capture it without recourse to stipulations about negation's effect on features. We thus take the sensitivity of FORCE to negation as indication that a fully semantic account of modal concord is desirable. We undertake this in the following section.

2.2 Analysis

Our core proposal is that concord adverbs are modal modifiers that assert their own modal claims about the proposition in question. Thus, they never lose their modal force. Rather, the compositional process ensures that both auxiliary and modifying adverb comment on the same proposition, with respect to the same modal base. FLAVOR will follow directly, while FORCE is somewhat trickier to capture.

Note that treating modal adverbs as modifiers (independently of how they modify) immediately accounts for the observation that the modal auxiliary and adverb must be clausemates, as in (17) (Zeijlstra 2008, Huitink 2008).

- (17) a. John must obligatorily be home by 12.
 b. #John must be home by the time the clock obligatorily strikes 12.

We suggest that this is simply the manifestation of a general restriction on adjunct modifiers, as with the eventuality modifier *needlessly* in (18), whose event target is determined by the clause it is in.

- (18) a. John was needlessly home by twelve.
 b. #John was home by the time the clock needlessly struck 12.

We will not discuss here the complex conditions for clausemate dependencies, but merely limit ourselves to the syntactic simplification that modals and concord adverbs are sisters at LF.

- (19) $[[[\text{adv modal}] f_{modal\ base}] \text{proposition}]$

Modal verbs will have their usual denotations (Kratzer 1977, 1981) (we specify only the modal base f for expository simplicity):

- (20) a. $[\text{must}] = \lambda w \lambda f_{s, \langle st \rangle t} \lambda p_{st}. \bigcap f(w) \subseteq p$

$$\text{b. } \llbracket \text{can / may} \rrbracket = \lambda w \lambda f_{s, \langle st \rangle t} \lambda p_{st}. \bigcap f(w) \cap p \neq \emptyset$$

Given the syntactic structure in (19), we propose that modal adverbs modify the modal verb and predicate their own modal claim about the argument proposition p that they ‘share’ with the modal verb. The modal claim is parametrized by the *common* modal base f , which the adverb may make (additional) demands on. (21) provides an informal denotation for *obligatorily*, formalized in (22).

$$(21) \quad \llbracket \text{obligatorily modal } f \text{ } p \rrbracket \text{ is defined iff } f \text{ is deontic; if so, } \llbracket \text{obligatorily} \rrbracket(w)(f)(p) \text{ and } \llbracket \text{modal} \rrbracket(w)(f)(p)$$

$$(22) \quad \llbracket \text{obligatorily} \rrbracket = \lambda M_{s, \langle \langle s, \langle st \rangle t \rangle, \langle st \rangle t \rangle} \lambda w \lambda f_{s, \langle st \rangle t} \lambda p_{st} : f \text{ is deontic.} \\ M(w)(f)(p) \wedge \bigcap f(w) \subseteq p$$

Note that in (22) the modal base is presupposed to be deontic, as in the O+F framework, though here it is because, alike with all modal operators (i.e., the auxiliaries), the adverb specifies the modal bases it will quantify over.

While the modal base presuppositions capture FLAVOR, they do not capture FORCE agreement. We propose that non-agreeing situations are illicit not because of a formal requirement (recall NEGATION), but because of a contradiction between an \forall assertion and a $\neg\forall$ **implicature** triggered by the \exists assertion. Let us consider the example in (23):

$$(23) \quad \# \text{We must legitimately deny your request.}$$

We claim that the universal assertion from *must* clashes not with the relatively trivial existential assertion from *legitimately*, but its strengthened implicature. To appreciate this, first consider the denotation of *legitimately* in (24), which differs from (22) only in quantificational force.

$$(24) \quad \llbracket \text{legitimately} \rrbracket = \lambda M_{s, \langle \langle s, \langle st \rangle t \rangle, \langle st \rangle t \rangle} \lambda w \lambda f_{s, \langle st \rangle t} \lambda p_{st} : f \text{ is deontic.} \\ M(w)(f)(p) \wedge \bigcap f(w) \cap p \neq \emptyset$$

Then we have the following two assertions for (23):

$$(25) \quad \text{a. } \text{ASSERTION from modal: all m.b. worlds are denial worlds} \\ \bigcap f(w) \subseteq \{w : \text{request denied in } w\} \\ \text{b. } \text{ASSERTION from adv: } \bigcap f(w) \cap \{w : \text{request denied in } w\} \neq \emptyset$$

However, existentials trigger a non-universality implicature, which directly clashes with (25-a):

$$(26) \quad \text{IMPLICATURE from adv: some m.b. world is not a denial world} \\ \bigcap f(w) \cap \{w : \neg \text{request denied in } w\} \neq \emptyset$$

It is this inference, we think, that clashes with (25-a) and produces the contradiction in (23). As this is an implicature, the natural question is why this is not straightforwardly cancelled. One

attractive option would be to argue that composition of modal adverbs and auxiliaries forces exhaustification, rendering the implicature a *bona fide* assertion of free choice:

- (27) $[[\text{legitimately}]] = \lambda M_{s, \langle \langle s, \langle st \rangle t \rangle, \langle st \rangle t \rangle} \lambda w \lambda f_{s, \langle st \rangle t} \lambda p_{st} : f \text{ is deontic.}$
 $M(w)(f)(p) \wedge \bigcap f(w) \cap p \neq \emptyset \quad \wedge \quad \bigcap f(w) \cap \bar{p} \neq \emptyset$

However, such an approach incorrectly predicts that the implicature is uncancellable with an adverb, true for *optionally/freely* (the real free choice items in this domain) but not *legitimately*

- (28) a. We can legitimately deny your request. In fact, we have to.
 b. We can $\left\{ \begin{array}{l} \text{optionally} \\ \text{freely} \end{array} \right\}$ deny your request. *In fact, we have to.

Instead, we will suggest that the availability of cancellation is proscribed. In particular, it is not available in one simple assertion, but only during subsequent discourse update.⁶ This constraint is also active in the individual domain, as shown in the examples below, where there is a clash between the implicatures of an overt quantifier and the generic operator. This suggests that a domain-neutral pragmatic procedure is at work (cf. Magri 2009).

- (29) Boys will $\left\{ \begin{array}{l} \text{*sometimes} \\ \text{always} \end{array} \right\}$ be boys.

- (30) a. *Most dolphins are dolphins.
 b. Every dolphin is a dolphin.⁷

How might we make sense of this constraint on cancellation? We sketch two accounts. Under one proposal, simple assertions are viewed as one package of proposals to update the current state of the conversation. As such, there is a normative requirement of internal consistency, given the agent's goal (maximal acceptance across all dimensions of meaning). Another account would emphasize the triviality of the existential assertion in the presence of the universal. The constraint on NON-TRIVIALITY of common ground update (Stalnaker 1984) is directional since (32) is acceptable.⁸

- (31) You must take out the trash. #In fact, you can.

- (32) You can take out the trash. In fact, you must.

However, modal concord cases are not directional, as auxiliary and adverb simultaneously contribute. One might argue that triviality for simultaneous assertion requires checking both directions; if so, one of them will always produce a trivial update.

⁶This procedure is clearly not in force for other modifiers:

- (i) John slipped without actually falling.

⁷Examples (30-a) and (30-b) are from Brasoveanu (2006), where they are attributed to R. Schwarzschild.

⁸See Singh (2008) for closely related observations.

2.3 Negation

In the previous subsection, we dealt with FLAVOR and FORCE, but were silent about the modulation of FORCE by negation – that when negation scopes over a modal (14-a), it allows the dual deontic adverb to scope over the modal+negation constituent. We must now discuss this in the context of the structure assumed in (19).

In sum, we propose that negation acts as a dual operator on the modal, operating above or below the position of the adverbial modifier. When it operates above, we see the appearance of force-matching adverbs, while when it operates below, we see force reversal:

- (33) a. *obligatorily cannot* — LF: [obligatorily [DUAL can]]
 b. *cannot legitimately* — LF: [DUAL [legitimately can]]

Assuming that $\text{DUAL}(\llbracket \text{can} \rrbracket) = \llbracket \text{must} \rrbracket$ and vice versa, we arrive at an interpretation for (33-a) that alters the auxiliary to $\llbracket \text{must} \rrbracket$:

- (34) $\llbracket \text{obligatorily [DUAL can]} \rrbracket = \lambda w \lambda f_{s,(st)t} \lambda p_{st} : f \text{ is deontic.}$
 $\text{DUAL}(\llbracket \text{can} \rrbracket)(w)(f)(p) \wedge \bigcap f(w) \subseteq p$

However, the dual semantically requires an additional form of negation. Hence, we assume that propositional negation is syntactically present and takes scope over the sentence radical.

- (35) *John obligatorily cannot be home* —
 LF: [obligatorily [DUAL can] *w f*] [NEG [John be home]]

- (36) $\llbracket \text{NEG} \rrbracket = \lambda p_{st} \lambda w. \neg p(w)$

This leads to the following correct truth conditions:

- (37) $\llbracket \llbracket \text{obligatorily [DUAL can } wf \rrbracket \rrbracket \llbracket \text{NEG [John be home]} \rrbracket \rrbracket$ is defined iff f is deontic;
 if so, it is 1 iff $\text{DUAL}(\llbracket \text{can} \rrbracket)(w)(f)(\neg \text{home}'(j)) \wedge \bigcap f(w) \subseteq \neg \text{home}'(j)$

We provide two kinds of evidence in support for an analysis of modal-verb negation along these lines. First, (a suitable generalization of) propositional negation enables us to account for modal subordination examples like (38) below.

- (38) Bill doesn't have a car. It would be parked in front of the house.
 -✓ if Bill had a car, it would be parked in front of the house

But there is no parallel 'propositional' reading for cases of modal-verb negation like (39) below. If modal-verb negation was simply a propositional operator that could take scope above or below the modal, we predict that the second reading listed below should be available.

- (39) Bill couldn't possibly have a car. He wouldn't have anywhere to park it.

- ✓if Bill had a car, he wouldn't have anywhere to park it
- #if Bill could have a car, he wouldn't have anywhere to park it

Second, the relative scope of negation and various modals is lexically specified – and this kind of interaction supports the idea that modal-verb negation is different from regular propositional negation. The relative scope of negation and modals can be modeled as the lexically-specified presence vs absence of the DUAL operator:

- (40) a. You needn't leave.
b. LF: DUAL(\forall) NEG(you leave)
- (41) a. You mustn't leave.
b. LF: \forall NEG(you leave)
- (42) a. You can't go home for Thanksgiving.
b. LF: DUAL(\exists) NEG(you go home)
- (43) a. You can't not go home for Thanksgiving.
b. LF: DUAL(\exists) NEG(NEG(you go home))

2.4 Interim Conclusion

The system articulated above captures the various constraints we have observed for modal concord, FLAVOR, FORCE, and NEGATION. The first is the result of a constraint a concord adverb places on the common modal base, the middle of clash between a universal assertion and the implication of that assertion's negation, and the final constraint of the operation of a DUAL operator in the logical form. We have been silent on STRENGTHENING, which we see as simply the pragmatic reflex of redundancy. Thus, unlike in ABSORPTION, neither statement actually vanishes from the assertion, triggering the inference of strengthening.

3 Widening the net

In the remainder of the paper we take up the broader project of attempting to fit modal concord within the general behavior of modal modifiers, both when there is a modal auxiliary present and when there is not. If the skeleton of our proposal is correct, there should be nothing particular about modal concord *per se* beyond the general logic of modification.

With respect to this, there are two questions of note. The first concerns the typology of concord properties. We have seen adverbs sensitive to FLAVOR and FORCE, but what about independently. Our examination of the adverbs appearing with English modal auxiliaries in the Corpus of Contemporary American English (COCA, www.americancorpus.org⁹) reveals a glaring gap – no adverbs sensitive to FORCE alone.

⁹COCA is a large, balanced corpus of 400+ million words that includes 20M words each year from 1990-2009, divided among spoken, fiction, popular magazines, newspapers and academic texts. We examined adverbs

FLAVOR \wedge FORCE	<i>legitimately</i>
FLAVOR	<i>legally</i>
FORCE	undiscovered
neither	<i>absolutely</i>

In addition to explaining the sensitivities modal adverbs show to their auxiliary partners, a general account of these items should also seek to capture the range of readings modal adverbs can have in extensional environments – and decide whether we should provide a unified account of (a subset of) these readings. Thus, the two adverbs below show outside of concord the following kinds of readings (using the terminology of Ernst 2002, 2007):

- (44) a. additional readings for *legally*: domain, means-domain, manner, clausal
 b. additional readings for *legitimately*: manner, clausal

In exemplifying the aims of this project, in this section we will focus on only two classes of adverbs: *absolutely* and *legitimately / legally*. We shall pay particular attention to determining if modal concord is assimilable to one of the extensional categories, and conclude that as of yet there is no clear unification.

3.1 *Absolutely, Definitely and relatives*

3.1.1 Distributional facts

As discussed above, *absolutely / definitely* and their relatives (*certainly, really, and for sure*) are both force and flavor neutral:

- (45) a. There is no choice, he absolutely must stay in the lineup.
 b. Yes, sir, you absolutely may.
 c. It probably wouldn't make sense for a college professor, but absolutely might make sense for a bus driver.¹⁰

As we mentioned in section 2, it is important to verify that this is not a case of stacking, or, more generally, that *absolutely* isn't serving as an epistemic or evidential marker. We suspect not, given that for the first two examples above, the speaker is in fact the deontic authority (or the authority's proxy), in which case knowledge does not seem relevant. Intuitively, in such examples the contribution of *absolutely* is similar to *regardless of circumstance* and *without exception*.¹¹

appearing with *can, could, may, might, must, should, have to*, revealing the following list: *absolutely, accidentally, apparently, arguably, barely, certainly, clearly, conceivably, definitely, easily, hardly, honestly, ideally, just, legally, legitimately, literally, maybe, necessarily, obligatorily, obviously, mandatorily, perhaps, plausibly, possibly, potentially, practically, probably, reasonably, scarcely, simply, surely, for sure, theoretically, truly, (very / damn) well*.

¹⁰www.capitalgainsandgames.com/blog/stan-collender/1052/keith-hennessy-only-asks-part-health-care-reform-question.

¹¹This is possibly similar to *single* in the individual domain – consider the behavior of *every single student* and a *single student*.

Definitely seems to be interpreted in the same way; when something is not just allowed, but *definitely* allowed, it is allowed under a subset of the deontic worlds (e.g., those where there are no bad consequences). In contrast, with universals, *definitely* goes for a large superset of the deontic worlds.

- (46) You can / must definitely come in now.
(vs: You can / must come in now.)
- (47) If you come to Monterey, you can / must definitely stay with Craig.
(vs: If you come to Monterey, you can / must stay with Craig.)

Thus, these items in general select the **strongest meaning** given the contextual modal bases / ordering sources:¹²

- (48) a. existential: choose the smallest modal base $\bigcap f(w)$ (i.e., the largest set of propositions $f(w)$), so that $\bigcap f(w) \cap p \neq \emptyset$ is as strong as possible
b. universal: choose the largest modal base $\bigcap f(w)$ (i.e., the smallest set of propositions $f(w)$), so that $\bigcap f(w) \subseteq p$ is as strong as possible

3.1.2 Accounting for the data

The above data may be straightforwardly dealt with in terms of quantification, assuming the context provides multiple relevant modal bases (truly: multiple conversational backgrounds determining ordering sources):

- (49) $[\text{absolutely}]^c = \lambda M \lambda p \lambda w. \forall f \in c[M(f)(p)(w)].$

Another possibility arises from the work of Grosz (to appear), who constructs modal scales of necessity (via ordering sources), defining duals in terms of scale reversal for the negation of the argument proposition:

- (50) a. $[\text{must}] = \lambda d \lambda p \lambda w. \text{NECESSITY}(p)(w) \geq d.$
b. $[\text{may}] = \lambda d \lambda p \lambda w. \text{NECESSITY}(\neg p)(w) < d.$

Absolutely and its kin are thus degree words, specifying a maximal degree for a scale. This produces precisely the desired result for these adverbs.

¹²This calculation is local to the modal, not the entire sentence, as we can see by the lack of inversion in downward-entailing environments:

- (i) a. Each person who could definitely [i.e., without repercussions] stay with Craig called him.
b. Each person who definitely had [was maximally obligated] to stay with Craig called him.

$$(51) \quad [\text{completely}] = \lambda M \lambda p \lambda w. M(\text{max}_{ad} \in \text{SCALE}(M))(p)(w).^{13}$$

Grosz (to appear) extends this to modal concord, encoding the FORCE requirement in terms of a scale structure presupposition (thus, FORCE conflicts are a result of cross-polar anomaly):

$$(52) \quad \begin{array}{l} \text{a. } [\text{obligatorily}] = \lambda M \lambda p \lambda w : M \text{ is deontic and } \mathbf{positive}. \\ \quad M(\text{max}_{ad} \in \text{SCALE}(M))(p)(w) \\ \text{b. } [\text{legitimately}] = \lambda M \lambda p \lambda w : M \text{ is deontic and } \mathbf{negative}. \\ \quad M(\text{min}_{ad} \in \text{SCALE}(M))(p)(w) \end{array}$$

This is a very elegant system, but note that the various components (force and flavor requirements, type of degree provided) are independent primitives. Thus, there is nothing truth-conditionally blocking a modal concord adverb which gives a min degree for a universal or which provides a max degree for an existential (that is, goes for the weakest reading). So far, we haven't found such an item (note that *barely* is force and flavor neutral).¹⁴

$$(53) \quad [\text{legitimately may}] = \lambda p \lambda w. \text{NECESSITY}(\neg p) < \text{max}_{ad} \in \text{SCALE}(\text{NECESSITY}) \\ \text{i.e., } p \text{ is not absolutely impossible.}$$

3.2 *Legitimately vs Legally*

We now turn to a comparison of *legitimately* and *legally*. We compare these because they are both intuitively existential, especially in extensional contexts. And yet, in modal cases, they behave quite differently, since *legally* is a force-neutral modal base specifier.

3.2.1 *Legitimately and Legally in modal environments*

We have claimed that *legitimately* is sensitive to FORCE. In contrast, it would seem that *legally* is force neutral, but it does have a deontic flavor requirement. It is thus the analog of Kratzer's *in virtue of* clauses.

- (54) a. The Boy Scouts claim they are a private organization and legally may set their own standards for membership.
 b. Again, we remind you that Ted Kaczynski has not gone on trial yet, so legally he must still be presumed innocent.

¹³Grosz acknowledges the compositional difficulties for *completely possible* given the scale structure assumed.

¹⁴Grosz does connect these to the German particles *ja*, *bloß* and *ruhig* discussed in Grosz (2008) (see also the Romanian particle *liniştit*, the counterpart of *ruhig*). While the English adverbs are compatible with both existential and universal force, the German and Romanian particles exhibit FORCE – *ja* and *bloß* require universal force, while *ruhig* and *liniştit* require existential force. Hence, these are terms that behave like *absolutely* but require an orientation.

If the above characterization is correct, we should see the contrasts between *legitimately* and *legally* in corpus investigation. (55) shows a contingency table based on COCA searches¹⁵ in environments with existential modals (*can*, *could*, *not have to*) and universal modals (*can't*, *couldn't*, *must*, *have to*). This difference is highly significant ($\chi^2 = 44.32$, $df = 1$, $p = 2.79e - 11$). As expected, the *legitimately*+universal cell contributes the most to the χ^2 value.

	<i>legitimately</i>	<i>legally</i>	χ^2 contributions	<i>legitimately</i>	<i>legally</i>
existential	266	658	existential	8.07	2.57
universal	26	257	universal	26.34	8.41

Recall that under our explanation for NEGATION, *legitimately* should be able to appear below negation with existentials. There are four examples in COCA with $\neg\exists$ concord, given in (56) below, suggesting that this is not correct. In addition, as all the examples involve *can*, they may be analyzed as cases of capability above a clausal use of *legitimately* (see section 3.3).

- (56)
- a. Because of widespread corporate belt-tightening, you can't legitimately sum up career status with salary ranges and promotions anymore.
 - b. The state can't legitimately cut \$700 million.
 - c. They couldn't legitimately take pride in it.
 - d. I thought music would articulate that which you couldn't legitimately articulate in dialogue.

Thus, the results of our corpus search are mixed for the claims in section 2.

There is a further contrast between *legally* and *legitimately* worth noting. *Legally*'s effect is not clause bounded, even by evidential attitudes (see Simons 2007 for discussion of these forms):

- (57) Legally, I think you could probably chew her up [for her testimony].

This is in line with the behavior of conditional antecedents noted by Iatridou (1991),¹⁶ but in sharp contrast with *legitimately*.

- (58) {If he hurries, Whether or not he hurries, To get to Harlem}, I suspect that John can be out by noon. (Kyle Rawlins, p.c.)
- (59)
- a. *Legitimately, I think you could probably chew her up.
 - b. *Legitimately, I suspect that John can be out by noon.

This behavior suggests that *legally* can be assimilated to a domain restrictor (like conditional antecedents and *in virtue of* clauses), but *legitimately* should not be; this contrast may be surprising under a mixed approach such as that of Huitink (2008).

¹⁵At a time when COCA did not contain the 2009 texts, i.e., it had only approx. 385M words.

¹⁶We are indebted to Kyle Rawlins for noticing this connection.

3.2.2 *Legally and Legitimately in their extensional uses*

In this final section, we consider the behavior of these two adverbs in extensional settings. While the most theoretically parsimonious move would be to unify the modal concord uses of these adverbs with those above, we will conclude that the nature of the reduction is not yet obvious. In extensional contexts, *legally* has several interpretations (cf. Ernst 2002).

- (60)
- a. DOMAIN (alters the domain with respect to which the predicate is evaluated)
No laws had been broken, and, after all, David was legally an adult.
 - b. MEANS-DOMAIN (specifies domain of manner of accomplishment)
There's little the besmirched can do legally, unless there are children involved.
 - c. MANNER
I mean, we do everything legally.
 - d. CLAUSAL (comment on nature of event property)
Legally, it's used as an anesthetic.

It is still unknown how best to unify these readings, but we will ask here whether some of them should be unified with modal concord.

We will now argue that the clausal interpretation is probably not the source of modal concord. There are three approaches to unification of MANNER and CLAUSAL in extensional settings. Wyner (1994) argues that the adverbs are EVENT MODIFIERS, and that the differences above correlate with the sub-event being modified. Ernst (2002) argues instead that they arise from contextual DOMAIN RESTRICTION of the adverb's quantificational domain. Finally, Rawlins (2008) argues that the manner reading is the result of TYPE-SHIFTING the clausal use into an event-property. Both the event modifier and type-shifting approaches correctly predict correlations between adverb position and interpretation.

- (61)
- a. Legally, Alfonso moved the pawn.
'Alfonso moved a pawn, and all such pawn-moving events by him are permitted.'
 - b. Alfonso moved the pawn legally.
'Alfonso moved the pawn in a manner which was permitted.' (Rawlins 2008)

Following Piñón (2007), assume that manners are representable via relations between event properties and events.

$$(62) \quad [\text{legally}] = \lambda P \lambda e \lambda w. P(e)(w) \wedge \text{LEGALLY}(P)(e)(w)$$

We will define the legality of a property P in terms of its manner being instantiated in one of the worlds that obey the laws:

$$(63) \quad \text{LEGALLY}(P)(e)(w) \text{ iff } \exists w' \in \text{LEGAL}(w) [\exists e' [e' \text{ in } w' \wedge P\text{-manner}(e)(e')(w')]]$$

CLAUSAL and MANNER readings thus differ on whether the event property contains temporal information (we assume that temporal information is event modification) (cf. Rawlins 2008).

- (64) a. Alfonso moved the pawn.
 b. manner: $\lambda e \lambda w. move'(a, ix.pawn(x), e, w)$
 c. clausal: $\lambda e \lambda w. move'(a, ix.pawn(x), e, w) \wedge \tau(e) \subseteq t \wedge t < t_{@}$

Even with this, it is not clear how this can be extended to handle modal modification, since the definition above discusses legal events in terms of legal worlds, and legal worlds are the objects we wish to manipulate in the modal modification cases. That is, the CLAUSAL/MANNER forms are interdefined with the modal concord forms, suggesting that unification is precisely the wrong tack to take.

This leaves us with DOMAIN undiscussed. Suggestively, domain *legally* like modal *legally* can cross evidential attitudes, unlike the other two uses:

- (65) a. Legally, I think it could make a very big difference.
 b. #Illegally, I think that he moved the pawn.

However, assimilation of concord readings to domain readings is challenged by *legitimately*, which has no domain interpretation, but has manner and clausal interpretations:

- (66) a. MANNER
 Some did finally give up the ghost legitimately, but others doubtless were scuttled.
 b. CLAUSAL
 Someone who invites you to lunch legitimately wants to get to know you.

Thus, distributionally it would seem that there is a correlation with modal modification and MANNER and CLAUSAL uses, but it is unclear how to derive them in a similar fashion.

4 Conclusion

We have argued that modal concord (in non-epistemic environments) arises because the adverb is a modifier that makes its own ancillary modal claim. While modal flavor consonance is grammatically determined, we take agreement in modal force to be a pragmatically mediated phenomenon, specifically, due to contradiction between a universal assertion and its implicated negation. Finally, we have argued that the facts of NEGATION are problematic for a syntactic account of concord phenomena, but accountable under a semantic treatment.

Nonetheless, we believe the accounts of modal concord (including the present one) should take into account the broader issues articulated in the final section of the paper, namely the typology of the semantic interactions between modal auxiliaries and modal modifiers and the range of readings and the typology of modal adverbs more generally. We argued that a class of modal base strengtheners (like *absolutely*) require a different account than concord adverbs, which show other uses in extensional settings – but indicated that at present there is no clear connection between these other uses and modal uses.

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