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Against wide scope free choice*

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Abstract Sentences of the form "x may A or x may B" have a reading that implies "x may A" and "x may B". This has led many to conclude that there is a specific problem of *wide-scope free choice*, namely, the problem of explaining how a disjunction of possibilities $\Diamond \mathsf{A} \vee \Diamond \mathsf{B}$ can receive a reading that implies its disjuncts. We argue that this conclusion is mistaken: once we consider a broader range of data, it becomes plausible that the relevant reading in fact results from an LF of the form $\Diamond(\mathsf{A} \vee \mathsf{B})$. This raises the question of how this LF arises compositionally. We propose a solution based on the theory of modal concord of Zeijlstra (2007), which avoids the problems of previous movement-based approaches and explains an interesting contrast observed by Meyer & Sauerland (2017).

Keywords: free choice, modals, disjunction, coordination, modal concord

1 Introduction

A long-standing problem in modal semantics revolves around so-called *free choice inferences*. The problem is to explain why a sentence like (1) licenses robust inferences to the conclusions (1-a) and (1-b).

(1) You may do A or B.
   a. $\rightsquigarrow$ You may do A.
   b. $\rightsquigarrow$ You may do B.

Standard modal logic does not validate the corresponding entailments $\Diamond(\mathsf{A} \vee \mathsf{B}) \models \Diamond\mathsf{A}$ and $\Diamond(\mathsf{A} \vee \mathsf{B}) \models \Diamond\mathsf{B}$, and cannot be extended to validate them on pain of trivializing the logic of $\Diamond$ (Kamp 1974). The solutions to this problem can be roughly divided into two camps: some approaches (Zimmermann 2000,

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Geurts 2005, Simons 2005, Aloni 2007, Fusco 2015, Aloni 2022, Booth 2022, Goldstein 2019) revise the semantics of modals and disjunction to validate the relevant entailments; others retain a standard semantics for modals and disjunction and derive free choice inferences as implicatures through complex processes of meaning enrichment (Kratzer & Shimoyama 2002, Schulz 2005, Fox 2007, Franke 2011, Bar-Lev & Fox 2020).

It has long been noted that sentences like (2) also license inferences to (2-a) and (2-b).

(2) You may do A or you may do B.
   a. $\rightsquigarrow$ You may do A.
   b. $\rightsquigarrow$ You may do B.

This is widely taken (see, for instance, Zimmermann 2000, Aloni 2022) to be evidence for a separate problem of "wide-scope free choice": the problem of explaining why the conclusions $\Diamond \mathsf{A}$ and $\Diamond \mathsf{B}$ can be derived from $\Diamond \mathsf{A} \vee \Diamond \mathsf{B}$ — a very puzzling fact, since from a disjunction we can*not* normally infer the individual disjuncts. Most existing solutions to the free-choice problem fail to extend to wide-scope free-choice; exceptions are Zimmermann 2000, Geurts 2005, Schulz 2005, Aloni 2022.

In this paper, we argue against the existence of a separate problem of wide-scope free-choice, defending the following view.

> *The reductionist thesis.*
> The free-choice reading of sentences like (2) does not arise from the LF $\Diamond \mathsf{A} \vee \Diamond \mathsf{B}$, but from the LF $\Diamond(\mathsf{A} \vee \mathsf{B})$.

We are not the first to make this claim: Simons (2005) took this view, proposing a compositional account of (2) that relies on *across the board (ATB) movement* of the modal at LF. However, by her own admission, there is no independent evidence that ATB movement can take place at LF. On the contrary, there is evidence that it *cannot* happen; this is for instance the case for nominal quantifers: (3-a) cannot be interpreted as (3-b).

(3) a. Everyone sang or everyone danced.
   b. Everyone sang or danced.

More recently, Meyer & Sauerland (2017) proposed an account based on overt ATB movement, which avoids this problem but faces a different challenge (see Section 4.1).

In this paper, we contribute to defending the reductionist thesis in two ways: by providing novel evidence for the thesis (Section 2), and by offering a novel account of how the LF $\Diamond(\mathsf{A} \vee \mathsf{B})$ may be compositionally derived for (2) (Section 3). We conclude by pointing out some repercussions and open problems (Section 4).

2 Against wide-scope free choice

Previous work has focused on sentences of the form "may A or may B". We will broaden the scope of the discussion by considering the more general behavior of sentences of the form

(4) Mod A coord Mod B.

where Mod is a modal auxiliary and coord a coordinating item (*and*/*or*). Our contention is that such constructions are generally ambiguous between a reading that involves a coordination of two modal claims, and one that involves a single modal operator scoping over a coordination of non-modal clauses. In other words, if Mod expresses the operator Δ and coord the connective $\circ$, then (4) has two readings, corresponding to the following LFs:

$$\Delta\mathsf{A} \circ \Delta\mathsf{B} \qquad\qquad \Delta(\mathsf{A} \circ \mathsf{B})$$

If one assumes, with Zimmermann (2000) and Aloni (2022), that the only LF for (4) is $\Delta\mathsf{A} \circ \Delta\mathsf{B}$, one is faced with the problem of finding an alternative derivation of the missing reading corresponding to $\Delta(\mathsf{A} \circ \mathsf{B})$. The problem disappears if we accept that (4) is indeed subject to a scope ambiguity.

Must or must. Suppose Alice asks Bob how one can get credit for a certain course. Bob replies:

(5) (Either) you must write an essay or you must give a presentation.

Bob's response has two distinct readings. On one reading, Bob isn't sure about the answer to Alice's question: he is uncertain whether one gets credit by writing an essay or by giving a presentation, and he could follow up with "I'm not sure which". This reading is naturally regimented by the LF $\Box\mathsf{essay} \vee \Box\mathsf{presentation}$.

Under another reading, Bob is giving a complete answer to Alice's question: to get credit, one is required to do either of two things; (5) conveys a

disjunctive obligation, captured by the LF $\Box(\mathsf{essay} \vee \mathsf{presentation})$.[1] This reading is dominant when Bob is assumed to be knowledgeable (e.g., if he is the instructor).

Interestingly, an online search for sentences of the form "Either you must A or you must B" returns almost exclusively examples whose intended interpretation is $\Box(\mathsf{A} \vee \mathsf{B})$:

(6) a. Either you must stop eating my food from the refrigerator or you must pay me for it.
b. Gentlemen, either you must govern or you must be governed.
c. Whatever the hell you are right now, it's yours. Either you must have the courage to change it or you must learn to settle into it.

In each case, the addressee is clearly being presented with two options to choose from.

May and may. Imagine that Alice has three friends who are having birthdays this week: Bob, Charlie, and Diana. Each of them invited Alice to their party. Alice asks her mom for permission to go to these parties. Mom thinks about this, and tells Alice that she can't go to Diana's party, as she has an exam the following morning. However, she says:

(7) You may go to Bob's party and you may go to Charlie's party.

How many parties is Alice allowed to go to? The natural answer seems to be *two*. In other words, Mom's statement in (7) is naturally interpreted as a permission to go *both* to Bob's party and to Charlie's party, which is captured by the LF $\Diamond(\mathsf{Bob} \wedge \mathsf{Charlie})$.

In addition to this salient conjunctive permission reading, (7) also has a second reading as a conjunction of permissions, corresponding to the LF $\Diamond\mathsf{Bob} \wedge \Diamond\mathsf{Charlie}$. This reading is brought out, e.g., by the continuation "but you can't go to both".

That (7) has a reading as a conjunctive permission can be verified by embedding it in the antecedent of a conditional. Imagine that children are normally allowed to attend only one party per week (and may choose which). A few children are allowed to attend multiple parties in the same week, and are considered lucky. Consider:

1 In addition, (5) implies that each disjunct is permitted. This free-choice component presumably arises in the same way as for the sentence "you must write an essay or give a presentation". Whatever our story for free-choice in the latter, the same applies to (5).

(8) If Alice may go to Bob's party and she may go to Charlie's party, she's lucky.

In our scenario, this conditional has a true reading. This reading can only come from a reading of the antecedent which corresponds to the LF $\Diamond(\mathsf{Bob} \wedge \mathsf{Charlie})$, since the conclusion that Alice is lucky only follows if she's allowed to go to two parties; it is not warranted if the antecedent is interpreted as $\Diamond\mathsf{Bob} \wedge \Diamond\mathsf{Charlie}$, since that only means that each party is individually permitted, which is compatible with her parents upholding the one-party-per-week rule.

As further evidence of the relevant reading, note the following contrast:

(9) a. You may come with me or you may stay here.
b. ?You may come with me and you may stay here.

While (9-a) is perfectly natural, (9-b) has one striking reading on which it is absurd, precisely because it implies the possibility of the addressee *both* going and staying.[2]

Taking stock. Let us now come back to our initial concern, i.e., sentences of the form "may A or may B". Based on the previous discussion, we expect such sentences to have two LFs: $\Diamond\mathsf{A} \vee \Diamond\mathsf{B}$, and $\Diamond(\mathsf{A} \vee \mathsf{B})$. Moreover, it is well-known that such sentences have two readings: an ignorance reading, conveying that the speaker is unsure which of A and B is allowed, and a free-choice reading, conveying that each disjunct is allowed. Presumably, each of the two LFs is responsible for one of the readings. It seems overwhelmingly plausible that the ignorance reading comes from the LF $\Diamond\mathsf{A} \vee \Diamond\mathsf{B}$, since disjunctive sentences generally generate ignorance readings. In addition, this claim has been argued for in detail by Fusco (2019) based on a careful analysis of sluicing constructions (e.g., "I don't know which"). It follows that the free-choice reading is generated by the LF $\Diamond(\mathsf{A} \vee \mathsf{B})$, just as the Reductionist Thesis would have it. Further support for this idea comes from the comparison with the must-or-must case, where the LF $\Box(\mathsf{A} \vee \mathsf{B})$, expressing the obligatoriness of the disjunction, also gives rise to free-choice inferences.

2 What about coordinations of the form "must and must"? We similarly think that two LFs are possible for such sentences, $\Box\mathsf{A} \wedge \Box\mathsf{B}$ and $\Box(\mathsf{A} \wedge \mathsf{B})$. In the standard modal semantics, these LFs lead to the same truth conditions. Yet, as the Editor suggests, there might be a conceptual difference: the former conveys two obligations, the latter a single conjunctive obligation. The question, then, is whether a sentence of the form "You must do A and you must do B" can have, in addition to a two-obligations reading, also a one-obligation reading. We think this reading is possible, for one can naturally say: "There is only one thing I require you to do: you must go to my brother and you must give him this letter".

3 Scope via modal concord

We have argued that sentences of the form in (10) are ambiguous between the LF in (10-a) and the one (10-b).

(10) Mod A coord Mod B
  a. $\Delta(A \circ B)$
  b. $\Delta A \circ \Delta B$

But how can a sentence like (10) be compositionally associated with the LF in (10-a)? If we assume that each occurrence of a modal auxiliary contributes a modal operator at LF, this seems puzzling: the LF of (10) should unambiguously contain two modals, as in (10-b). However, there is independent evidence that this assumption is false. This is clearly illustrated by cases of modal concord like (11):

(11) a. The boss allows that Alice may leave.
  b. The boss demands that Bob must stay.

On one reading of these sentences, although two modal words are present, only one of them contributes a modal operator at LF. On these grounds, on a prominent account of modal concord (Zeijlstra 2007), modal auxiliaries like 'may' are argued to be semantically vacuous. Specifically, every modal element is assumed to carry a modal feature, specified for modal force ($\exists/\forall$) and either semantically active (interpretable, 'i') or vacuous (uninterpretable, 'u'), as in (12).

(12) [i$\exists$-MOD]
  [u$\exists$-MOD]
  [i$\forall$-MOD]
  [u$\forall$-MOD]

If a modal item carries an uninterpretable feature, it must be c-commanded by a modal item that carries a semantically interpretable modal feature. Zeijlstra argues that modal auxiliaries carry an uninterpretable modal feature, whereas other modal elements like *allow* or *demand* carry an interpretable modal feature. Thus, in the salient modal concord reading of (11) where only one modal operator is present at LF, the verb *allows*, which carries interpretable features, "checks" the uninterpretable features of the occurrence of *may* it c-commands, as in (13). This correctly predicts the availability of an LF like (13-b) containing only one possibility modal.

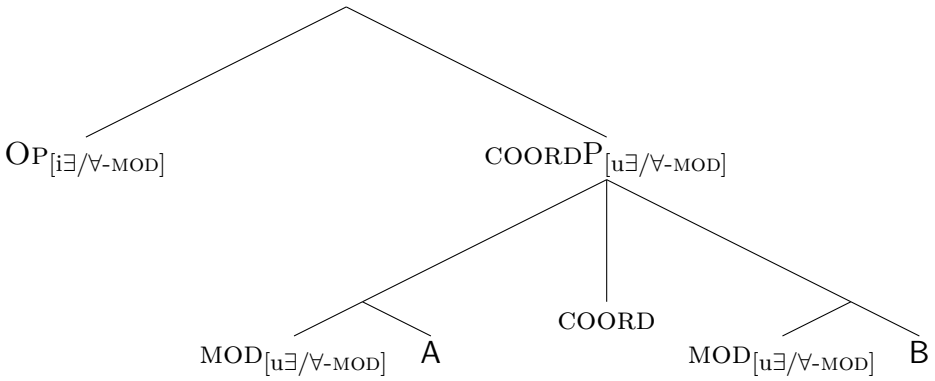
(13) a. The boss allows$_{[i\exists\text{-MOD}]}$[that Alice may$_{[u\exists\text{-MOD}]}$ leave]
b. $\Diamond$(Alice leave)

Zeijlstra furthermore argues that, when occurring in isolation as in (14-a), modal auxiliaries are c-commanded by a silent modal operator carrying interpretable modal features, as in (14-b), allowing them to get their features checked. This ensures the presence of a modal operator at LF, as in (14-c).

(14) a. Alice may leave.
b. $\Diamond_{[i\exists\text{-MOD}]}$[Alice may$_{[u\exists\text{-MOD}]}$ leave]
c. $\Diamond$(Alice leave)

Going back to coordinate sentences with superficial forms like those in (10), we simply propose that when two auxiliaries with the same feature occur in a sentence, their features can be checked by a single silent operator c-commanding the coordinate structure that inherits their modal feature, as shown in (15).[3] This yields an LF like (10-a) in which the modal outscopes the connective denoted by the coordinator.

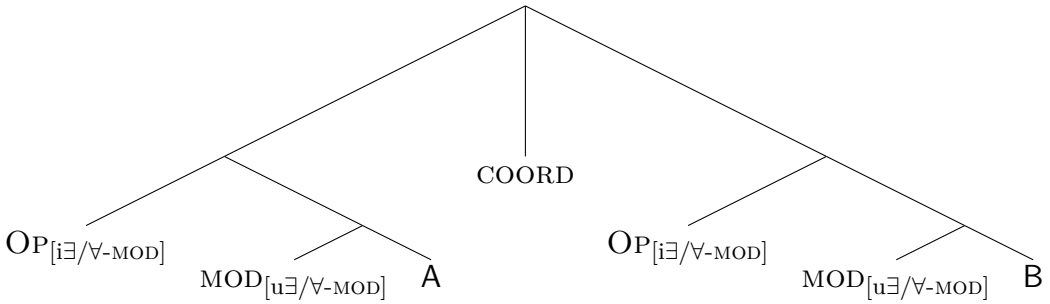
(15) Structure giving rise to an LF of the form $\Delta(A \circ B)$ (cf. (10-a)):



Alternatively, two modal operators can be present, each checking the features of the modal auxiliary appearing in their coordinate, as in (16):

(16) Structure giving rise to an LF of the form $\Delta A \circ \Delta B$ (cf. (10-b)):

3 See for instance McCloskey 1986 for a discussion of agreement with coordinate structures.



For an illustration, let us show how an ambiguity is derived for the sentence "Al may sing or he may dance". One option is that a silent possibility modal agreeing with the whole disjunction appears in a high position, as shown in (17-a) (cf. (15)). Since it is the silent modal operator that gets interpreted, this yields the LF in (17-b), where the disjunction is interpreted with narrow scope.[4]

(17) a. $\Diamond_{[i\exists\text{-MOD}]}[[\text{Al may}_{[u\exists\text{-MOD}]}\ \text{sing}]\ \text{or}\ [\text{he may}_{[u\exists\text{-MOD}]}\ \text{dance}]]_{[u\exists\text{-MOD}]}$
b. $\Diamond(\mathsf{sing} \vee \mathsf{dance})$

Alternatively, an instance of the possibility modal can appear in both disjuncts (cf. (16)), individually checking the features of the modal auxiliary appearing below it, thus yielding an LF in which disjunction takes wide scope, as in (18-b).

(18) a. $[\Diamond_{[i\exists\text{-MOD}]}[\text{Al may}_{[u\exists\text{-MOD}]}\ \text{sing}]]\ \text{or}\ [[\Diamond_{[i\exists\text{-MOD}]}[\text{he may}_{[u\exists\text{-MOD}]}\ \text{dance}]]$
b. $\Diamond\mathsf{sing} \vee \Diamond\mathsf{dance}$

A similar reasoning can be applied to sentences with conjunction in lieu of disjunction, or with a modal auxiliary of different force.[5]

4 Our view also counters Alonso-Ovalle's (2006) criticism to accounts viewing wide scope Free Choice as arising from 'narrow scope disjunction' LFs. Alonso-Ovalle observes that Free Choice inferences arise even when the modal has a different surface form across the two clauses, as in (i):

(i) You may email us or you can reach the Business License office at 949 644-3141.

On our account, this is expected: if, as is reasonable, *may* and *can* have the same uninterpretable feature, this feature is inherited by their disjunction and can agree with a higher interpretable modal operator, leading to an LF of the form $\Diamond(\mathsf{email} \vee \mathsf{call})$.

5 A strikingly similar idea is proposed by Szabolcsi (2015) in a different domain: Szabolcsi argues that the Japanese particles *-ka* and *-mo* (and their cross-linguistic counterparts), when occurring in coordinations such as "A-ka B-ka", do not directly contribute to the semantics of the coordinate clauses, but merely signal the presence of a higher, unpronounced coordinator of the right type (disjunction for *-ka*, conjunction for *-mo*).

4 Repercussions, extensions, and open issues

Most existing theories only derive free-choice readings from LFs in which disjunction scopes below the modal. Crucially, if our proposal is correct, this is not a shortcoming but an advantage, since the ambiguity between free-choice and ignorance readings can then be explained as a scope ambiguity.[6] Note, further, that our proposal is compatible with any account of free-choice, so long as it derives a free-choice reading for the LF $\Diamond(\mathsf{A} \vee \mathsf{B})$ but not for $\Diamond\mathsf{A} \vee \Diamond\mathsf{B}$.

In this final section, we explore some further repercussions of our view and discuss some remaining issues.

4.1 Modal auxiliaries vs non-auxiliary modal constructions

Meyer & Sauerland (2017) have pointed out a contrast between sentences like (2), which have a free-choice reading, and sentences like the following, which do not.

(19) a. It's ok for John to sing or it's ok for John to dance. (*FC)
b. John is allowed/required to sing or he is allowed/required to dance. (*FC)

On our account, this surprising contrast has a natural explanation. The mechanism we proposed to derive 'narrow scope disjunction' LFs for sentences like (2) crucially relies on the fact that modal auxiliaries are uninterpreted. We do not predict that free choice readings should be available for analogous sentences that involve interpreted modal constructions, such as 'it is ok that' or 'be allowed/required'. That these are indeed interpreted is witnessed by the absence of modal concord in the minimal variations in (20) of the examples in (13) (Zeijlstra 2007). E.g., (20-a) cannot mean that the boss is ok with Alice leaving; rather, it unambiguously conveys that the boss is ok with the fact that Alice has permission to leave.

(20) a. The boss allows that Alice be permitted to leave.*ModalConcord

6 In fact, even authors like Zimmermann (2000) and Aloni (2022), who take the free-choice reading of (2) to derive from the LF $\Diamond\mathsf{A} \vee \Diamond\mathsf{B}$, would be better off if they reconsidered this assumption, since their derivation of free-choice from this LF is problematic. This derivation relies crucially on the assumption that the speaker is fully informed about the relevant modal facts (cf. Zimmermann's "authority principle" and Aloni's "indisputability" of the accessibility relation). However, free-choice readings arise for sentences like (2) even when the speaker is known *not* to be fully informed, as demonstrated experimentally by Cremers et al. (2017). Furthermore, the story proposed by Zimmermann (2000) and Aloni (2022) overgenerates, wrongly predicting that "must A or must B" can mean "must A and must B".

b. The boss demands that Bob be required to stay. *ModalConcord

To our knowledge, the only existing proposal which predicts a difference between auxiliaries and non-auxiliary items is that of Meyer & Sauerland (2017). Like us, Meyer & Sauerland attribute the contrast to the fact that an LF where disjunction scopes below the modal is available only in the case of auxiliaries. However, their explanation of this latter fact is different from ours: it is based on the idea that the narrow-scope disjunction LF is generated by overt ATB movement, and that only finite modals can undergo this kind of movement.

A problem for this proposal concerns sentences containing a high 'either' (see also Cremers et al. 2017). As indicated by (21), ATB movement from disjunctions can only occur above *either*, not below it.

(21) a. I invited every person who$_i$ either Alice likes t_i or Bob hates t_i.
b. *I invited every person either who$_i$ Alice likes t_i or Bob hates t_i.

As a consequence, Meyer & Sauerland (2017) predict the possibility of a FC reading for (22-a), but not for (22-b). However, as empirically confirmed by Cremers et al. (2017), (21-b) does have a FC reading (cf. also the sentences in (6)).

(22) a. John may either sing or he may dance. ✓FC
b. Either John may sing or he may dance. ✓FC

Our proposal does not suffer from this problem, as the silent existential modal which contributes the operator $\Diamond$ can check the features of the two modal auxiliaries from above the whole coordinate structure, thus from above 'either'.

(23) $\Diamond_{[\mathrm{i}\exists]}\Big[\text{Either [John may}_{[\mathrm{u}\exists]}\text{ sing] or [he may}_{[\mathrm{u}\exists]}\text{ dance]}\Big]_{[\mathrm{u}\exists]}$

Incidentally, this implies that, contrary to what Cremers et al. (2017) assume, the presence of an initial *either* in a sentence of the form "either may A or may B" does not rule out the availability of the LF $\Diamond(\mathsf{A} \vee \mathsf{B})$.

4.2 Negation

Observations reveal that modal concord across negation can happen when the higher modal has universal force and the lower one existential force, or vice versa, but not when the two modals have the same force (see Grosz 2010,

Anand & Brasoveanu 2010).[7] This is illustrated by the following examples of modal concord, adapted from examples we found online.

(24) The countess graciously allowed that I needn't do it for her again.
$\textsc{Allow}_{[i\exists]}(\neg\textsc{Need}_{[u\forall]})$

(25) A restraining order demands that Roiland may not harass or surveil the plaintiff.
$\textsc{Demand}_{[i\forall]}(\neg\textsc{May}_{[u\exists]})$

The unavailability of concord across negation between modals with the same force is illustrated by the following infelicitous variations:

(26) *The countess firmly demanded that I needn't do it for her again.
$^{*}\textsc{Demand}_{[i\forall]}(\neg\textsc{Need}_{[u\forall]})$

(27) *A special permit allows that Roiland may not recycle.
$^{*}\textsc{Allow}_{[i\exists]}(\neg\textsc{May}_{[u\exists]})$

Interestingly, a reviewer observes that (28) can convey that I am permitted to neither cook nor clean ($\Diamond(\neg\text{Cook}\wedge\neg\text{Clean})$), but cannot convey that I am required to do neither ($\Box(\neg\text{Cook}\wedge\neg\text{Clean})$).

(28) I need not cook and I need not clean.

The above generalization about modal concord across negation suggests an explanation: the two occurrences of the universal modal *need* in (28) are below negation; they can thus stand in a relation of modal concord with a covert existential modal scoping above the conjunction, as in (29-a), but not with a universal modal, as in (29-b).

(29) a. $\Diamond_{[i\exists]}[[\neg\textsc{Need}_{[u\forall]}\ \text{cook}]\ \text{and}\ [\neg\textsc{Need}_{[u\forall]}\ \text{clean}]]$
b. $\rightsquigarrow\ \Diamond(\neg\text{Cook}\wedge\neg\text{Clean})$
c. $^{*}\Box_{[i\forall]}[[\neg\textsc{Need}_{[u\forall]}\ \text{cook}]\ \text{and}\ [\neg\textsc{Need}_{[u\forall]}\ \text{clean}]]$
$\rightsquigarrow\ \Box(\neg\text{Cook}\wedge\neg\text{Clean})$

A similar explanation can be given for the reviewer's reported intuition that (30) "need not entail the disjunction $[\neg\Diamond\text{Cook}\vee\neg\Diamond\text{Clean}]$ (which would support an implication of uncertainty), but could instead merely convey $[\neg\Diamond(\text{Cook}\wedge\text{Clean})]$, that it is impossible for me to do both".

7 This fact is not predicted by Zeijlstra's account, as is, and it is in fact used by Grosz and Anand to motivate alternative accounts. Nevertheless, it seems to us that these data can be accommodated in Zeijlstra's account by positing that negation affects the relevant modal feature (i.e., if A has feature [u∀] then ¬A has feature [u∃] and vice versa), with concord happening at the level of the entire constituent containing negation.

(30) I cannot cook or I cannot clean.

4.3 Outstanding data points

Consider (31) which, despite containing two instances of a non-auxiliary modal item, seems to allow for a FC interpretation.

(31) It is possible that the gardener committed the murder or it is possible that the butler did it.
⇝ It is possible that the gardener committed the murder.
⇝ It is possible that the butler did it.

This is surprising on the account we just proposed. However, notice that (32-a) (an example we found online) seems to be equivalent to (32-b), suggesting that *it's possible* is not interpreted at LF, but rather agrees with *perhaps*.

(32) a. Perhaps it's possible you're not sure why you're even here.
b. Perhaps you're not sure why you're even here.

This indicates that the class of items carrying uninterpretable modal features is not co-extensive with the class of modal auxiliaries. We leave it to future research to explore this idea.[8]

A second potential problem concerns conjunctions of possibilities expressed by non-auxiliary modal items, like (33):

(33) You are allowed to go to Bob's party and you are allowed to go to Charlie's party.

Does (33) have a reading on which it allows the addressee to go to two parties? Intuitions seem mixed. If it does, this is unexpected for the account we presented in Section 3 (at least if *allowed* is interpreted). We leave this to future work.

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8 Alternatively, a reviewer suggests that there may be a purely Gricean explanation for (31), based on the idea that a disjunction generally implies the epistemic possibility of the conjuncts, and that an iteration of epistemic possibilities collapses to a single one (see Zimmermann 2000).

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