

# Future orientation & free choice<sup>1</sup>

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**Abstract.** Epistemic necessity modals cannot be future-oriented. Previous attempts to explain this ban tie the constraint directly to speakers' intuitions about the metaphysics of the future. As a result, they fail to predict the range of cross-linguistic variation attested in the domain of temporal orientation. This paper defends a fully grammatical approach to the phenomenon. I assume, with much of the recent literature on temporal orientation, that future orientation stems from a covert temporal morpheme. Then, I proceed to show that in English and in Brazilian Portuguese there is substantial overlap between the distribution of this morpheme and the distribution of Universal Free Choice Items ( $\forall$ -FCIs), like *any* in some of its uses. Based on these similarities, I sketch an account of temporal orientation that employs tools from the literature on polarity sensitivity.

**Keywords:** future orientation, modality, mood, polarity sensitivity.

## 1. Introduction

This paper sheds new light on a well-known gap in the temporal orientation of modal verbs: epistemic necessity modals cannot be future-oriented. Simply put, epistemic modals are used to make inferences based on a body of evidence, so there is no obvious reason why a speaker who sees dark clouds in the sky cannot utter (1c) to make a prediction about the weather. Besides its temporal dimension, this constraint is also relative to modal force and modal flavor: epistemic *possibility* modals (2a) and *root* necessity modals can be future-oriented.

- (1) a. It must<sub>epis</sub> have rained.                      (2) a. It may<sub>epis</sub> rain.  
      b. It must<sub>epis</sub> be raining.                      b. John must<sub>deon</sub> pay a fine.  
      c. \*It must<sub>epis</sub> rain.

A successful account of the unacceptability of (1c) must meet at least two desiderata: it needs to account for the force asymmetry between (1c) and (2a), and for the flavor asymmetry between (1c) and (2b):

### (3) The constraint on future orientation

- a. **The force asymmetry**  
Epistemic *necessity* modals cannot be future-oriented.  
Epistemic *possibility* modals can.
- b. **The flavor asymmetry**  
*Epistemic* necessity modals cannot be future-oriented.  
*Root* necessity modals can.

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<sup>1</sup>This project has benefited from discussions with Valentine Hacquard, Paolo Santorio, Fabrizio Cariani and Alexander Williams. I am also thankful to the audience at SuB27 and to three anonymous reviewers for their suggestions. All errors are my own.

Many existing accounts have reduced the ban on future orientation to either a force-based or a flavor-based constraint. Klecha (2016) claims that *may* in (2a) is not truly epistemic, which dissolves the force asymmetry. I will show that this view is challenged by the interaction between possibility modals and negation: in its predictive use, like (2a), *may* outscopes negation, a behavior that is typical of epistemic modals. Williamson (2021), on the other hand, claims that future reference can only be licensed in a diverse modal context. Epistemic *must* is, in a sense, stronger than root *must*: it quantifies over a homogeneous modal base, which prevents it from being future-oriented. That circumvents the flavor asymmetry, but it comes at the cost of making problematic typological predictions.

In this paper, I argue that constraints on future orientation can be reduced to the more well-known puzzle of polarity sensitivity, which opens doors for a more principled and predictive account of the phenomenon.

The paper is organized as follows: In §2, I suggest that we should approach the puzzle on future orientation as a puzzle about futurity, not as a puzzle about modality. In §3 I show that there is substantial overlap between environments that license future orientation, and those that license a certain class of polarity sensitive items. In §4, I investigate the source of futurity in modal sentences. In §5, I develop an account of future orientation building on Crnič's (2017) theory of polarity sensitivity. In §6, I discuss challenges for previous accounts of future orientation. In §7, I conclude and suggest directions for future research.

## 2. Refining the puzzle

Much of the literature on temporal orientation has focused on the paradigm in (1). A consequence of this approach is that the constraint on future orientation is often seen as a puzzle about modals. I would like to argue that, instead, we should approach it as a puzzle about future-oriented clauses. The motivation for this change in perspective comes from the fact that, in matrix clauses, future reference without overt future morphology is also disallowed (4). I take this as evidence that *must*, in (1c), is not blocking an otherwise-available future reading. Instead, the modals in (2a) and (2b) are rescuing an otherwise-unavailable reading.

(4) \*It rains (soon).

I adopt the common view that future orientation comes from a forward-shifting morpheme, which is silent in English (Kratzer 2011; Matthewson 2012; Klecha 2016; Williamson 2021). In order to remain neutral on the nature of this morpheme, I will refer to it as simply FUT. From now on, we can recast the puzzle on future orientation as a puzzle about the licensing of FUT: What are the environments that license FUT? Why does FUT need to be licensed? In the next section, I tackle the first of these questions.

### 3. Polarity sensitivity in future reference: the empirical landscape

In this section, I show that in Brazilian Portuguese (BP) and English, there is substantial overlap between the environments that license FUT and those that license a certain class of polarity sensitive items (PSIs), namely, universal free choice items ( $\forall$ -FCIs). To make this point, I focus on two aspects of the distribution of  $\forall$ -FCIs that set them apart from other PSIs: their interaction with modals, and their behavior in the restrictor of universal quantifiers, in conditional antecedents, and under negation.

**Interaction with modals** A lot of attention has been given to the interaction of  $\forall$ -FCIs and modals (Aloni 2007; Menéndez-Benito 2010; Chierchia 2013; Dayal 2013; Crnič 2017; Xiang 2020, among many others), but there is still some disagreement about the empirical facts and their proper derivation. The most stable generalization is that  $\forall$ -FCIs are generally unacceptable in episodic contexts and with necessity modals, but can be rescued by possibility modals. This phenomenon is sometimes called *modal obviation* (Xiang 2020).

- (5) \*John read any book.
- (6) a. John may<sub>deon</sub> read any book.  
b. John may<sub>epis</sub> be in any room in the house.
- (7) a. \*John must<sub>epis</sub> be in any room in the house.  
b. \*John must<sub>deon</sub> read any book.

As we saw, the interaction of FUT with modals is more nuanced: in addition to the obviating effect of possibility modals, FUT is also acceptable with root necessity:

- (8) a. John may<sub>deon</sub> go to the party.  
b. John might<sub>epis</sub> get sick.
- (9) a. John must<sub>deon</sub> pay a fine.  
b. \*John must<sub>epis</sub> get sick.

While this disanalogy might seem to jeopardize the unification I'm pursuing, in §5 I'll show that the flavor asymmetry follows naturally from plausible assumptions about the syntax of modals and the temporal operator I take to be the source of future orientation.

**Restrictor of every and conditional antecedents** Another hallmark of the distribution of  $\forall$ -FCIs is that they are licensed in the restrictor of universal quantifiers, but not of existentials—compare (10a) and (10b)—and in conditional antecedents, but not consequents—compare (11a) and (11b):<sup>2</sup>

<sup>2</sup>I only bring data from BP in this section because, unlike *qualquer*, *any* also has NPI uses—that is, it's licensed under negation.

- (10) a. Todo aluno que leu **qualquer** artigo tirou A na prova  
 every student that read QUALQUER article got A in the test  
 ‘Every student who read any article got an A in the test.’  
 b. \*Algum aluno que leu **qualquer** artigo tirou A na prova  
 some student that read QUALQUER article got A in the test  
**Intended:** ‘Some student who read some article or another got an A in the test.’
- (11) a. Se você já fez **qualquer** curso de semântica, você vai ir bem  
 if you already taken QUALQUER course of semantics, you will go well  
 nesse seminário.  
 in this seminar  
 ‘If you’ve taken any semantics courses, you’ll do well in this seminar.’  
 b. \*Se o João se formou em linguística, ele já fez **qualquer**  
 if the John REFL majored in linguistics, he already taken QUALQUER  
 curso de semântica.  
 course of semantics  
**Intended:** ‘If John majored in linguistics, he has taken some course or another in semantics.’

The distribution of FUT follows the same pattern. As described by Crouch (1994), a future orientation is possible in conditional antecedents, even in the absence of any overt future marker (12a). Conditional consequents, on the other hand, require an overt marker, like *will*, to acquire a future orientation—compare (12b) and (12c). Under the assumptions made in this paper, that means that conditional antecedents, but not consequents, license FUT.

- (12) a. If I smile when I get out, the interview went well. [(5) in Crouch (1994)]  
 b. \*If my next interview goes well, I smile when I get out.  
 c. If my next interview goes well, I will smile when I get out.

On a similar vein, Williamson (2021), observed that the restrictor of *every*, but not of *some*, licenses FUT. The author illustrates this point with the Crouch-inspired minimal pair below, slightly adapted to favor an episodic reading:

- (13) a. Every student who comes out of this room smiling did well.  
 b. \*Some student who comes out of this room smiling did well.  
 [adapted from (319) in Williamson]

These facts suggest that the licensing of  $\forall$ -FCIs and of FUT is tied to the monotonicity of the environment:  $\forall$ -FCIs and FUT are licensed in conditional antecedents and in the restrictor of *every* because they are downward-entailing (or, at least, not upward-entailing) environments. Sentential negation, however, seems to provide a counterexample to this generalization:

- (14) \*Eu não li **qualquer** livro.  
 I NEG read QUALQUER book  
**Intended:** ‘I didn’t read any book.’

(15) \*It doesn't rain (soon).

The fact that some polarity sensitive items are not licensed under sentential negation is a recurring pattern cross-linguistically. Chierchia (2013) reports similar facts for Italian, and Pereltsvaig (2000) for Russian. This pattern also shows in the licensing of  $\forall$ -FCIs and FUT under negated modals. Pure  $\forall$ -FCIs, like *qualquer*, are disallowed under negated possibility modals, regardless of flavor:<sup>3</sup>

- (16) a. \*O João não pode<sub>root</sub> ler **qualquer** livro.  
the John NEG can read QUALQUER book  
**Intended:** 'John can't read any book.'
- b. \*O João não pode<sub>epis</sub> ter lido **qualquer** livro.  
the John NEG can have read QUALQUER book  
**Intended:** 'John can't have read any book.'

FUT behaves similarly, but we again see an effect of modal flavor. Only with negated epistemic modals is FUT disallowed:

- (17) a. John can't<sub>root</sub> leave.  
b. \*It can't<sub>epis</sub> rain (soon).

One might wonder if the ban of pure  $\forall$ -FCIs under negated modals is due to the resulting modal force of the assertion. Since  $\neg\Diamond \equiv \Box\neg$ , it could be that *qualquer* is banned in (16) because these sentences are logically necessity statements. I don't believe this is the case. In (18), the necessity modal *ter que* scopes under negation, which means that the resulting modal force of the assertion is existential. If *qualquer* was disallowed in (16) because of its resulting force, we would predict it to be licensed in (18), which is not the case.

- (18) \*O João não tem que<sub>root</sub> ler **qualquer** livro.  
the John NEG have to read QUALQUER book  
**Intended:** 'John doesn't have to read any book.'

I therefore conclude that the facts in (16), (17), and (18) are related to the more general pattern of anti-licensing by negation that some  $\forall$ -FCIs are subject to.<sup>4</sup>

### 3.1. Further evidence of polarity sensitivity in future reference

Before I conclude this section, I would like to present some cross-linguistic evidence that further supports the view that constraints on future orientation boil down to polarity sensitivity.

<sup>3</sup>Examples (14) and (16) could be rescued in the right conversational context if *qualquer* was focused. When focused, *qualquer* acquires a 'just any' reading: (16) would convey that John didn't read just any book, he read a special/remarkable book. It's not clear how this 'just any' reading comes about, or why it has special licensing conditions. I leave an investigation of these facts for future work.

<sup>4</sup>I am unable to replicate the pattern in (18) with epistemic necessity modals because it's unclear that they can ever scope under negation. In examples like 'It must not have rained', the only interpretation available seems to be  $\Box\neg$ .

	$\forall$ -FCIs	FUT
Root $\diamond$	✓	✓
Epistemic $\diamond$	✓	✓
Root $\square$	*	✓
Epistemic $\square$	*	*
Conditional antecedents	✓	✓
Restrictor of $\forall$	✓	✓
Restrictor of $\exists$	*	*
Episodic contexts	*	*
Sentential negation	*	*

Table 1: Overlap in the distribution of  $\forall$ -FCIs and FUT

A growing body of research shows that future morphemes are subject to cross-linguistic variation in their licensing conditions. Mucha (2016) proposes that, in Medumba (Grassfields Bantu), a covert forward-shifting morpheme is licensed under negation, in questions, conditional antecedents and modal complements, among other environments. Bochnak (2016), on the other hand, shows that graded future markers in Washo (language isolate) are licensed in modal complements, conditional antecedents, attitude verbs, and questions, but not under negation.<sup>5</sup>

This brief overview shows that, while constraints on future reference are subject to cross-linguistic variation, this variation is systematic. In Medumba, FUT displays the behavior of an NPI/FCI hybrid (like *any*), being licensed also by sentential negation. In Washo, future markers, are also licensed in questions, an environment that is often hospitable for PSIs.

Importantly, these facts also cast doubt on any theory of future orientation that builds on the idea that the future is uncertain or open: If constraints on future orientation were tied to the inherent uncertainty of future affairs, why would FUT be licensed under negation in Medumba? Conversely, why would FUT *not* be licensed in questions in English?

### 3.2. Taking stock

In this section, I have shown that the distribution of FUT closely resembles the distribution of  $\forall$ -FCIs. These facts are summarized in table 1. I take this as evidence that the puzzle on future orientation can be reduced to the more familiar puzzle of polarity sensitivity. This conclusion raises two important questions: (i) if FUT is really a polarity sensitive item, why is it subject to a robust flavor asymmetry, in a way that other PSIs are not? (ii) why would a forward-shifting morpheme be sensitive to the monotonicity of the environment? I believe an investigation of the nature of FUT can shed light on both issues.

<sup>5</sup>See Bochnak (2019) for a more thorough discussion of these facts.

#### 4. What is FUT?

So far, I have been using the theory-neutral label FUT to refer to the source of futurity in all environments surveyed in §3. But what is the nature of this morpheme? The received wisdom is that FUT is an aspectual morpheme (Kratzer 2011; Matthewson 2012; Klecha 2016; Williamson 2021),<sup>6</sup> whose lexical entry is roughly the one in (19). This semantics is inspired by an analogy with the perfect aspect, but direct evidence that this is the correct treatment of FUT is quite elusive.

$$(19) \quad \llbracket \text{FUT} \rrbracket = \lambda P_{\langle i, st \rangle} . \lambda t_i . \lambda w_s . \exists t' [t' \succ t \wedge P(t')(w)]$$

I would like to propose an alternative view: at least in some environments, future orientation comes from a subjunctive future. This is supported by evidence from Brazilian Portuguese, which is, to my knowledge, the only Romance language with a productive and dedicated subjunctive future (henceforth, SF):<sup>7</sup>

- (20) a. Se o João **for** à festa, a Maria pode ir também.  
 if the John **go.SUBJ.FUT** to.the party, the Mary might go too  
 ‘If John goes to the party, Mary might go too.’
- b. Todos os candidatos que **forem** eleitos vão ser empossados em  
 all the candidates who **be.SUBJ.FUT** elected will be sworn into office on  
 1 de Janeiro.  
 1 of January  
 ‘Every candidate who is elected will be sworn into office on January 1st.’

What do we gain by switching to the view that future orientation comes from a subjunctive morpheme? For starters, subjunctives cross-linguistically have a tendency to display polarity sensitive behavior. So-called *polarity subjunctives* have been observed in several languages with overt indicative/subjunctive moods (Rivero 1971; Farkas 1992; Giannakidou 2011; Quer 2000: a.m.o). That makes the polarity-sensitive nature of FUT much less surprising. Furthermore, subjunctives are usually taken to attach high in the clause, either at T or C.<sup>8</sup> The fact that BP has both a past and a future subjunctive supports this view—it’s likely that these two forms can be decomposed into a subjunctive morpheme and a combination of tense and aspect. It’s also well-known that epistemic and root modals have complements of different sizes, so that gives us an initial clue of why FUT displays a flavor asymmetry.

<sup>6</sup>I should clarify that, with the exception of Williamson (2021), all the other authors listed here focused on temporal orientation in non-finite clauses. That is, they didn’t claim that the future orientation of conditional antecedents and relative clauses also comes from an aspectual marker.

<sup>7</sup>SF morphology appears only in a subset of the environments that license future readings, namely, conditional antecedents and the restrictor of some quantifiers. Modals, on the other hand, always have infinitival morphology, regardless of their flavor or temporal orientation. In §5 I’ll show that the surface form of modal sentences is not particularly informative about their morphological makeup, therefore, I believe it would be a hasty decision to assume that no modals embed the SF.

<sup>8</sup>See (Quer 2006: §4) for an overview of existing proposals for the syntax of subjunctive moods.

## 5. Proposal

### 5.1. Explaining the flavor asymmetry

Let's recall the basic pattern that motivated this paper. Root modals can always be future-oriented, regardless of force, but only epistemic *possibility* modals can:

- |      |                                      |      |                                     |
|------|--------------------------------------|------|-------------------------------------|
| (21) | a. John might <sub>epis</sub> leave. | (22) | a. John may <sub>deon</sub> leave.  |
|      | b. *John must <sub>epis</sub> leave. |      | b. John must <sub>deon</sub> leave. |

This pattern closely resembles the pattern of modal obviation displayed by nominal  $\forall$ -FCIs, with the exception that nominal  $\forall$ -FCIs are not susceptible to such a robust flavor asymmetry. How can we capture this disanalogy? In her seminal work, Kratzer (1981, 1991) proposed that modals only lexicalize their force, but not their flavor, which is retrieved from the context of utterance. This proposal is based on the fact that, cross-linguistically, the same modals are compatible with different readings, which speaks against an ambiguity-based theory. An account of temporal orientation should preserve this attractive feature of the Kratzerian framework and derive the flavor asymmetry without stipulating different lexical entries for root and epistemic modals. I would like to suggest that instead of relying on semantic differences, we should rely on syntactic differences between the two classes of modals.

It's widely believed that epistemic and root modals combine with complements of different sizes (see Picallo 1990; Brennan 1993; Butler 2003; Hacquard 2006; among many others).<sup>9</sup> Evidence for this syntactic split comes mainly from the interaction of modals with tense. For instance, consider how the past tense on *have to* seems to have a different interpretive effect depending on how the modal is construed:

- |      |   |
|------|---|
| (23) | a. John had to <sub>deon</sub> go to bed early when he was a child.   |
|      | b. $\llbracket 23a \rrbracket = 1$ iff $\forall w'. w'$ is compatible with the rules in $w_0$ <b>in the past</b><br><span style="display: block; text-align: right;">→ John goes to bed early in <math>w'</math></span>     |
| (24) | a. A: Do you know where John was last night?<br>B: He had to <sub>epis</sub> be home. He never goes out on the weekends.  |
|      | b. $\llbracket 24a \rrbracket = 1$ iff $\forall w'. w'$ is compatible with the evidence in $w_0$ <b>at speech time</b><br><span style="display: block; text-align: right;">→ John <b>was</b> home in <math>w'</math></span> |

In (23a), *have to* is interpreted deontically; the modal refers to a past obligation. That is: past tense is setting the time of modal evaluation. In the epistemic example (24a), on the other hand, past seems to be setting the running time of the eventuality denoted by the prejacent. These facts suggest that epistemic modals scope above tense, while root modals scope below:

<sup>9</sup>This is the majority view in the literature, but see Rullmann and Matthewson (2018) for counter-evidence.



(25)  $[_{\text{MODP}} \mathbf{Mod}_{\text{epis}} [_{\text{TP}} \text{T} [_{\text{MODP}} \mathbf{Mod}_{\text{root}} \dots$

How can these different LFs lead to the flavor asymmetry? I have argued that FUT, which is often taken to be an aspectual head, sometimes is a subjunctive mood. Root modals have smaller complements, which are unlikely to host a mood morpheme. Based on this, I would like to suggest that the future orientation of epistemic and root modals comes from different sources: only epistemic modals embed a subjunctive morpheme, which, as a polarity sensitive item, has a limited distribution. That explains why root modals are not subject to the same constraints on future orientation. While I will remain mostly neutral on the source of future orientation for root modals, one possibility is that they combine with the temporal marker in (19), which, being aspectual in nature, attaches lower in the clausal spine.

If this is on the right track, the distribution of FUT now looks less messy than initially thought: if only epistemics embed a SF morpheme, then the SF is uniformly banned under necessity modals, just like  $\forall$ -FCIs are usually taken to be.<sup>10</sup> In the next section, I provide an account of this force asymmetry couched in alternative semantics.

## 5.2. Explaining the force asymmetry

Having sharpened the empirical picture, we can now account for the distribution of the subjunctive future using tools from the literature on polarity sensitivity. I begin by proposing the following entry for the subjunctive future:

(26)  $[[\text{SUBJ FUT}]^{w,t} = \lambda P_{\langle i, st \rangle} . \exists w' \in \text{HIST}(w, t) [\exists t' : t' \succ t \wedge P(t')(w')]$

In addition to temporal displacement, I assume the subjunctive future also introduces modal displacement.<sup>11</sup> This move is justified by the interpretation of the subjunctive in relative clauses. Consider the Crouch-inspired example below. Notice that (27) does not presuppose that any student *will* ace the test. Instead, (27) seems to allow for the possibility of different students acing the test in different historical alternatives<sup>12</sup> to the world of evaluation,  $w@$ .

(27) Every student who aces this test cheated.

I also propose the modal force of the subjunctive is existential. This is in line with the widespread assumption that  $\forall$ -FCIs are underlyingly existentials, and any hint of a universal force comes via exhaustification. The basic truth conditions of future oriented sentences with epistemic modals are given below:

<sup>10</sup>See §7 for some exceptions to this view.

<sup>11</sup>As I said earlier, in addition to a subjunctive future, Brazilian Portuguese also has a subjunctive past. These facts suggest that both forms share a common core that combines with different of tenses and aspects. Presumably, this shared morpheme contributes the layer of modality in (26), while temporal displacement comes from tense and aspect. Here, I opt for a syncategorematic entry for the sake of simplicity, given that the present paper focuses on the subjunctive future only.

<sup>12</sup>Two worlds are *historical alternatives* to each other at an interval  $t$  if they are identical up to (and including)  $t$ , even if they are distinct at a later interval (Thomason 1970, 1984).

- (28) John may<sub>epis</sub> leave.
- a. LF: [may [SUBJ FUT [ John leave
  - b.  $\llbracket (28) \rrbracket (w_0)(t_0) = 1$  iff  $\exists w' : w'$  is compatible with the evidence in  $w_0$  at  $t_0$   
 $[\exists w'' : w''$  is a historical alternative to  $w'$  at  $t_0 [\exists t' : t' \succ t_0$  s.t. John leaves( $w''$ )( $t'$ )]]
- (29) \*John must<sub>epis</sub> leave.
- a. LF: [must [SUBJ FUT [ John leave
  - b.  $\llbracket (29) \rrbracket (w_0)(t_0) = 1$  iff  $\forall w' : w'$  is compatible with the evidence in  $w_0$  at  $t_0$   
 $[\exists w'' : w''$  is a historical alternative to  $w'$  at  $t_0 [\exists t' : t' \succ t_0$  s.t. John leaves( $w''$ )( $t'$ )]]

That sets the stage to derive the polarity sensitivity of the subjunctive future. For concreteness, I adopt the theory of polarity sensitivity from Crnič (2017).<sup>13</sup>

The crux of Crnič's theory is the idea that some polarity sensitive items are associated with a covert operator,  $\text{EVEN}_\emptyset$ .<sup>14</sup> Like its overt counterpart,  $\text{EVEN}_\emptyset$  has a scalar presupposition requiring that its prejacent,  $P(D)$ , be stronger than its alternatives,  $P(D')$ .

- (30)  $\llbracket \text{EVEN}_\emptyset \rrbracket^{g,c}(D)(P)$  is defined only if  $\forall D' \subset D : P(D) \neq P(D') \rightarrow P(D) \subset P(D')$ .  
 If defined,  $\llbracket \text{EVEN}_\emptyset \rrbracket^{g,c}(D)(P)(w) = \lambda w.P(D)(w) = 1$

What are the alternatives to a sentence with the subjunctive future? Following a long-standing tradition in the polarity sensitivity literature, I assume the alternatives to a quantifier are obtained by replacing the original domain of the quantifier with subsets of it. Assuming a toy model containing only two historical alternatives, the alternative set to (28) is given in (31). The alternative set to (29) would look identical, except for modal force.<sup>15</sup>

$$(31) \text{Alt}(28) = \left\{ \begin{array}{l} \diamond[\text{John leaves in } w_1 \vee \text{John leaves in } w_2], \\ \diamond[\text{John leaves in } w_1], \\ \diamond[\text{John leaves in } w_2] \end{array} \right\}$$

When the subjunctive future is in matrix clauses, the presupposition of  $\text{EVEN}$  is not satisfied: if John will leave in some accessible world, that doesn't entail he will leave in any particular world.

- (32) \* [  $\text{EVEN}_\emptyset$  [ John leaves<sub>{ $w_1, w_2$ }</sub>]]
- a.  $\not\models$  John leaves<sub>{ $w_1$ }</sub>.
  - b.  $\not\models$  John leaves<sub>{ $w_2$ }</sub>.

However, when the subjunctive future is in a downward-entailing environment, like the restrictor of *every*, all alternatives are entailed and the presupposition of  $\text{EVEN}_\emptyset$  is satisfied:

<sup>13</sup>This presentation follows closely the one in (Crnič 2017: §2.1) and Francis (2020). I should emphasize that Crnič's theory was developed specifically for *any*.

<sup>14</sup>This part of Crnič's proposal is based on Lahiri's (1998) influential analysis of Hindi NPIs, which can be overtly decomposed into *even*+an indefinite.

<sup>15</sup>Crnič (2017) assumes that, in addition to these alternatives, polarity sensitive items also project a conjunctive alternative, which can be pruned from the alternative set. In the case at hand, the conjunctive alternative would be ( $\diamond[\text{John leaves in } w_1 \wedge \text{John leaves in } w_2]$ ), but I'll omit it to avoid clutter.

- (33) [ EVEN<sub>∅</sub>[ Every student who comes out smiling<sub>{w<sub>1</sub>,w<sub>2</sub>}</sub> did well ] ]  
 a. ⊨ Every student who comes out smiling<sub>{w<sub>1</sub>}</sub> did well.  
 b. ⊨ Every student who comes out smiling<sub>{w<sub>2</sub>}</sub> did well.

Now, we incorrectly predict that the subjunctive future should be licensed under negation. Crnič's account was meant to capture the distribution of *any*, which has both NPI and FCI uses. However, as we saw in §3, the subjunctive future is part of a class of polarity sensitive items that are banned under clause-mate negation. Pereltsvaig (2000) proposes an explanation to this ban based on morphological blocking. The idea is that, under negation, some NPIs would compete with, and be blocked by, negative concord items. An extension of this account is unlikely to work for the subjunctive future, that doesn't have any natural competitors in the English or Portuguese lexicon.

Supplementing Crnič's account with morphological blocking would also be insufficient to explain the distribution of the  $\forall$ -FCI *qualquer*. In addition to being banned under sentential negation, *qualquer* is also disallowed in other environments that license *any*, like the scope of *only* and the scope of *few*.<sup>16</sup> Neither of these two environments licenses negative concord items. This points to a more general problem: no existing theory is able to fully capture the distribution of  $\forall$ -FCIs, which is more intricate than that of NPIs. Developing a theory that is better suited for  $\forall$ -FCIs is out of the scope of this paper.

For existential modals, things are not as straightforward. Existential modals do not create a downward-entailing environment, so, as things stand, Crnič's account would incorrectly predict *any* to be disallowed. To integrate modals into his account, Crnič builds on a well-established difference between the interpretation of *any* in modalized and episodic sentences. In downward-entailing environments, *any* is naturally interpreted as a negated existential. However, in modalized sentences, *any* seems to acquire the force of a wide-scope universal: 'John may read any book' does not convey simply that John may read *a* book. It conveys that every book is a permissible option—hence the label 'free choice'.

Crnič (2017) takes this interpretive difference as evidence that, when under a modal, *any* gives rise to a free choice implicature. This implicature is generated by the application of a covert operator, EXH, whose meaning is akin to *only*. The particular denotation of EXH I adopt is the one from Bar-Lev (2018) and Bar-Lev and Fox (2020):<sup>17</sup>

- (34)  $\llbracket \text{EXH} \rrbracket (C)(p)(w) = \forall q \in \text{IE}(p, C)[\neg q(w)] \wedge \forall r \in \text{II}(p, C)[r(w)]$   
 a.  $\text{IE}(p, C) =$  Innocently Excludable alternatives to  $p$  in  $C$   
 b.  $\text{II}(p, C) =$  Innocently Includable alternatives to  $p$  in  $C$

The algorithm to calculate the **IE alternatives** to a prejacent  $p$  is the following: First, we look at the maximal sets of alternatives that can be negated consistently with  $p$ . Then, we select only the alternatives that are members of all these sets. These alternatives are IE. The calculation of **II alternatives** is analogous: First, we look at the maximal sets of alternatives that can be assigned true consistently with the prejacent *and* the negation of all IE alternatives. Then, we

<sup>16</sup>The same observations apply to the subjunctive future. I omit the relevant examples due to space limitations.

<sup>17</sup>This version of EXH has the benefit of deriving free choice implicatures in one single application. Adopting the denotation of EXH in Fox (2007) and applying it recursively would yield the same results.

select only the alternatives that are members of all these sets. These alternatives are II. EXH excludes (i.e. assigns false) to the former and includes (i.e. assigns true) to the latter.

To see how this mechanism works, consider (35), ignoring the role of  $EVEN_{\emptyset}$  for now. The alternatives under consideration are given in (35b). Two sets of alternatives can be negated consistently with the prejacent, namely, the set in (ii) and the set in (iii). The intersection of (ii) and (iii) is the empty set. Therefore, none of the alternatives is IE. The set formed by the union of (ii) and (iii) can be assigned true consistently with the prejacent, so both (ii) and (iii) are II. The enriched meaning of (35) is given in (35c). (35c) says that John will leave in a historical alternative to some epistemically-accessible world, while expressing indifference about which historical alternative that will be.

- (35) John may<sub>epis</sub> leave<sub>{w<sub>1</sub>,w<sub>2</sub>}</sub>.
- a. [ EXH<sub>C</sub> [  $\diamond$  [ John leaves<sub>{w<sub>1</sub>,w<sub>2</sub>}</sub> ] ] ] ]
- b.  $C = \left\{ \begin{array}{l} \text{(i) } \diamond(\text{John leaves}_{\{w_1\}} \vee \text{John leaves}_{\{w_2\}}), \\ \text{(ii) } \diamond(\text{John leaves}_{\{w_1\}}), \\ \text{(iii) } \diamond(\text{John leaves}_{\{w_2\}}) \end{array} \right\}$
- c.  $\diamond(\text{John leaves}_{\{w_1\}} \vee \text{John leaves}_{\{w_2\}}) \wedge \diamond(\text{John leaves}_{\{w_1\}}) \wedge \diamond(\text{John leaves}_{\{w_2\}})$

Now, let's put  $EVEN_{\emptyset}$  back into the picture. The prejacent of  $EVEN_{\emptyset}$  is no longer the basic existential meaning of (35), but rather, its strengthened meaning, in (35c).  $EVEN_{\emptyset}$  tests whether its prejacent entails all of its alternatives, which are the ones in (ii) and (iii). Since the prejacent of  $EVEN_{\emptyset}$  now contains the conjunction of all its alternatives, the subjunctive future passes the test.

- (36) [  $EVEN_{\emptyset C'}$  [ EXH<sub>C</sub> [  $\diamond$  [ John leaves<sub>{w<sub>1</sub>,w<sub>2</sub>}</sub> ] ] ] ] ]
- a.  $C' = \left\{ \begin{array}{l} \text{(i) } \diamond(\text{John leaves}_{\{w_1\}} \vee \text{John leaves}_{\{w_2\}}) \wedge \\ \quad \diamond(\text{John leaves}_{\{w_1\}}) \wedge \diamond(\text{John leaves}_{\{w_2\}}), \\ \text{(ii) } \diamond(\text{John leaves}_{\{w_1\}}), \\ \text{(iii) } \diamond(\text{John leaves}_{\{w_2\}}) \end{array} \right\}$

Let's briefly consider what happens when the subjunctive future is under the scope of a necessity modal. Now, there's only one maximal set of alternatives that can be excluded consistently with the prejacent. This is the set formed by the union of (ii) and (iii). It follows that both alternatives are IE. The only II alternative is the prejacent itself.

- (37) \*John must<sub>epis</sub> leave<sub>{w<sub>1</sub>,w<sub>2</sub>}</sub>.
- a. [  $EVEN_{\emptyset C'}$  [ EXH<sub>C</sub> [  $\square$  [ John leaves<sub>{w<sub>1</sub>,w<sub>2</sub>}</sub> ] ] ] ] ]
- b.  $C = \left\{ \begin{array}{l} \text{(i) } \square(\text{John leaves}_{\{w_1\}} \vee \text{John leaves}_{\{w_2\}}), \\ \text{(ii) } \square(\text{John leaves}_{\{w_1\}}), \\ \text{(iii) } \square(\text{John leaves}_{\{w_2\}}) \end{array} \right\}$

Because the alternatives in (ii) and (ii) were not included, the prejacent of  $EVEN_{\emptyset}$  does not contain the conjunction of its alternatives. As a result, it does not entail (ii) and (iii), and

the presupposition of  $\text{EVEN}_{\emptyset}$  is not satisfied, which explains why the subjunctive future is disallowed with necessity modals.

$$(38) \quad C' = \left\{ \begin{array}{l} \text{(i) } \Box(\text{John leaves}_{\{w_1\}} \vee \text{John leaves}_{\{w_2\}}) \wedge \\ \quad \neg\Box(\text{John leaves}_{\{w_1\}}) \wedge \neg\Box(\text{John leaves}_{\{w_2\}}), \\ \text{(ii) } \Box(\text{John leaves}_{\{w_1\}}), \\ \text{(iii) } \Box(\text{John leaves}_{\{w_2\}}) \end{array} \right\}$$

## 6. Challenges for previous accounts

As I said earlier, many existing proposals have reduced the constraint on future orientation to either the flavor asymmetry or the force asymmetry. In this section, I discuss one recent representative of each approach: Klecha (2016), who defends a flavor-based approach, and Williamson (2021), who defends a force-based approach.<sup>18</sup>

### 6.1. Klecha (2016)

The most explicit flavor-based account is due to Klecha (2016), who hard-wires constraints on temporal orientation directly into modal bases. In his system, modal bases are represented as covert pronouns that, after combining with modal verbs, can impose restrictions on the temporal interpretation of the complements of these verbs. Epistemic (or doxastic) modal bases repel future-oriented prejacent, while circumstantial modal bases demand them. Presenting the details of Klecha's proposal would lead us too far afield; what is crucial for this discussion is his empirical claim: root modals are always future-oriented; epistemic modals are never future-oriented.

Let's start with his claim about the temporal orientation of root modals. While it is true that root modals are *typically* future-oriented, it is unlikely that this tendency is purely linguistic. Root modals are often used performatively, to give orders or permissions, which are inherently future-oriented—giving someone an order to have done something would be decidedly odd.<sup>19</sup> Once we provide enough contextual support to suppress the performative tendency of root modals, present- (39) and past-oriented (40) readings become available.<sup>20</sup>

<sup>18</sup>Both Klecha and Williamson assume that future orientation comes from a covert future operator, an assumption that is shared with the present work. Some earlier theories, like Werner (2003; 2006) and Lekakou and Nilsen (2009), assumed that modal sentences are almost completely unspecified with respect to temporal orientation. According to this view, temporal orientation is determined by the interplay of pragmatic principles governing the interpretation of modalized utterances. However, there is cross-linguistic evidence that future orientation stems from an aspectual morpheme (Matthewson 2012), so a purely pragmatic explanation of the facts discussed in this paper seems unlikely.

<sup>19</sup>See Williamson (2021) for a formal proposal that links performativity to temporal orientation.

<sup>20</sup>More could be said against the thesis that root modals are always future-oriented, but I would like to keep this discussion short for the sake of focus. I refer the reader to Harr (2019), ch.7, for a more thorough case against the obligatoriness of future orientations for root modals.

- (39) a. John has to run every day to stay fit.  
 b. I'm only here because I have to be.<sup>21</sup>
- (40) All students must have received their booster shot before returning to campus.

When it comes to Klecha's claim about epistemic modals, the burden of proof lies not in showing that *might* or *may* can be used to make predictions, but rather in showing that these uses are epistemic. Klecha argues that the modality expressed in sentences like *it might rain tomorrow* is better understood as metaphysical, rather than epistemic. Since metaphysical modals are taken to be a subset of root modals, these predictive uses of *may* and *might* are not counterexamples to his generalization.

Teasing apart epistemic and metaphysical readings is not a trivial task, as Klecha himself points out. I will offer instead, a simple syntactic argument to support the view that predictive *may* and *might* are epistemic. In its root readings, *may* scopes below negation, while epistemic *may* scopes above. This difference in behavior most likely stems from the different heights of interpretation of the two classes of modals.

- (41) a. You may<sub>root</sub> not leave. ¬◇  
 b. John may<sub>epis</sub> not be home. ◇¬

If predictive uses of *may* and *might* exemplify metaphysical modality, they should pattern like root *may* with respect to negation—after all, Klecha takes metaphysical modals to be a subset of root modals. This is not the case: predictive *may* and *might* scope above negation.

- (42) a. It may not rain. ◇¬  
 b. It might not rain. ◇¬

I take this behavior as evidence that the puzzle about temporal orientation cannot be reduced to modal flavor: predictive *may* and *might* are epistemic. I now turn to Williamson (2021), and show that the puzzle cannot be reduced to modal force either.

## 6.2. Williamson (2021)

For Williamson (2021), the puzzle of future orientation is a puzzle about the distribution of FUT, which he models as roughly the mirror image of the perfect. Williamson argues that FUT has a presupposition that requires it to be under the scope of an operator that meets certain criteria. Informally, FUT is only defined if its *modal context*<sup>22</sup> contains *p*-worlds and ¬*p*-worlds:

<sup>21</sup>Attributed by Klecha to Kai von Fintel.

<sup>22</sup>The term *modal context* was introduced by Portner (1997) to account for mood selection. A modal context can be understood as the modal base of a certain operator  $\mathcal{O}$  that is accessible to other operators embedded under  $\mathcal{O}$ .

- (43)  $\llbracket \text{FUT } p \rrbracket^{g,s}(w_1)(t_1)$
- a. is defined only if  $\exists \langle w_2, t_2 \rangle \in s : \exists t_3 \succ t_2 : \llbracket p \rrbracket^{w,g,s}(w_2)(t_3) = 1 \wedge \exists \langle w_3, t_4 \rangle \in s : \neg \exists t_5 \succ t_4 : \llbracket p \rrbracket^{w,g,s}(w_3)(t_5) = 1$
  - b. if defined, = 1 iff  $\exists t_6 \succ t_1 : \llbracket p \rrbracket^{w,g,s}(w_1)(t_6) = 1$

Root *must*, according to Williamson, quantifies over a diverse modal base;  $\neg p$  worlds are removed from this modal base by a Kratzerian ordering source. That guarantees that the presupposition of FUT is satisfied. Epistemic *must*, on the other hand, quantifies over a homogeneous modal base, which dooms FUT to systematic presupposition failure, thus leading to ungrammaticality.

Within English, Williamson himself recognizes a potential problem for his analysis. Semi-modals, like *be bound to*, *be certain to*, and *be sure to* all express epistemic necessity. Under Williamson's assumptions, they should be incompatible with future-shifted prejacent, a prediction that's not borne out:

- (44) John is {sure / certain / bound} to win the match.

One simple way to integrate these semi-modals into the account presented in this paper is by capitalizing on the size of their complements: unlike other epistemic operators, *be sure/certain/bound* take complements smaller than a TP; so like root modals, they might not be able to host a subjunctive mood.

### 6.3. Discussion

Most accounts of temporal orientation build directly on the idea that the distribution of future morphemes is constrained because the future is (perceived as being) open. Although Klecha's and Williamson's proposals are compositional at their core, this notion is also lurking behind their accounts. According to Klecha, the generalizations he states evolved from 'pragmatic pressures' that the English lexicon is subject to. Williamson, on the other hand, claims that a homogeneous modal base 'conveys a degree of certainty about future states of affairs which cannot be warranted' (Williamson 2021: pp. 11). While both proposals are language-specific, their view strongly implies that there should not be much cross-linguistic variation in the licensing of future markers. Why would the lexicon of different languages be subject to different pragmatic pressures? Why would speakers of different languages be more confident about future affairs? As we saw in §3, however, languages vary with respect to which environments license future markers, and the range of variation attested closely resembles the kind of variation seen in the licensing of polarity sensitive items.

## 7. Conclusion and loose ends

This paper provides a fresh perspective on the debate about the temporal orientation of modal auxiliaries. There are two cornerstones to my proposal, both of which are very general, and therefore compatible with a number of different implementations. First, I argued that constraints on future orientation are simply instances of polarity sensitivity. Tying future ori-

entation to polarity sensitivity makes my account more flexible and predictive than previous works. Then, I proposed that the flavor asymmetry is likely to follow from syntactic differences between epistemic and root modals: root modals are immune to the constraint on future orientation because their complements are too small to embed a subjunctive future. This is a principled way to refine the empirical picture and explain why future orientation has a more nuanced distribution than other cases of polarity sensitivity.

I would like to point out that, if we're willing to grant that root modals *do* embed the subjunctive future, in principle, there should still be ways to account for the flavor asymmetry while preserving the spirit of my proposal. Although  $\forall$ -FCIs are typically assumed to not be licensed under necessity modals, there are several exceptions to this generalization. For instance, so-called supplementary *any* is both compatible with necessity modals *and* subject to a flavor asymmetry (Fălăuș 2014):

- (45) a. \*John must<sub>epis</sub> be with a friend, any friend. [= (90) in Fălăuș (2014)]  
 b. John must<sub>root</sub> come with a friend, any friend.

A fully-developed theory of polarity sensitivity clearly has to be able to explain why certain syntactic configurations allow necessity modals to license  $\forall$ -FCIs. When available, such a theory might be able to also explain the flavor asymmetry without relying on the assumption that root modals do not embed subjunctives.

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