

Indefiniteness in future reference*

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Abstract In some languages, future-oriented readings of the present have a puzzling distribution: in matrix clauses, the present can only be used to refer to settled events (*The train leaves at 5pm*), but in certain subordinate environments, the present can be used to refer to the future more freely (*If John gets this award, he'll be very happy*). Taking English morphology at face value, much of the existing literature has proposed to unify these two readings, a move that has immediate consequences for how the phenomenon should be analyzed. In this paper, I bring data from Portuguese to argue that this future found in subordinate environments is inherently different from the scheduled future found in matrix clauses; in particular, I argue that the former contains a subjunctive mood morpheme. Then, focusing on the interpretation of this *Subordinate Future* in relative clauses, I show that the subjunctive has a distinctive semantic footprint: it introduces modal displacement in the form of an indefinite description of situations. Because of its indefinite nature, the subjunctive is able to (dynamically) bind situation variables outside of its domain

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of c-command, giving rise to the modal counterpart of donkey anaphora. I leverage this treatment of the subjunctive to provide a natural explanation to otherwise unexpected facts concerning the temporal interpretation of the Subordinate Future. The resulting picture has interesting implications for the semantics and taxonomy of conditionals.

Keywords: future reference, subjunctive mood, donkey anaphora, indefinites, conditionals

1 Introduction

Languages have a number of devices to refer to episodic future events; one of these devices involves present morphology. In English, this form of future reference is found in the antecedent of some conditionals (1a), *when*-clauses (1b), and certain relative clauses (1c), but it is generally banned in matrix environments (2a).

- (1) a. If John gets a raise, he'll be very happy.
- b. When John gets a raise, he'll be very happy.
- c. Every intern who gets a raise will be very happy.

- (2) a. #John gets a raise.
- b. cf.: John will get a raise.

To stay as neutral as possible, I will call this phenomenon *Subordinate Future* (SF). The SF raises several questions, of which I highlight a few: What exactly is the nature of the SF — is it a non-past tense, does it involve a silent *will*, or something else entirely? What does the SF mean — does it promote only temporal displacement, or does it also introduce a layer of modality, often associated with future reference? Where exactly is the SF licensed, and why does it have a limited distribution? In this paper, I focus on the first two questions, but the proposal I will put forward has consequences for the distribution of the SF as well.

My proposal builds on a series of novel empirical observations. First, based on data from Portuguese, I argue that the SF is a subjunctive form. Then, based on the interpretation of future-oriented relative clauses, I argue that the subjunctive mood morpheme that composes the SF introduces modal displacement. Once we

recognize that the SF involves a modal component, the next step is to understand the semantics of this modal. Taking into account, again, the interpretation of the SF in relative clauses, I propose that the subjunctive should be modeled as an indefinite description of situations. As a consequence of its indefinite nature, the subjunctive has exceptional semantic scope: it seems to bind the situation variable of clauses outside of its domain of c-command. I argue that this is an instantiation of a more general phenomenon, namely, donkey anaphora; in donkey sentences, the variable introduced by an indefinite covaries with the variable introduced by a pronoun out of its syntactic scope.

I then turn to the temporal interpretation of the SF. As Crouch (1993, 1994) observed, when the SF appears in conditional antecedents, it is also able to anchor the *temporal* interpretation of the consequent. Assuming a modal semantics for the SF adds new layers of complexity to this well-known temporal puzzle, but at the same time, points to a natural solution: I propose that this temporal shift is parasitic on the modal donkey anaphora licensed by the subjunctive. These insights are then formalized in a dynamic framework.

The paper is organized as follows. In Section 2, I present case studies on the expression of the SF in Portuguese (§2.1), and on the interpretation of the SF in relative clauses (§2.2). In Section 3, I zoom in on the modal (§3.1) and temporal interpretation (§3.2) of the SF, laying the foundations for my account. In Section 4, I present a formal and compositional proposal, couched in Compositional Discourse Representation Theory (CDRT). In Section 5, I compare my analysis to four existing accounts. Section 6 highlights some implications of the theory developed here and concludes the paper.

2 The nature of the SF

In this section, I bring underexplored cross- and intralinguistic evidence to shed new light on the grammatical category and meaning of the SF. First I argue, based on data from Portuguese, that the SF is a subjunctive form. Next, I turn to the interpretation of the SF in relative clauses. I show that, when the SF appears in the restrictor of strong quantifiers, it weakens their existence presupposition. I take that as an indication that the subjunctive mood morpheme that composes the SF introduces modal displacement.

2.1 The SF is a subjunctive form

Portuguese has a very rich repertoire of subjunctive forms. While other Romance languages have (at most) present and past subjunctive forms (Comrie & Holmback 1984, Santos 2019), Portuguese also has a subjunctive future.¹ Table 1 gives the conjugation of the verb *estar* ('to be', the stage-level copula) in the 1/3rd person singular, in each subjunctive form. It also provides a non-exhaustive list of the environments where these forms can be found:²

SUBJUNCTIVE	MORPHOLOGY	LICENSING ENVIRONMENTS
Present	<i>esteja</i> be.1SG.SUBJ.PRES	complement of (some) attitude verbs relative clauses
Past	<i>estivesse</i> be.1SG.SUBJ.PST	complement of (some) attitude verbs relative clauses counterfactual conditionals <i>when</i> -clauses
Future	<i>estiver</i> be.1SG.SUBJ.FUT	relative clauses predictive conditionals <i>when</i> -clauses

Table 1 The three subjunctive forms in Portuguese

The facts in Portuguese are quite straightforward: in most environments where English employs the present to refer to future events, Portuguese employs the subjunctive future:^{3,4}

¹ Historically, Spanish also had a subjunctive future, but it is now considered archaic (Laca 2010, a.o.)

² Notice that the subjunctive present and the subjunctive future are in nearly complementary distribution, with the exception of relative clauses. In RCs, both forms are licensed, but with a difference in meaning: the subjunctive future is used in future-oriented RCs, the subjunctive present in present-oriented RCs. At this point, I do not have an explanation for this asymmetric paradigm.

³ Portuguese judgments were provided by the author, a native speaker of Brazilian Portuguese, and confirmed by five other speakers, from the regions of São Paulo and Rio de Janeiro.

The subjunctive future is productive in both Brazilian Portuguese and European Portuguese, so here and throughout the paper, I will be referring to Portuguese without specifying a variety. However, all my examples employ the lexicon and syntax of Brazilian Portuguese.

⁴ Abbreviations: SUBJ = subjunctive; IND = indicative; PRES = present; FUT = future; PST = past; PL = plural; SG = singular.

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- (3) 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.'
- (4) Quando o resultado das eleições **forem** anunciados, vamos
when the result of the elections **be.SUBJ.FUT** announced, go.3PL
comemorar.
to celebrate
'When the results of the elections are announced, we'll celebrate.'
- (5) Todos os candidatos que **forem** eleitos serão
all the candidates who **be.SUBJ.FUT** elected be.FUT.IND
empossados em 1 de Janeiro.
sworn into office on 1 of January
'Every candidate who is elected will be sworn into office on January 1st.'

Like other subjunctive forms — and like the SF — the subjunctive future is banned in matrix clauses. Examples like (6) are not acceptable under any reading:

- (6) *O João **conseguir** o emprego.
the John **get.SUBJ.FUT** the job

Intended: 'John will get the job.'

As expected, other readings of the present, like habitual and generic, are translated with the indicative present in Portuguese:

- (7) a. O João **vai** a uma festa todo fim-de-semana.
the John **go.IND.PRES** to a party every weekend
'John goes to a party every weekend.'
- b. Cachorros **têm** rabos.
dogs **have.IND.PRES** tails
'Dogs have tails.'

The same form is found in standard (that is, non-predictive) indicative conditionals:

- (8) Se o João **está** em casa, a Maria **está** também.
 if the John **be.IND.PRES** at home, the Mary **be.IND.PRES** too
 ‘If John is home, Mary is too.’

Crucially, the indicative present is also found in future-oriented sentences that refer to events that are either scheduled or fixed by the laws of nature:

- (9) a. O avião **sai** às 5pm.
 the plane **leave.IND.PRES** at 5pm
 ‘The plane leaves at 5pm.’
 b. O Sol se **põe** às 5pm hoje.
 the Sun **REFL set.IND.PRES** at 5pm today
 ‘The Sun sets at 5pm today.’

The morphological contrast between the examples in (3)-(5) and (9) is particularly significant. Much of the extant literature assumes that the examples in (9) and those in (1) involve related phenomena (Kaufmann 2005, Schulz 2008, Rumberg & Lauer 2023). Simply put, these authors propose that English has a non-past tense which in principle can only be used to refer to events that are somehow settled — either by a schedule, or by the laws of nature. Conditionals lift this constraint, allowing this non-past to be used more freely.⁵ The Portuguese data suggests that, although this unification might seem tempting, sentences like (9a) and (9b) have a different morphosyntactic makeup from sentences with the SF.

These facts also suggest that the SF is tied to a broader phenomenon, namely, the subjunctive mood. Of course, this last conclusion relies on the assumption that the label *subjunctive* is not a misnomer, and that the subjunctive future really does form a natural class with other subjunctives.

There are reasons to believe that this is correct. As we saw in Table 1, the three subjunctive forms have very similar distributions, which is in itself evidence for a connection between them.⁶ There is also morphological evidence for this connection: when the subjunctive future appears on a relative clause that is further embedded under another verb in the past, it is spelled out exactly as the subjunctive past. By means of illustration, suppose that, at a time *t*, a teacher makes the promise in (10):

⁵ These proposals are reviewed in more detail in Section 5.

⁶ See (Mendes 2024: §3.1), for further distributional evidence supporting this point.

- (10) *Context:* Hoping to improve her students' motivation, a teacher makes a promise:

Todos os alunos que **gabaritarem** a próxima prova podem
every the students who **ace.SUBJ.FUT** the next test can
pular o exame final.
skip the exam final

'Every student who aces the next test can skip the final exam.'

At a time t^+ , after the test, that promise would be reported as (11):

- (11) A professora **prometeu** que todos os alunos que **gabaritassem**
the teacher **promised** that every the students who **ace.SUBJ.PST**
a próxima prova podiam pular o exame final.
the next test could skip the exam final

'The teacher promised that every student who aced the next test could skip the final exam.'

These facts are identical to what we observe when *will* is embedded under a past attitude verb:

- (12) a. The teacher promises: 'I **will** grade all the homework over the weekend.'
b. The teacher promised she **would** grade all the homework over the weekend.

The paradigm in (12) is usually invoked as evidence that *would* is the past of *will*. By analogy, I take the facts in (10) and (11) as evidence that the label *subjunctive future* is not a matter of terminological confusion: the differences between the subjunctive future and the subjunctive past boil down to the temporal morphemes that combine with the subjunctive in each case.⁷

At this juncture, a natural question arises as to whether the conclusions drawn from Portuguese can be generalized to other languages. In other words, should we assume the SF involves a subjunctive morpheme even in languages like

⁷ A caveat: there is no well-accepted definition of what the subjunctive is. The descriptive label 'subjunctive' is usually attributed to forms whose distribution is constrained to some of the environments in Table 1, but there is still considerable crosslinguistic variation between these forms. For instance, the German *Konjunktiv II* differs from the Romance subjunctive in its ability to appear in matrix clauses that express offers, but it is, nevertheless, considered a subjunctive (Csipak 2015, 2020). Without in-depth research, I am not in a position to say that the SF forms a natural class with all these forms.

English, that lack mood morphology almost entirely? Or, alternatively, should we analyze future-oriented uses of the present as being semantically distinct from the subjunctive future found in Portuguese?

Taking the first route means adopting Matthewson's (2001) *No Variation* null hypothesis, according to which all natural languages have a common semantic core despite their surface dissimilarities. Operationalizing this hypothesis often involves positing abstract morphological material, a move that needs to be well-justified. Developing the second option means assuming that surface differences reflect semantic differences, and that our analyses need to be tailored accordingly.

For the case in hand, I find the evidence in favor of the No Variation hypothesis extremely robust. We have seen so far that the SF and the subjunctive future have a very similar distribution. And this distribution is what we would normally expect of a subjunctive form, not of a tense. As we will see in the next sections, the SF is also identical to the subjunctive future in its modal and temporal interpretation. In both dimensions, the SF displays behaviors that are not expected of a tense, and more easily subsumed under a mood-based analysis. Specifically, in Section 2.2, we will see that the SF induces a modalized reading of relative clauses, a property shared by other subjunctive forms crosslinguistically; in Section 3.2, we will see that the SF is able to temporally anchor clauses outside of its domain of c-command, which I show is also a feature of the past subjunctive (see Section 6). Taken together, this evidence already points strongly toward an analysis of the SF in terms of mood. The existence of a language where this connection is morphologically overt further reinforces this conclusion.

If, instead, we adopted the second view, we would have to assume that the present tense in certain languages carries a much richer semantics than what is typically attributed to temporal morphemes. To account for the distribution of the SF, we would then have to explain why this enriched meaning emerges only in specific subordinate environments. Finally, we would have to account for the overlap between the behavior of the present tense and of the subjunctive mood, as discussed above. Leaving the semantics of tense unaltered and positing a covert subjunctive morpheme in English sounds like a more parsimonious analysis.

In view of the discussion above, from this point on, I will assume that the SF and the subjunctive future instantiate the same phenomenon. Since Portuguese and English behave identically in all relevant respects, the examples to follow will be presented in English only.

2.2 The SF introduces modal displacement

There is a long history of associating future reference and modality (Copley 2002, Kaufmann 2005, Klecha 2014, Cariani & Santorio 2018, a.m.o.). However, since the SF often occurs in modalized contexts, it is difficult to disentangle its contribution from that of the licensing environment, and even more difficult to spell it out precisely. Consider, for instance, a sentence like (13):

(13) If John leaves, Mary might get upset.

To reverse engineer the semantics of the SF from (13), two ingredients are required: first, a clear understanding of the meaning of conditionals; second, an account of how each morphosyntactic element contributes to the overall interpretation. The semantics of conditionals is already a notoriously challenging topic, and their syntax-semantics interface proves even more complex. Besides that, one of the morphosyntactic elements in (13) is the SF itself, which leaves us in a chicken-and-egg situation. Given how tenuous our understanding of conditionals is, it is difficult to be sure that any interpretive effect the SF has in (13) actually comes from the SF. In fact, as we will see in Section 5, it is a common strategy to distribute what I take to be the contribution of the SF to covert elements in conditionals (Kaufmann 2005, Schulz 2008, Rumberg & Lauer 2023).

To sidestep this challenge, in this section I focus on the interpretive effect of the SF in relative clauses. The advantage of looking into relative clauses is that they do not introduce any (obvious) modality on their own, thus offering a way to isolate the contribution of the SF.

To set the stage for the crucial facts, recall that strong quantifiers, like *every*, presuppose that their restrictors are not empty (Geurts 2007, a.m.o.):

(14) Every professor who came to the last meeting agreed on this decision.
↪ Some professors came to the last meeting.

Because of this presupposition, continuations like the one below are odd:

(15) Every professor who came to the last meeting agreed on this decision. #It's too bad nobody showed up to that meeting.

Turning our attention back to the SF, the key observation is that, when the SF appears in a relative clause, it seems to weaken the existential import of the quantifier. That is, (16) does not presuppose that anyone *will* come to the

mayor's funeral. This is confirmed by the acceptability of the continuation in (17):⁸

- (16) Each person who comes to pay respect to the mayor will get a commemorative card.
- (17) Each person who comes to pay respect to the mayor will get a commemorative card. But the mayor was so unpopular. I doubt anyone will come at all...⁹

For comparison, a variant like (18), with other future forms in the relative clause, gives rise to a standard existential presupposition. As a result, the continuation in (19) sounds odd:

- (18) Each person who {is going to come / is coming / will come} to pay respect to the mayor will get a commemorative card.
- (19) Each person who {is going to come / is coming / will come} to pay respect to the mayor will get a commemorative card. But the mayor was so unpopular. #I doubt anyone will come at all...

The intuition I will pursue is that in sentences like (16), the SF introduces modal displacement, allowing the presupposition of the determiner to be satisfied in worlds that are only historical alternatives to the world of evaluation, w_c .¹⁰ Sentences like (18), on the other hand, require this presupposition to be satisfied in w_c .¹¹

⁸ (16) and (18) are adapted from a naturally-occurring example <https://transcripts.cnn.com/show/se/date/2004-06-09/segment/03>.

⁹ Judgments for the crucial English examples were gathered via an informal survey, which was answered by 13 native speakers. Unless noted otherwise, all examples used in the paper received an average rating of at least 4 on a 1–5 scale, where ‘1’ was completely unacceptable, and ‘5’ was completely acceptable.

¹⁰ ‘Historical alternatives’ can be intuitively understood as different ways in which history might unfold. I say more about historical modality in footnote 19.

¹¹ After this paper was completed, Caleb Kendrick and Jacopo Romoli (p.c.) brought the following example (Schlenker 2012: ex. 62a) to my attention:

(i) *Context*: A professor who is renowned for the difficulty of his tests announces to his students: I’ll give a bottle of champagne to every student who gets a perfect score on the next test.

Schlenker concludes from (i) that *every* and *all* do not always give rise to an existential inference. However, notice that (i) also involves the SF in the restrictor of *every*. If my proposal is on the right track, it suggests that it is possible to maintain that strong quantifiers *uniformly* give rise

- (20) a. Each person who comes to pay respect to the mayor...
↔ some people will come to pay respect to the mayor in a world w' ,
historically accessible from w_c
- b. Each person who will come to pay respect to the mayor...
↔ some people will come to pay respect to the mayor in w_c

At first sight, a potential explanation to this asymmetry would be to assume that the DPs modified by the SF have an obligatory de dicto reading: they must always be interpreted under the scope of a modal in the main clause; *will*, in the cases above.¹² The question that would immediately arise is *why* a de dicto reading is obligatory for (16). But even if we put this concern aside, I believe there are compelling reasons to reject this approach.

Although *will* is often treated as a modal, Cariani & Santorio (2018) and Cariani (2021) convincingly argue that *will*, by itself, does not introduce modal displacement; rather, it picks out the world of evaluation.¹³ If *will* does not introduce modal displacement, it should not license a de dicto reading of *each person* in (16).

For those skeptical of this particular view of *will*, other strategies can be employed to make the same point. For instance, consider the examples in (21):¹⁴

- (21) *Context:* Your department is hiring a new professor and decides to interview candidates from all subfields of Linguistics. You are wondering if they are particularly likely to hire candidates with a certain specialty, but your friend tells you:

to existential inferences, but these inferences can be weakened by mood morphemes in their restrictors.

¹² Let me point out from the outset that the possibility of reconstruction under *will* is only a temporary concern. In Section 3.2, we will see that the SF anchors the temporal interpretation of *will*. If the DP containing the SF had undergone reconstruction, *will* would be anchored to the utterance time instead.

¹³ Part of the supporting evidence for this view comes from the ‘scopelessness’ of *will* with respect to negation (Copley 2002, Cariani & Santorio 2018, Cariani 2021):

- (i) a. It will **not** rain.
b. It’s **not** the case that it will rain.

Sentences (i-a) and (i-b) are perceived to be truth-conditionally equivalent, despite the fact that in (i-b), negation is in a different clause from *will*.

¹⁴ Because the SF has a different meaning from other forms of future reference, creating minimal pairs that are equally acceptable is very difficult. For that reason, I use different predicates in (21b) and (21a).

- a. {Every / Each} candidate who {is going to get / is getting / will get} invited for a job talk has an equal chance of being hired.
- b. {Every / Each} candidate who delivers a good job talk has an equal chance of being hired.

The examples in (21) display the same contrast observed before. While (21a) presupposes that some candidates are going to get invited for a job talk, (21b) does not presuppose that anyone will actually deliver a good job talk. Since reconstruction in this case is not possible, we are led to the conclusion that the SF itself is the culprit.

We can also support this conclusion by looking at sentences that do not involve any overt modal expressions, like (22):¹⁵

- (22) *Context:* An elementary school teacher has promised to give a lollipop to all students who ace her next test. You are waiting outside the school with the father of a new student who does not know about this habit. Your children are classmates, and they are taking a test, which will be automatically graded once they finish. You tell him:
Every kid who leaves the room with a lollipop aced the test.

Sentences like (22) are perhaps the most straightforward way to make the point that the SF introduces modality. The issue with these examples is that, in the absence of any future-oriented predicates, a generic reading of the relative clause becomes very salient, and judgments become blurry. As a result, sentences like (22) tend to require additional contextual support.¹⁶

¹⁵ Example (22) was suggested to me by Gesoel Mendes (p.c.), inspired by (319a) in Williamson 2021: 170. In the acceptability survey I ran, (22) received an average rating of 4.92/5. In English, besides the intended episodic interpretation, this example could also receive a habitual reading. The context provided, which singles out a specific test, is meant to disfavor this second construal.

¹⁶ An anonymous reviewer points out that they can only get the intended reading for sentences with the structure of (22) if the relative clause is headed by *any*, instead of *every*. While the speakers I consulted do not find examples of this kind unacceptable with *every*, I believe there is a principled explanation to why some speakers might prefer other determiners. It is well-known that *every* tends to favor generic or group readings (for recent discussions, see Knowlton, Trueswell & Papafragou 2022 and Knowlton 2024). I hypothesize that this tendency makes it harder to access the episodic interpretation intended for (22). Therefore, the preference for other determiners has little to do with the SF, and a lot to do with *every*.

In the recent literature, there is widespread consensus that *any* does not introduce modality in its own right (Chierchia 2013, Crnič 2019a,b, a.m.o.). Therefore, in my examples, the DPs headed by *every* could be replaced with DPs headed by *any* (or *each*, or *the*) with no impact to the argumentation. I do not use *any* in my sentences because deriving the licensing of *any*

Here is another example of the same kind:

- (23) *Context:* For the final assignment of the semester, a professor asks her students to choose between writing an essay or taking a quiz. That professor has a reputation for grading essays very harshly. While students choose their favorite option, a student who is aware of the professor's reputation tells her peer:
Everyone who chooses the essay is screwed!

As before, (22) and (23) do not give rise to the presupposition that any kid will actually leave the room with a lollipop, or that anyone will actually choose the essay. That suggests that there is some modal element in these examples. In the absence of any overt modals, the conclusion to be drawn is that relative clauses with the SF are inherently modalized. That is, although they may co-occur with other modal elements, they do not *depend* on these elements to acquire a modal reading.

The contrast between the SF and *will* in relative clauses can be replicated in conditional antecedents:¹⁷

- (24) *Context:* A family member from another state is traveling tomorrow to visit you.
- a. If you'll need help with your luggage, I will pick you up at the airport.
≈ If you predict that you will need help with your luggage...
 - b. If you need help with your luggage, I will pick you up at the airport.
≈ If you end up needing help with your luggage...

would introduce several complications — like potentially the addition of a covert *even* (Crnič 2019a,b) and/or an exhaustivity operator (Chierchia 2013, Crnič 2019a,b), depending on one's view.

Finally, it is worth pointing out that the SF is not equally acceptable with all quantifiers; for instance, as Williamson (2021) observed, the SF seems to clash with *some*:

- (i) a. Every student who comes out smiling (later) did well. (Williamson 2021: ex. 319)
b.*Some student who comes out smiling (later) did well.

This observation also appears in the literature on the subjunctive future (Comrie & Holmback 1984, Santos 2019), where the problem is characterized in terms of the indefiniteness of *some*. It is possible that the correct generalization is that the SF/subjunctive future is only licensed in the restrictor of *strong* determiners. In this paper I will not deal with the distribution of the SF, therefore I leave further exploration of these facts for future work.

¹⁷ The acceptability of conditionals with *will* in the antecedent is somewhat controversial. I refer the reader to (Kaufmann 2005: §7.3.2) for a series of naturally-occurring examples of this kind, and a discussion of the peculiar reading associated with these sentences.

In (24b), the airport pick up is conditional on whether the addressee ends up needing help when they arrive. In (24a), it is conditional on whether the addressee predicts or not (at the utterance time) that they will need help when they arrive. Although the conditional makes judgments murkier, I believe what is happening in these cases is not too different from what is happening in relative clauses: in (24a), the speaker seems to be reasoning about what might happen in the actual future, while in (24b), the speaker is reasoning about possible historical alternatives.

2.3 Interim conclusion

In this section, I put forward two empirical claims that lay the groundwork for my proposal. First, drawing on morphological evidence from Portuguese, I argued that the SF should be analyzed as a subjunctive form. Given that the distribution of the subjunctive is typically restricted to subordinate environments, this supports the view that the SF constitutes a distinct phenomenon from scheduled or settled readings of the present available in matrix clauses. Second, I showed, on the basis of the interpretation of SF-marked relative clauses, that the subjunctive morpheme underlying the SF has a systematic semantic footprint: it induces modal displacement.

These two conclusions, reached independently, actually go hand-in-hand. There is a vast body of literature that converges on the idea that subjunctive-marked relative clauses give rise to modalized readings of the modified DP (Panzeri et al. 2006, Giannakidou 2014, Borgonovo, De Garavito & Prévost 2015, Santos 2019, a.o.).¹⁸ Therefore, once we recognize that the SF is itself a subjunctive form, its behavior in relative clauses is unsurprising.

Armed with the observations from this section, the next step is to examine the modal and temporal components of the SF. What kind of modal does the SF encode? Where does its futurity come from? How do these two dimensions of meaning interact with one another?

¹⁸ I should point out, however, that these four studies focused on subjunctive-marked RCs embedded under attitude verbs. As a result, some authors characterized the reading of the DP in terms of scope. Here, I depart from this tradition: I argue that the subjunctive *itself* introduces modality.

3 Decomposing the modal and temporal semantics of the SF

3.1 The modal interpretation of the SF

Many important insights in intensional semantics have been inspired by analogies between the domains of worlds and times and the domain of individuals. For instance, it is well-established that a modal like *must* is akin to a quantifier like *all* (Kratzer 1981, 2012, a.m.o.). In this section, I will extend this line of reasoning to the SF: I will argue that the modal component of the SF can be fruitfully modeled after indefinite noun phrases, like *a cat*.

To set the stage for the crucial facts, let me start by providing a baseline for the interpretation of modals in relative clauses. Consider (25a):

- (25) a. Every student who might fail the midterm missed the review session.
 b. $\forall x[(\text{student}(x, w_c) \wedge \exists w'(w_c R^{\text{epi}s} w' \wedge \text{fail_the_midterm}(x, w')) \rightarrow \text{missed_the_review}(x, w_c)]$
 c. Every student x , such that there is an epistemically accessible world w' where x fails the midterm, missed the review session in the actual world.

As seen in the paraphrase in (25c), the sentence above makes a claim about a fixed group of students who might fail the midterm. If only Ann, Bea and Chris are in trouble, (25a) conveys that those three individuals missed the review session. Sentences with necessity modals in the relative clause behave the same way:

- (26) a. Every student who has to redo the midterm missed the review session.
 b. $\forall x[(\text{student}(x, w_c) \wedge \forall w'(w_c R^{\text{deon}} w' \rightarrow \text{redo_the_midterm}(x, w')) \rightarrow \text{missed_the_review}(x, w_c)]$
 c. Every student x , such that x redoes the midterm in all deontically accessible worlds w' , missed the review session in the actual world.

There is nothing particularly noteworthy about (25a) or (26a). The modals in these two examples behave exactly as quantifiers in relative clauses should behave: their semantic scope is clause-bound.

Now, let's turn our attention back to the SF. Consider (21b), repeated below.

- (27) Every candidate who delivers a good job talk has an equal chance of being hired. =(21b)

Let's assume the SF has a historical modal base.¹⁹ In view of the discussion above, if the SF was a regular possibility or necessity modal, (27) would have one of the following translations:

- (28) a. $\forall x[(\text{candidate}(x, w_c) \wedge \exists w'(w_c R^{\text{hist}} w' \wedge \text{delivers_a_good_talk}(x, w')))$
 $\rightarrow \text{has_an_equal_chance}(x, w_c)]$
- b. $\forall x[(\text{candidate}(x, w_c) \wedge \forall w'(w_c R^{\text{hist}} w' \rightarrow \text{delivers_a_good_talk}(x, w')))$
 $\rightarrow \text{has_an_equal_chance}(x, w_c)]$

However, neither of these translations seems intuitively correct. For one, they offer no handle on why the DP in subject position receives a modalized reading.

To illustrate the problem, (28a) conveys that all candidates for which there is at least one historical alternative in which they deliver a good job talk, have an equal chance of being hired. Now, suppose Ann, Bea, and Chris have all prepared very clear slides and practiced their talks extensively. It seems safe to say that, for all three candidates, there is at least one historical alternative to the actual world where they deliver a good talk. Unfortunately, on the big day, Ann gets nervous and her talk goes horribly wrong. Bea and Chris are much more fortunate. In this scenario, the paraphrase in (28a) incorrectly predicts that Ann has the same chances as Bea and Chris — after all, at the evaluation time t_c , there were historical alternatives to w_c where Ann did not get nervous and delivered a good talk. It just so happens to be the case that the actual future of w_c is not one of these alternatives. The second paraphrase is also problematic: it picks out all candidates who are *certain* to deliver a good job talk. How can we be that sure about the outcome of a talk?

The second issue with (28a) and (28b) concerns the world index of the main predicate. Consider again the scenario above. Presumably, in each historical alternative to w_c , different candidates deliver good job talks: in w_1 , Ann and Bea do well; in w_2 , it is Bea and Chris; etc. This is represented in Figure 1:

¹⁹ This is a common assumption both in accounts of the SF (Kaufmann 2005, Williamson 2021, a.o.), and in the literature on counterfactuals (Khoo 2022, Ippolito 2013, a.o.), which also involve a subjunctive marker in languages with rich mood morphology.

The historical modal base of a world at a given time consists in the set of worlds that are its duplicates up to that time ($\text{hist}_{w,t} = \{w' \mid w' \approx_t w\}$). We will call such worlds *historical alternatives* to w . Histories branch forward, not backwards (Thomason 1984), so the number of historical alternatives to a world only decreases over time. In other words, if two worlds are historical alternatives at t , they are also historical alternatives at all times before t , but that may no longer be the case at later times.

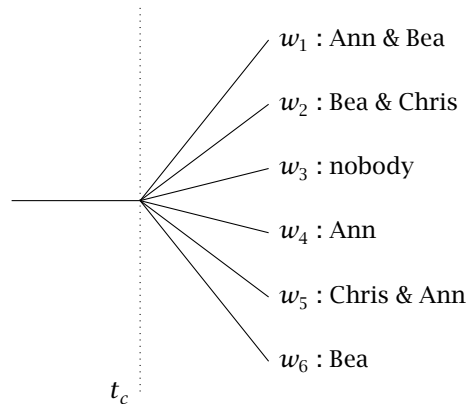


Figure 1 A historical modal base for (27)

What should we say about the prospects of the candidates in each of these worlds? It seems that, for worlds $w_1 - w_6$, the candidates who have equal chances of being hired are those who delivered good talks *in that world*, and not necessarily in the actual world. That means that (27) can be informally paraphrased as (29):²⁰

(29) Every candidate in w_c who delivers a good job talk *in any world w' historically accessible from w_c* , has an equal chance of being hired in w' .

At this point, we run into compositional trouble. The most adequate way to translate (29) into first-order logic involves a wide scope universal modal:

(30) $\forall x \forall w' [(candidate(x, w_c) \wedge w_c R^{hist} w' \wedge delivers_a_good_talk(x, w')) \rightarrow has_an_equal_chance(x, w')]$

However, I have argued that the source of the modality in (27) is the SF itself. And in this sentence, the SF is inside a relative clause. It should not be able to bind the world variable of the main predicate, which is outside of its domain

²⁰ Here is another way to access the intuition behind this paraphrase. It seems that examples like (27) are semantically equivalent to a conjunction of predictive conditionals:

- (i) a. If candidates A, B and C deliver a good job talk in w_1 , they have an equal chance of being hired in w_1 &
- b. If candidates D, E and F deliver a good job talk in w_2 , they have an equal chance of being hired in w_2 &
- c. ...

of c-command. That being the case, (30) cannot be derived via a traditional compositional route.

This state of affairs is reminiscent of a more well-known problem, namely, that of donkey sentences. Donkey sentences are characterized by the presence of an indefinite whose variable co-varies with a higher variable introduced by a quantifier. This indefinite seems to be able to bind a pronoun in clauses outside of its c-command domain, even when it is introduced inside a syntactic island. That poses a significant compositional challenge (Geach 1962, Heim 1982, Chierchia 2009, a.m.o.). The analogy is clear: notice the similarity between (30) and the first-order translation of a classic donkey sentence:

- (31) a. Every farmer who owns a donkey feeds it.
 b. $\forall x \forall y [(farmer(x) \wedge donkey(y) \wedge own(x, y)) \rightarrow feed(x, y)]$

I propose that the same mechanisms that derive the truth conditions of (31a) can be fruitfully extended to (27). In the dynamic tradition, the unexpected binding pattern found in donkey sentences follows from the semantics of indefinites. Indefinites have the ability to introduce new discourse referents (*drefs*), which then become available for anaphoric retrieval in the subsequent discourse. That, in effect, divorces the semantic scope of indefinites from their syntactic scope.

The intuitive gist of my account — which I formalize in Section 4 — is that the relationship between the subjunctive and the indicative is analogous to the relationship between indefinites and donkey pronouns. The subjunctive makes two contributions: First, it picks up a contextually-salient modal dref, which determines its evaluation world. Then, it introduces a modal dref, which becomes available for anaphora. This new dref is retrieved by the indicative, and fixes the evaluation world of the main clause, thus giving rise to *modal donkey anaphora*.

Before presenting this proposal in full, I must address the temporal interpretation of the SF. As will become evident, the temporal dimension of the phenomenon also exhibits a non-canonical binding pattern, which any adequate theory of the SF must explain. The pursuit of a unified account for the modal and temporal properties of the SF will dictate some crucial aspects of my account.

3.2 The temporal interpretation of the SF

3.2.1 An old observation

So far, I have discussed nuances of the semantics of the SF that have not been sufficiently appreciated in the literature. First, I argued that the SF includes a modal element, which comes from a subjunctive mood morpheme. Then, I argued that this modal has exceptional semantic scope, being able to ‘bind’ modal pronouns out of its domain of c-command. However, I am yet to address what is probably the most well-known aspect of the interpretation of the SF.

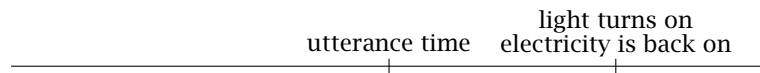
As Crouch (1993, 1994) famously observed, when the SF appears in a conditional antecedent, it is able to shift the temporal anchor of the consequent to a future interval. In other words, the SF licenses a non-deictic reading of the tense in the consequent:

- (32) If I smile when I get out, the interview went well. (Crouch 1993, ex. 1)
-
- A horizontal timeline with an arrow pointing to the right. Three vertical tick marks are placed along the line. Below the first tick mark is the label 'utterance time'. Below the second tick mark is the label 'interview'. Below the third tick mark is the label 'getting out'.

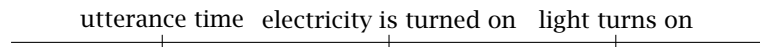
The most salient interpretation of (32) places the interview time before the getting-out time, but *after* the utterance time. Crouch originally called this phenomenon *deictic shift*. Since the deictic center of a clause encompasses more than its temporal anchor, to avoid confusion, I will call it *temporal shift* instead.

Temporal shift also arises in conditionals with the present (perfect) in the consequent and in sentences with SF-marked relative clauses:

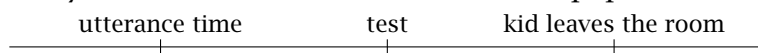
- (33) *Context:* Alice calls Bobby to tell him that the electricity has been shut off and she doesn’t know whether it will be back on by the time Bobby gets home. She tells him: (Williamson 2021, ex. 241)
- a. If the light turns on when you come home later, then the electricity is back on.



- b. If the light turns on when you come home later, then the electricity has been turned back on.

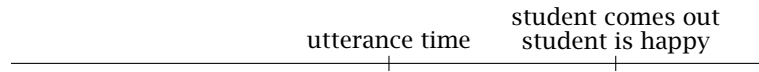


- (22) Every kid who leaves the room with a lollipop aced the test.

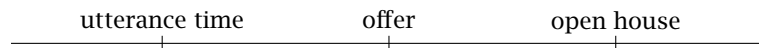


As expected, SF-marked relative clauses in sentences with the present (perfect) in the main clause also give rise to temporal shift:

- (34) a. Every student who comes out smiling is happy with their results in the test.

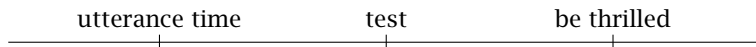


- b. Every prospective student who gets invited to the open house has already received an offer from the program.



To complete this picture, temporal shift also seems to be operative in sentences with future-oriented main clauses, such as (35). However, in cases like this, the argument needs to be more careful.

- (35) If Caleb aces this test, he will be thrilled.



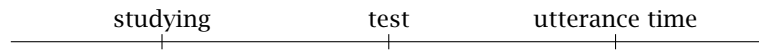
In its most natural reading, (35) places the consequent event later than the antecedent event ($C >_t A$); that is, it seems that in (35), the SF is setting the reference time for *will*. However, since *will* introduces an interval of time that is later than the utterance time, this reading could be obtained without resorting to temporal shift. The interval introduced by *will* in principle could precede ($A >_t C$) or succeed ($C >_t A$) the interval introduced in the antecedent. The ($A >_t C$) reading would then be filtered on pragmatic grounds: people normally get thrilled after acing a test, not before. If that was indeed the case, with enough contextual manipulation, we should be able to force the ($A >_t C$) reading. This prediction is not borne out; example (36) is pragmatically odd:

- (36) *Context:* Caleb has not been coming to classes and is very unlikely to get a good grade in next week's test. The only way he could reverse his situation is by studying very hard over the next couple of days.

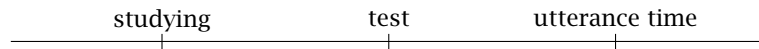
#If Caleb aces the test, he will study really hard.

As a baseline, notice that indicative conditionals with the past tense in both the antecedent and the consequent do allow for the two temporal orderings — ($C >_t A$) and ($A >_t C$) — provided that the resulting readings are pragmatically felicitous:

(37) a. If Caleb aced the test, he studied really hard.

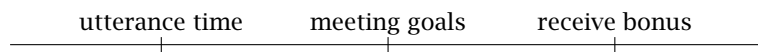


b. If Caleb studied really hard, he aced the test.



The conclusion, then, is that temporal shift is also operative in conditionals with future-oriented consequents. For completeness, notice that the same applies to relative clauses in sentences with future-oriented main clauses:

(38) Every employee who meets their quarterly goals will receive a bonus.



The takeaway from this empirical overview is that temporal shift arises whenever the SF is in a conditional antecedent or in a relative clause, regardless of the temporal composition of the main clause. These facts are summarized in Table 2.

	FORM	TEMPORAL ORDERING	EXAMPLE
Conditionals	SF(A); PRES(C)	UT < A = C	(33a)
	SF(A); PRES PERF(C)	UT < C < A	(33b)
	SF(A); PAST(C)	UT < C < A	(32)
	SF(A); FUT(C)	UT < A < C	(35)
RCs	SF(RC); PRES(MC)	UT < RC = MC	(34a)
	SF(RC); PRES PERF(MC)	UT < MC < RC	(34b)
	SF(RC); PAST(MC)	UT < MC < RC	(22)
	SF(RC); FUT(MC)	UT < RC < MC	(38)

Table 2 Interaction between the SF and the tenses in main clauses

We are now in a position to adopt an informal definition of temporal shift:

(39) **Temporal shift**

When the SF appears in relative clauses and conditional antecedents, it shifts the temporal anchor of the main clause to the future time it introduces.

Before I conclude this section, it is worth noting that the literature has examined other cases in which tenses seem to be anchored to future intervals.

However, these differ in a crucial way from what I call temporal shift. Consider the following examples:

- (40) a. John decided a week ago that in ten days at breakfast he **would** say to his mother that they were having their last meal together.
(Abusch 1997, ex. 27)
- b. By 2080, everyone **will** know at least one linguist who {left academia to work with AI / works with AI}. (adapted from Crouch 1993, ex. 2)

In (40a), the breakfast is located in the future with respect both to the attitude holder's now and to the utterance time, yet the embedded verb *be* bears past morphology. Similarly, in the variants of (40b), the events of leaving or working may also occur in the future relative to the utterance time, despite the past or present marking on the embedded verbs. In both cases, the apparent mismatch arises because the temporal interpretation of the underlined verbs is anchored to the higher future operators *would* and *will*. Importantly, these operators stand in a c-command relation to the temporal variables of the subordinate clauses, a relation that is absent in the data discussed in this section. For this reason, examples such as (40) should be regarded as distinct from genuine cases of temporal shift.²¹

As it is, temporal shift is rather puzzling: in main clauses, tenses are normally anchored to the utterance time, not to the time introduced inside a subordinate clause. However, as we will see in the next section, the observations made in this paper add new layers of complexity to the phenomenon.

3.2.2 Some new challenges

If we restricted our attention to conditionals and to English, accounting for temporal shift would already be far from trivial. But we would have a little more wiggle room: conditionals are typically assumed to involve covert modal elements, some of which are taken to scope above the entire conditional; it would be fairly straightforward to build temporal properties into these modals as well.²²

However, that move would go against the two main themes of this paper: (i) the SF is not tied exclusively to conditionals; (ii) the SF is the manifestation of the subjunctive future, a typologically rare form found in Portuguese. Staying

²¹ Thanks to Vera Hohaus and Ana Arregui (p.c.) for pushing me to clarify this distinction.

²² As we will see in Section 5, this is a common response to the problem.

true to these two premises adds some rather stringent requirements to a theory of temporal shift.

I have argued for a transparent mapping between form and meaning in sentences with the SF: any interpretive effect we observe in these sentences is coming from the SF itself. This position was motivated by the modality perceived in relative clauses, which are normally not taken to introduce any modal elements. Adopting such a view leads to a compositional challenge: If a future time is introduced *inside* a conditional antecedent or a relative clause, this interval should not be able to anchor the temporal interpretation of the main clause.²³ This observation was originally made by Williamson (2021), who noted that temporal shift looks like an instance of donkey anaphora, but in the temporal domain. Thus, we have stumbled into the same compositional problem we faced in Section 3.1: the SF seems to have exceptional scope properties in the modal *and* in the temporal domain.

To handle the modal facts, I suggested that the SF is an indefinite modal, and the unexpected binding facts we see in the modal domain are a genuine case of donkey anaphora. At this point, we could simply extend that insight into the temporal component of the SF. One way to do that would be to assume that the subjunctive alone encodes both temporal and modal displacement. The treatment of donkey anaphora in the modal domain would then extend straightforwardly to the temporal domain.

However elegant this approach may look, at least for Portuguese, it does not work. To see why, let's take a closer look at the morphosyntactic appearance of the three subjunctive forms in Portuguese, given in Table 3.

Although the segmentation of the forms above is not completely transparent, one fact about the subjunctive future is uncontroversial: it contains the morpheme *-r-*, which expresses futurity in Romance.²⁴ As we will see shortly, *-r-* is also found in the indicative future in Portuguese; besides that, this morpheme

²³ In the literature on embedded tenses, there have been proposals that assume tenses can undergo *res*-movement; for an overview, see Ogihara & Sharvit 2012. Adopting a movement-based approach could, in principle, also give us a handle on the behavior of the SF; we could assume that the modal and temporal morphemes that compose the SF scope out of their clauses and land in a position from which they *c*-command the main clause. I do not find this approach very promising for a few reasons. First, the SF often appears inside islands, which should block movement. Second, the SF is only licensed in certain subordinate clauses. It would be very hard to reconcile a theory of the distribution of the SF with the view that the SF can move out of its licensing environments after all.

²⁴ For different proposals of how subjunctive forms in Portuguese should be segmented, see Pontes 1965, Câmara 1972, and Santana 2019. All three authors agree on the status of *-r-*.

	arrive.3PL	run.3PL	leave.3PL
Subj. present	<i>cheguem</i>	<i>corram</i>	<i>partam</i>
Subj. past	<i>chegassem</i>	<i>corressem</i>	<i>partissem</i>
Subj. future	<i>chegarem</i>	<i>correrem</i>	<i>partirem</i>

Table 3 Morphological appearance of the subjunctive forms in Portuguese

is optionally realized on future-oriented modal verbs (Mendes 2019, Ferreira 2020). From here on, I will gloss this morpheme as FUT.²⁵

Since the Portuguese data suggests that the futurity of the SF comes from this discrete morpheme, placing the burden of temporal shift on the subjunctive would be unprincipled.²⁶

What if we assumed that FUT itself is an indefinite, and, as such, has exceptional scope properties? The problem with this view is that, in its other uses, FUT does not give rise to temporal shift. For instance, in (41), FUT appears as part of the indicative future; nevertheless, the main clause is anchored to the utterance time:

25 As an anonymous reviewer points out, some languages, like St’át’imcets and Yukatek Maya, have overt morphemes that obligatorily mark future shifting in environments like the complement of modals. Nevertheless, these languages do not employ these morphemes in conditional antecedents (Bochnak 2019). Is that a problem for the decompositional approach I am pursuing? Not necessarily. There are several paradigmatic gaps of this kind: other Romance languages also have *-r-* and do not realize it in the antecedent of predictive conditionals. French has an overt subjunctive, but does not use it in counterfactuals. Presumably, there are language-specific morphosyntactic rules conditioning which forms are realized in each environment.

26 The same reviewer wonders if there is any intralinguistic evidence that the SF in English can also be decomposed into SUBJ + FUT. The subjunctive in English does not have an obligatory future orientation, which, *prima facie*, could be taken as evidence for this decompositional approach:

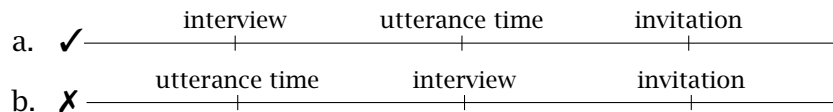
(i) If I weren’t so busy right now, I would visit you.

However, cases like (i) could be handled by assuming that the subjunctive introduces a non-past interval. Therefore, because of its impoverished morphology, the conclusion that modality and futurity come from separate morphemes cannot be confidently extended to English.

That being said, I will continue to base my analysis on the Portuguese paradigm. My rationale is that the Portuguese facts are, in a way, the worst case scenario — for reasons that will become clear throughout this section. Once we find a principled explanation for temporal shift that accounts for these facts, it should not be difficult to adapt that analysis into a non-decompositional treatment of the SF.

- (41) Os candidatos que se-rão convidados para a Open House
 the candidates who be-IND.FUT invited to the Open House
 já foram entrevistados pelo comitê.
 already were interviewed by the committee

‘The candidates who will be invited to the Open House have already been interviewed by the committee.’



This state of affairs can be summarized as follows: Temporal shift does not come from the subjunctive, as the subjunctive does not introduce futurity. However, temporal shift only emerges when FUT combines with the subjunctive. In other words, temporal shift is *parasitic* on the subjunctive. In isolation, these two facets of the phenomenon are baffling, but taken together, they give us an indication of what is going on: I suggest that FUT has unexceptional semantic scope, but it is able to ‘ride’ the donkey anaphora licensed by the subjunctive.

The idea I will pursue is that, in sentences with the SF, the main clause is not anchored to the *worlds* introduced in a subordinate clause, but rather, to the *situations*.²⁷

Situations can be understood as slices of worlds (Kratzer 1989, 2002, 2023). A situation s_1 can be something as small as me typing this sentence. Situations can also be bigger, and have other situations as their subparts. For instance, s_1 is part of the situation s_2 of me writing this paper (that is, $s_1 \leq s_2$). Some situations are maximal: they are so big that they are not part of any other situations. These maximal situations are simply possible worlds.

Crucially, in addition to a modal dimension, situations also have a temporal coordinate. For instance, the running time of s_1 ($\tau(s_1)$) is May 5, 2024, at 10am. If a clause is anchored not to a possible world, but to a situation, it will inevitably also be anchored to its running time. Therefore, if modal donkey anaphora is anaphora to situations, temporal shift falls out naturally.

In the next section, I present a proposal that combines insights about the modal and temporal interpretation of the SF, and formalize it within a dynamic framework.

²⁷ The basic insight, of course, is not new. Variations of this idea have been explored fruitfully in the literature on counterfactuals (Arregui 2009, Mirrazi 2022, a.o.), modals (Hacquard 2006, Kratzer 2020, a.o.), and aspect (Arregui, Rivero & Salanova 2014, a.o.).

4 Proposal

4.1 Formal preliminaries

This section presents some basic ingredients of Compositional Discourse Representation Theory (CDRT), the formal system underlying my analysis of the SF.

CDRT consists in a marriage between Discourse Representation Theory and Montague semantics. From the former, it inherits the tools to capture anaphoric relations that resist syntactic hierarchy; from the latter, it inherits the tools to model compositionality at the sub-clausal level. I follow closely the version of CDRT introduced in Muskens 1996.²⁸

Objects In addition to objects of the usual types, like e for individuals, s for situations, and t for truth values, I will also assume primitive objects of type r , for variable assignments. Variable assignments earn their keep by assigning values to drefs, which can be intuitively understood as placeholders for individuals or situations addressed in the discourse. In the version of CDRT I will assume, drefs are treated as functions from variable assignments to individuals or situations — that is, drefs are of type re , abbreviated as \mathbf{e} , or rs , abbreviated as \mathbf{s} . Figure 2 illustrates the interplay between drefs (represented by v_n) and variable assignments:

	v_1	v_2		
i	anne	beth	$v_1(i) = \text{anne}$	$v_2(i) = \text{beth}$
j	beth	anne	$v_1(j) = \text{beth}$	$v_2(j) = \text{anne}$
k	chris	beth	$v_1(k) = \text{chris}$	$v_2(k) = \text{beth}$

Figure 2 Mapping drefs to their values

Introducing and retrieving drefs Within this framework, indefinites are characterized by their ability to introduce new drefs. The introduction of a new dref amounts to randomly updating the value stored for a certain variable. This is

²⁸ Presumably, the results from this paper are also compatible with other analyses of indefinites and donkey anaphora, but I must leave alternative implementations for future work.

represented by $i[v_1]o$, which signals that the input assignment i and the output assignment o differ with respect to, at most, the value they assign to v_1 :

$$(42) \quad i[v_1]o := \forall v_n : v_n \neq v_1 \rightarrow v_n(i) = v_n(o)$$

A standard CDRT semantics for the indefinite article is given below. Following the convention in dynamic semantics, superscripts indicate that a certain term introduces a new dref. Subscripts indicate that a term is anaphoric to a previously introduced dref:

$$(43) \quad a^{v_1} \rightsquigarrow \lambda P_{\text{et}}. \lambda Q_{\text{et}}. [v_1 \mid]; P(v_1); Q(v_1)$$

According to this lexical entry, a introduces a new dref v_1 by relating the input assignment i to an intermediate assignment j , which is required to differ from i with respect to, at most, the value of v_1 . The value of v_1 in j is passed up to the restrictor and nuclear scope of indefinite article with the help of another intermediate assignment k , for which j serves as the input assignment.

Quantifiers like *every* are also able to introduce drefs:

$$(44) \quad \text{every}^{v_1} \rightsquigarrow \lambda P_{\text{et}}. \lambda Q_{\text{et}}. [\mid (v_1 \mid); P(v_1)) \Rightarrow Q(v_1)]$$

The entry above abbreviates (45). According to (45), *every* performs a test: every possible extension of the input assignment i that meets the conditions imposed by the restrictor of *every* has to have at least one possible output assignment that meets the conditions imposed by its nuclear scope. *Every* is, therefore, internally dynamic, but externally static. That is, it passes up the output assignment of its restrictor to its nuclear scope, but leaves the input assignment unchanged.

$$(45) \quad \text{every}^{v_1} \rightsquigarrow \lambda P_{\text{et}}. \lambda Q_{\text{et}}. \lambda i_r. \lambda o_r. i = o \wedge \forall j. \forall k. ((i[v_1]j \wedge P(v_1(j)))(j)(k)) \rightarrow \exists l. (k = l \wedge Q(v_1(j))(k)(l))$$

Pronouns like *it* simply apply a property to an anaphorically-retrieved dref, also leaving the input assignment unchanged:

$$(46) \quad \text{it}_{v_1} \rightsquigarrow \lambda G_{(\text{e},\text{st})}. \lambda s_s. G(v_1)(s)$$

Lexical entries Other lexical entries differ only minimally from those adopted in static frameworks. Besides the addition of two λ -binders for the input and output assignments, the lexical entries for unary predicates also include a condition requiring that these two assignments be identical. Since I am adopting

an intensionalized version of the system, some entries will include an argument slot for situation drefs:²⁹

- (47) a. $\text{purred} \rightsquigarrow \lambda v_e. \lambda s_s. [\mid \text{purred}(v, s)]$
 b. $\text{cat} \rightsquigarrow \lambda v_e. [\mid \text{cat}(v)]$

Sentences and sentence radicals Sentences denote Discourse Representation Structures (DRSs), and are formally treated as relations between variable assignments — that is, they are of type (r, rt) , abbreviated as **t**. They can be schematically represented as (48a) or (48b), depending on whether they introduce new drefs or simply ‘test’ the output assignment:

- (48) a. $\lambda i_r. \lambda o_r. i [\text{NEW DREFS}] o \wedge \text{CONDITIONS}(o)$
Abbr.: [NEW DREFS | CONDITIONS]
 b. $\lambda i_r. \lambda o_r. i = o \wedge \text{CONDITIONS}(o)$
Abbr.: [| CONDITIONS]

Finally, I assume that sentence radicals — that is, clauses that lack tense and mood morphology — denote dynamic propositions, of type **st**, as illustrated in (49). These and other conventions are summarized in Table 4.

- (49) $A^{v_2} \text{ cat purred.} \rightsquigarrow \lambda s_s. [v_2 \mid \text{cat}(v_2); \text{purred}(v_2, s)]$

That concludes my presentation of CDRT; we are now in a position to formalize the modal and temporal contribution of the SF.

4.2 Intuitive overview of the proposal

As we saw above, sentence radicals are of type **st**; they take a situation dref and return an update. The crux of my proposal is that the role of mood is to introduce a variable that saturates the situation argument of sentence radicals.³⁰ Temporal morphemes impose conditions on the value of this variable. Let’s consider a concrete case:

²⁹ As a simplifying assumption, I will continue to adopt entries of type **et** for nominal predicates. This should not be seen as a claim that nouns are insensitive to modal and temporal displacement. Given the LFs I adopt later in the section, assuming entries of type **(e, st)** for nouns would lead to technical and empirical complications that are tangential to my purposes.

³⁰ Some version of this idea is also adopted by Stone & Hardt (1999), Brasoveanu (2010), and Hofmann (2022), a.m.o.

	TYPE	ABBR.	VARIABLES
individuals	e		
situations	s		
variable assignments	r		i, o, j, k, l, m
individual drefs	re	e	v_n
situation drefs	rs	s	s_n
dynamic one-place predicates	$(re, (r, rt))$	et	P, Q
dynamic properties	$(re, (rs, (r, rt)))$	(e, st)	G
DRSs	(r, rt)	t	\wp, \mathcal{Q}
dynamic propositions	$(rs, (r, rt))$	st	\mathcal{P}
dyn. relations between dyn. propositions	$(rs, (rs, (r, rt)))$	(s, st)	\mathbb{P}, \mathcal{Q}

Table 4 Types and variables assumed

- (22) [[Every [candidate who SUBJ_{s₀}^{s₁} FUT delivers a good job talk]]₂
 [IND_{s₁, s₂} PRES t_2 has an equal chance of being hired]].

In the embedded clause, the cluster consisting in SUBJ+FUT introduces a future situation s_1 , which is historically accessible from the utterance situation, s_0 . That is, s_1 is part of a maximal situation w which is a historical alternative to the actual world at the utterance time: $s_1 \leq w$: $w \in \mathbf{hist}_{s_0}$ (abbreviated as $s_1 \in \mathbf{hist}_{s_0}$). This new situation, s_1 , serves as the evaluation situation for the main clause.

In the main clause, IND+PAST relate the vP situation, s_2 , to the evaluation situation s_1 . What kind of relation should hold between these two situations? On the temporal dimension, it seems clear that the relevant notion is that of precedence: the running time of s_2 precedes the running time of s_1 ($\tau(s_2) < \tau(s_1)$). From a mereological perspective, it does not seem correct to say that s_2 stands in the part-of relation to s_1 — after all, their running times do not overlap.

There is a very rich literature on how to properly model the relation between situations and their anchors (Arregui 2009, 2010, Kratzer 2020, to mention a few). Since this paper is mainly concerned with the anaphoric properties of the SF, I will abstract away from this discussion. For simplicity, I will assume that s_2

and s_1 have to be part of the same world. I will write $s_2 \leq w_{s_1}$ as a shortcut for ‘ s_2 is part of a world w that has s_1 as one of its proper parts’.³¹

The end result is an anaphoric chain: the situation in the main clause is anaphoric to the situation introduced by the subjunctive, which, in turn, is anaphoric to the utterance situation.

4.3 Formal details

I adopt the LF in (50a) for the SF, and the LF in (50b) for main clauses:

- (50) a. $[_{CP} C [_{MOODP} SUBJ [_{FUTP} FUT [_{VP} \dots V \dots]]]]$
 b. $[_{CP} C [_{MOODP} IND [_{TP} T [_{VP} \dots V \dots]]]]$

These LFs are simplified in many respects. For instance, I remain neutral on the nature of FUT, which could in principle be an aspectual operator or a tense.³² Relatedly, I also omit other potential temporal elements, like aspect, which could scope at different positions in the clausal spine. My goal is to highlight the way moods and temporal morphemes conspire to give rise to temporal shift; the bare-bones LFs in (50) suffices for that purpose. The analysis I will develop can be easily extended to accommodate additional intensional morphemes.

As can be seen in (50), temporal elements combine directly with vPs. These morphemes do not do anything dynamically interesting; they do not introduce or retrieve drefs. They simply impose a relation between the running times of the vP situation and an evaluation situation:

- (51) a. $FUT \rightsquigarrow \lambda \mathcal{P}_{st}. \lambda s_s. \lambda s'_s. [| \tau(s) > \tau(s')]; \mathcal{P}(s)$
 b. $PRES \rightsquigarrow \lambda \mathcal{P}_{st}. \lambda s_s. \lambda s'_s. [| \tau(s) = \tau(s')]; \mathcal{P}(s)$
 c. $PAST \rightsquigarrow \lambda \mathcal{P}_{st}. \lambda s_s. \lambda s'_s. [| \tau(s) < \tau(s')]; \mathcal{P}(s)$

³¹ I borrow this notation from Kratzer 2012: ch.5.

³² If we analyzed FUT as an aspectual operator, we would also have to enrich this LF to include a tense, which could in principle scope above or below MoodP:

- (i) a. $[_{CP} C [_{TP} T [_{MOODP} SUBJ [_{FUTP} FUT [_{VP} \dots V \dots]]]]]]$
 b. $[_{CP} C [_{MOODP} SUBJ [_{TP} T [_{FUTP} FUT [_{VP} \dots V \dots]]]]]]$

More complicated LFs like these might be necessary in order to do justice to the connection between different subjunctive forms — for instance, the subjunctive future and the subjunctive past. Since the subjunctive past can be future-oriented, the difference between these forms cannot boil down solely to the presence or absence of FUT. As this paper focuses only on the subjunctive future, the simplification in (50) is innocuous to our purposes.

Mood morphemes take arguments of type (s, st) , which are outputted by FUT/ PRES:

- (52) a. $\text{SUBJ}_{s_0}^{s_1} \rightsquigarrow \lambda \mathbb{P}_{(s,st)}.[s_1 \mid s_1 \in \mathbf{hist}_{s_0}]; \mathbb{P}(s_1)(s_0)$
 b. $\text{IND}_{s_1,s_2} \rightsquigarrow \lambda \mathbb{P}_{(s,st)}.[\mid s_2 \leq w_{s_1}]; \mathbb{P}(s_2)(s_1)^{33}$

The subjunctive retrieves a situation s_0 from its input assignment, and introduces a new situation s_1 . By default, s_0 is mapped to the utterance situation: that is, it picks out a slice of the actual world, at the utterance time. The subjunctive further imposes the condition that s_1 be a historical alternative to s_0 .

The indicative says that the vP situation s_2 is part of the same world as s_1 . s_1 serves as the evaluation situation for the clause headed by the indicative. In discourse-initial contexts, s_1 would default to the utterance situation. However, in the cases we are interested in, this situation is co-indexed with a situation s_0 introduced by the subjunctive. As a consequence, the subjunctive ends up providing the evaluation situation for the indicative-headed clause.

4.3.1 Illustrations

The lexical entries adopted in this paper are collated in Table 5.

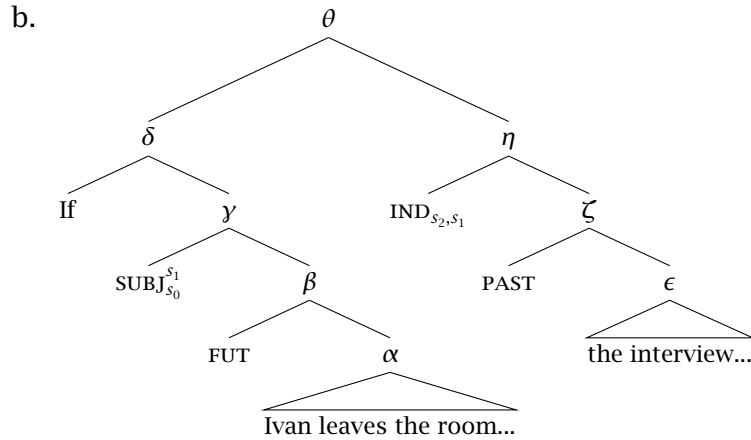
I will illustrate my proposal first with a conditional. In this derivation, I put aside some clause-internal details and focus on the role of mood and temporal morphemes. The LF I assume is given in (53):

- (53) **Conditionals**
 a. If Ivan leaves the room smiling, the interview went well.

³³ This lexical entry is heavily inspired by Brasoveanu's (2010) treatment of the indicative.

	LEXICAL ENTRY	TYPE
SUBJ _{s₀} ^{s₁}	$\lambda \mathbb{P}_{(\mathbf{s}, \mathbf{st})} . [s_1 \mid s_1 \in \mathbf{hist}_{s_0}]; \mathbb{P}(s_1)(s_0)$	$((\mathbf{s}, \mathbf{st}), \mathbf{t})$
IND _{s₂, s₁}	$\lambda \mathbb{P}_{(\mathbf{s}, \mathbf{st})} . [\mid s_2 \leq w_{s_1}]; \mathbb{P}(s_2)(s_1)$	$((\mathbf{s}, \mathbf{st}), \mathbf{t})$
FUT	$\lambda \mathcal{P}_{\mathbf{st}} . \lambda s_{\mathbf{s}} . \lambda s'_{\mathbf{s}} . [\mid \tau(s) > \tau(s')]; \mathcal{P}(s)$	$(\mathbf{st}, (\mathbf{s}, \mathbf{st}))$
PRES	$\lambda \mathcal{P}_{\mathbf{st}} . \lambda s_{\mathbf{s}} . \lambda s'_{\mathbf{s}} . [\mid \tau(s) = \tau(s')]; \mathcal{P}(s)$	$(\mathbf{st}, (\mathbf{s}, \mathbf{st}))$
PAST	$\lambda \mathcal{P}_{\mathbf{st}} . \lambda s_{\mathbf{s}} . \lambda s'_{\mathbf{s}} . [\mid \tau(s) < \tau(s')]; \mathcal{P}(s)$	$(\mathbf{st}, (\mathbf{s}, \mathbf{st}))$
<i>who</i>	$\lambda P_{\mathbf{et}} . \lambda Q_{\mathbf{et}} . \lambda v_{\mathbf{e}} . (Q(v); P(v))$	$(\mathbf{et}, (\mathbf{et}, \mathbf{et}))$
<i>every</i> ^{v₁}	$\lambda P_{\mathbf{et}} . \lambda Q_{\mathbf{et}} . [\mid (v_1 \mid); P(v_1)] \Rightarrow Q(v_1)$	$(\mathbf{et}, (\mathbf{et}, \mathbf{t}))$
<i>a</i> ^{v₁}	$\lambda P_{\mathbf{et}} . \lambda Q_{\mathbf{et}} . [v_1 \mid]; P(v_1); Q(v_1)$	$(\mathbf{et}, (\mathbf{et}, \mathbf{t}))$
<i>the</i> _{v₁}	$\lambda P_{\mathbf{et}} . \lambda Q_{\mathbf{et}} . P(v_1); Q(v_1)$	$(\mathbf{et}, (\mathbf{et}, \mathbf{t}))$
<i>if</i>	$\lambda \mathbb{P}_{\mathbf{t}} . \lambda \mathbb{Q}_{\mathbf{t}} . [\mid \mathbb{P} \Rightarrow \mathbb{Q}]$	$(\mathbf{t}, \mathbf{tt})$
<i>he</i> _{v₁} , <i>t</i> ₁	$\lambda G_{(\mathbf{e}, \mathbf{st})} . \lambda s_{\mathbf{s}} . G(v_1)(s)$	$((\mathbf{e}, \mathbf{st}), \mathbf{st})$
<i>Ivan</i> ^{v₁}	$\lambda G_{(\mathbf{e}, \mathbf{st})} . \lambda s_{\mathbf{s}} . [v_1 \mid v_1 = \mathbf{ivan}]; G(v_1)(s)$	$((\mathbf{e}, \mathbf{st}), \mathbf{st})$
<i>cat</i>	$\lambda v_{\mathbf{e}} . [\mid \mathbf{cat}(v)]$	\mathbf{et}
<i>purr</i>	$\lambda v_{\mathbf{e}} . \lambda s_{\mathbf{s}} . [\mid \mathbf{purr}(v)(s)]$	$(\mathbf{e}, \mathbf{st})$

Table 5 Lexical entries adopted in this paper



The derivation of the update associated with (53) proceeds straightforwardly; all nodes combine via function application:

(54) **Antecedent**

- a. $\alpha \rightsquigarrow \lambda s_{\mathbf{s}} . [v_1 \mid v_1 = \mathbf{ivan}, \mathbf{leaves}(v_1)(s)]$
- b. $\beta \rightsquigarrow \lambda s_{\mathbf{s}} . \lambda s'_{\mathbf{s}} . [v_1 \mid v_1 = \mathbf{ivan}, \mathbf{leaves}(v_1)(s), \tau(s) > \tau(s')]$

- c. $\gamma \rightsquigarrow [s_1, v_1 \mid s_1 \in \mathbf{hist}_{s_0}, v_1 = \text{ivan}, \text{leaves}(v_1)(s_1), \tau(s_1) > \tau(s_0)]$
- d. $\delta \rightsquigarrow \lambda \mathcal{Q}_t. [[s_1, v_1 \mid s_1 \in \mathbf{hist}_{s_0}, v_1 = \text{ivan}, \text{leaves}(v_1)(s_1), \tau(s_1) > \tau(s_0)] \Rightarrow \mathcal{Q}]$

(55) **Consequent**

- a. $\epsilon \rightsquigarrow \lambda s_s. [\mid \text{interview}(v_2), \text{went_well}(v_2)(s)]$
- b. $\zeta \rightsquigarrow \lambda s_s. \lambda s'_s. [\mid \text{interview}(v_2), \text{went_well}(v_2)(s), \tau(s) < \tau(s')]$
- c. $\eta \rightsquigarrow [\mid s_2 \leq w_{s_1}, \text{interview}(v_2), \text{went_well}(v_2)(s_2), \tau(s_2) < \tau(s_1)]$

Combining these two results yields the following update:

$$(56) \quad \theta \rightsquigarrow [[[s_1, v_1 \mid s_1 \in \mathbf{hist}_{s_0}, v_1 = \text{ivan}, \text{leaves}(v_1)(s_1), \tau(s_1) > \tau(s_0)] \Rightarrow [\mid s_2 \leq w_{s_1}, \text{interview}(v_2), \text{went_well}(v_2)(s_2), \tau(s_2) < \tau(s_1)]]]$$

To make things more transparent, this update can be unpacked as follows:

$$(57) \quad \lambda i_r. \lambda o_r. i = o \wedge \forall k. \left(\left(\begin{array}{l} i[s_1, v_1]k \quad \wedge \\ s_1(k) \in \mathbf{hist}_{(s_0(k))} \quad \wedge \\ \tau(s_1(k)) > \tau(s_0(k)) \quad \wedge \\ v_1(k) = \text{ivan} \quad \wedge \\ \text{leaves}(v_1(k), s_1(k)) \end{array} \right) \rightarrow \exists l. \left(\begin{array}{l} k = l \quad \wedge \\ s_2(l) \leq w_{s_1}(l) \quad \wedge \\ \tau(s_2(l)) < \tau(s_1(l)) \quad \wedge \\ \text{interview}(v_2(l)) \quad \wedge \\ \text{went_well}(v_2(l), s_2(l)) \end{array} \right) \right)$$

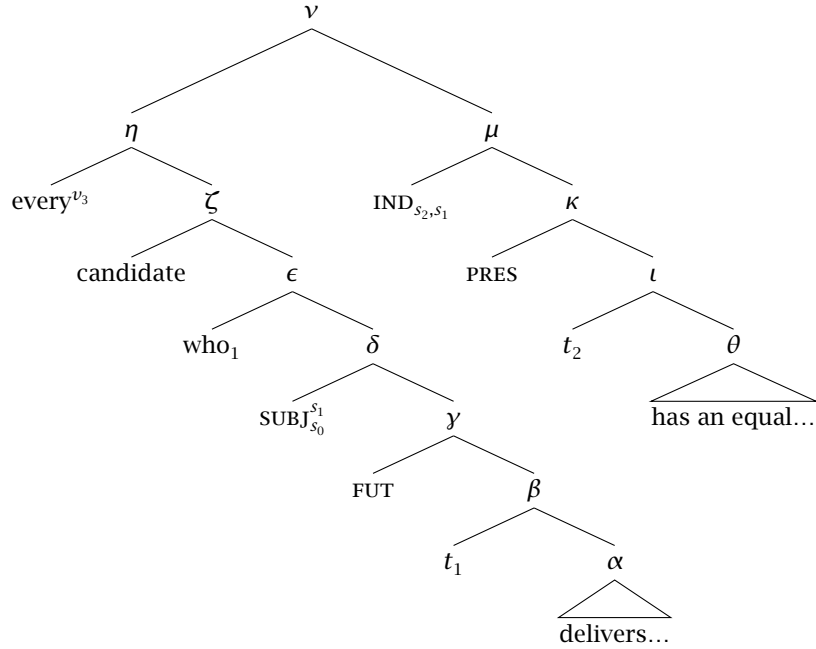
The DRS above performs a test: every assignment k that differs from i with respect to, at most, the values of s_1 and v_1 , and passes the tests imposed by the antecedent (i.e. maps v_1 to *ivan*), has a possible output assignment l that is identical to k , and passes the tests imposed by the consequent. In other words, for every future situation s_1 that involves Ivan leaving the room smiling, there has to be an earlier situation s_2 in which the interview goes well. These two situations have to be part of the same world.

The derivation of SF-marked relative clauses proceeds in an analogous fashion, but some added complexity is introduced by the syntax of relative clauses and quantifiers. I adopt the LF below:

(58) **Relative clauses**

a. [Every candidate who delivers a good job talk]₂ t₂ has an equal chance of being hired.

b.



This LF contains two traces, t_1 and t_2 , left by the relative pronoun *who*, and by the subject DP. These traces behave like free pronouns. They saturate the individual variable of the two VPs, and are then bound higher in the tree via the following compositional rule:

(59) **Quantifying-in**

(Muskens 1996)

If $X_n \rightsquigarrow \alpha$, $Y \rightsquigarrow \beta$ and X_n and Y are daughters of Z , then $Z \rightsquigarrow \alpha(\lambda v_{e,n}.\beta)$, provided that this is a well-formed term.

Quantifying-in applies at nodes ϵ and ν . The translations of all other nodes are obtained via function application as usual:

(60) **Restrictor**

- a. $\alpha \rightsquigarrow \lambda v_e.\lambda s_s.[| \text{delivers_a_good_talk}(v)(s)]$
- b. $\beta \rightsquigarrow \lambda s_s.[| \text{delivers_a_good_talk}(v_1)(s)]$
- c. $\gamma \rightsquigarrow \lambda s_s.\lambda s'_s.[| \tau(s) > \tau(s'), \text{delivers_a_good_talk}(v_1)(s)]$
- d. $\delta \rightsquigarrow [s_1 | s_1 \in \mathbf{hist}_{s_0}, \tau(s_1) > \tau(s_0), \text{delivers_a_good_talk}(v_1)(s_1)]$

Indefiniteness in future reference

- e. $\epsilon \rightsquigarrow \lambda Q_{\text{et}}.\lambda v_e.(Q(v); [s_1 \mid s_1 \in \mathbf{hist}_{s_0}, \tau(s_1) > \tau(s_0), \text{delivers_a_good_talk}(v_1)(s_1)])]$
- f. $\zeta \rightsquigarrow \lambda v_e.[s_1 \mid s_1 \in \mathbf{hist}_{s_0}, \tau(s_1) > \tau(s_0), \text{delivers_a_good_talk}(v)(s_1), \text{candidate}(v)]]$

(61) **Nuclear scope**

- a. $\theta \rightsquigarrow \lambda v_e.\lambda s_g.[\mid \text{has_an_equal_chance}(v)(s)]]$
- b. $\iota \rightsquigarrow \lambda s_g.[\mid \text{has_an_equal_chance}(v_2)(s)]]$
- c. $\kappa \rightsquigarrow \lambda s_s.\lambda s'_s.[\mid \tau(s) < \tau(s'), \text{has_an_equal_chance}(v_2)(s)]]$
- d. $\mu \rightsquigarrow [\mid s_2 \leq w_{s_1}, \tau(s_2) < \tau(s_1), \text{has_an_equal_chance}(v_2)(s_2)]]$

The quantifier then combines with ζ and μ , yielding the update in (62b):

- (62) a. $\eta \rightsquigarrow \lambda Q_{\text{et}}.[\mid [v_1, s_1 \mid s_1 \in \mathbf{hist}_{s_0}, \tau(s_1) > \tau(s_0), \text{delivers_a_good_talk}(v)(s_1), \text{candidate}(v_1)] \Rightarrow Q(v_1)]]$
- b. $\nu \rightsquigarrow [\mid [v_1, s_1 \mid s_1 \in \mathbf{hist}_{s_0}, \tau(s_1) > \tau(s_0), \text{candidate}(v_1), \text{delivers_a_good_talk}(v_1)(s_1)] \Rightarrow [\mid s_2 \leq w_{s_1}, \tau(s_2) = \tau(s_1), \text{has_an_equal_chance}(v_1)(s_2)]]]$

This DRS can be unpacked as before:

$$(63) \quad \lambda i_r.\lambda o_r.i = o \wedge \forall k. \left(\begin{array}{l} \left(\begin{array}{l} i[s_1, v_1]k \\ s_1(k) \in \mathbf{hist}_{(s_0(k))} \\ \tau(s_1(k)) > \tau(s_0(k)) \\ \text{candidate}(v_1(k)) \\ \text{delivers_a_good_talk}(v_1(k))(s_1(k)) \end{array} \right) \wedge \wedge \wedge \wedge \end{array} \right) \rightarrow \exists l. \left(\begin{array}{l} k = l \\ s_2(l) \leq w_{s_1(l)} \\ \tau(s_2(l)) = \tau(s_1(l)) \\ \text{has_an_equal_chance}(v_1(l))(s_2(l)) \end{array} \right) \wedge \wedge \wedge \end{array} \right)$$

In prose, (63) says that every assignment k that (i) is identical to the input assignment i with the exception of, possibly, the values of v_1 and s_1 and (ii) passes the tests imposed by the restrictor of *every* (i.e.: k maps v_1 to a candidate, etc.), is such that there is an assignment l that serves as output to k and passes the tests imposed by the nuclear scope of *every* (i.e.: maps v_1 to someone who

has fair chances of being hired, etc.). This update is very similar to the one derived for the conditional in (53).³⁴

4.4 Summary

In this section I presented a formal system that helps us make sense of the compositional challenges raised in §3. After making explicit the division of labor between mood and temporal morphemes, I provided two illustrations of how these elements interact to yield intuitively correct translations for sentences with the SF. These results generalize straightforwardly to sentences with future-oriented main clauses.

The main feature of the theory developed here is that it assumes a tight link between form and meaning. The SF is decomposable into two morphemes, a subjunctive, responsible for introducing modal displacement, and a forward-shifting operator, responsible for temporal displacement. The meaning of the SF comes from the interaction of these two morphemes, and not from other operators associated with the environments where the SF is embedded. Beyond this core feature, many details are negotiable. For instance, as far as I can tell, my proposal could be translated into a system that makes use of Montagovian indices instead of situations.

In the next section, I compare my account to four previous works. We will see that what distinguishes the current proposal has little to do with any particular implementational choices.

³⁴ It is well-known that donkey sentences also give rise to weak readings, whose availability is highly dependent on the context. The classic example, in (i-a) is biased towards a strong reading; this sentence is only true if every farmer feeds *every* donkey they own. A weak reading for (i-a) can, however, be coerced in more outlandish scenarios (see, for instance, Chierchia 2009). The sentence in (ii-b), on the other hand, is true as long as everyone put at least one dime in the parking meter — no matter how many dimes were left in their pockets.

- (i) a. Every farmer who owns a^{v₁} donkey feeds it_{v₁}.
- b. Everyone who had a^{v₁} dime put it_{v₁} in the parking meter.

Does the SF also give rise to weak readings? Although this issue certainly merits further research, I tentatively suggest that it does. Let's consider (16) again:

(16) Each person who comes to pay respect to the mayor will get a commemorative card.

Suppose that the mayor's funeral will last more than one day, and that some people will come to the funeral multiple times. However, due to budget limitations, only one commemorative card will be given to each person. Against this scenario, (16) would be judged true as long as each person gets a commemorative card in at least one of the situations in which they come to the funeral — even if there are situations in which they come to the funeral and do not get a card.

5 Previous analyses

As discussed in Section 2, present morphology in English gives rise not only to contingent future readings but also to scheduled ones. Since much of the existing literature on the SF focuses on English, determining whether these two readings should be analyzed in tandem constitutes a crucial theoretical choice point. Authors who define the SF on morphological grounds have pursued a unified analysis of scheduled and contingent present readings. I begin this section discussing three representatives of this approach: Kaufmann 2005, along with the closely related accounts in Schulz 2008 and Rumberg & Lauer 2023. An alternative perspective, however, individuates future readings of the present based on semantic rather than morphological criteria. On this view, contingent and scheduled readings arise from distinct grammatical ingredients. In addition to the present work, this line is also developed in Williamson 2021, which I turn to at the end of the section.³⁵

Kaufmann 2005, Schulz 2008 and Rumberg & Lauer 2023 all depart from the same set of premises, given below:^{36,37}

P1 In matrix sentences in English, the present can only be used to refer to the future if the future is settled (i.e.: in scheduled contexts).

P2 Conditional antecedents allow the present to refer to the future more freely (i.e.: not only in scheduled contexts).

P3 In conditionals with future-oriented antecedents, the consequent can be anchored to a future time (i.e.: they give rise to temporal shift).

Considered in isolation, the validity of each of these premises is hardly questionable. However, taking these three premises as the starting point for a theory of the SF reflects a very different view from the one adopted in this paper: P1 and P2 follow from the assumption that the SF and scheduled readings of the present constitute a unified phenomenon; the data from Portuguese casts

³⁵ Klecha (2016) also adopted a largely semantic criterion to taxonomize future readings of the present. However, because Klecha focuses specifically on the future orientation of attitude verbs, its empirical domain does not intersect with the one assumed here. For this reason, I set aside a discussion of that proposal.

³⁶ I am indebted to an anonymous reviewer for pointing me to Rumberg & Lauer (2023).

³⁷ Strictly speaking, it is a simplification to describe prior work as analyses of the SF. A central contribution of the present paper is the proposal that future forms should be taxonomized according to their interaction with mood. In this sense, no previous study has targeted precisely the same empirical object examined here.

doubt on that idea. P2 and P3 imply that certain aspects of the interpretation of the SF are unique to conditionals; the data from relative clauses suggests that this is not the case.

Naturally, adopting these premises also yields a very different agenda for a theory of the SF. The primary goal of this theory is to explain why future reference with the present tense is constrained in the way it is (assumed to be). A secondary goal is to explain what is special about conditionals that allows them to obviate the constraint in P1, and to license temporal shift.

5.1 Kaufmann 2005

Kaufmann's account is based on the interplay of three elements: the semantics of tense; a covert necessity operator, \emptyset ; and the meaning of the conditional connective *if*. Kaufmann assumes a historical modal base (see fn. 19) and a standard compositional system.

Kaufmann proposes traditional lexical entries for tenses: the past has its regular meaning, the present denotes a non-past. The main innovation of Kaufmann's system lies in the assumption that all tensed sentences contain a covert epistemic or metaphysical necessity operator, \emptyset , which expresses either belief or settledness. Given the asymmetry between the past and the future, the contribution of \emptyset cannot be felt in sentences in the past tense; past events are already settled. When it comes to matrix clauses in the present, the modality introduced by \emptyset has the effect of inducing scheduled readings: future events can only be settled if they are scheduled to happen or follow from the laws of nature. When settledness is ruled out on pragmatic grounds, matrix clauses in the present are unacceptable, explaining why a sentence like (64) is infelicitous.

(64) #John wins the match.

Conditional antecedents are special because the connective *if* shifts the modal base of \emptyset into the future. As a result, we are able to evaluate the truth of the antecedent proposition at a future time, when it *becomes* settled. And because *if* scopes above the entire conditional, it can also shift the temporal anchor of the consequent to this future time, giving rise to temporal shift.

In terms of empirical coverage, there is only partial overlap between my proposal and Kaufmann's: I do not discuss scheduled readings of the present; Kaufmann takes temporal shift to be specific to conditionals, leaving aside relative clauses. Since I take scheduled readings to constitute a separate phenomenon from the SF, I do not have anything to say about the source of these

readings. Therefore, it is impossible to compare the two accounts on these grounds. Conversely, it is not clear how Kaufmann's account could be extended to capture temporal shift in relative clauses.

5.2 Schulz 2008

Schulz's proposal is inspired by Kaufmann's, so unsurprisingly, the two accounts converge in important respects; for instance, Schulz also assumes the English present tense denotes non-pastness. The main departure from Kaufmann's account is that Schulz does not posit the presence of a covert modal in all tensed sentences.³⁸ The crucial innovation of this proposal lies in how the asymmetry between past and future is formalized.

Recall from Section 3.1, that historical alternatives of a world w at a time t are standardly defined as the worlds that agree with w up to t ; that is, $hist_{w,t} = \{w' \mid w' \approx_t w\}$. At a future time, the historical alternatives to a world may diverge with respect to the value they assign to a propositional variable P ; however, all these worlds are *defined* for the value of P . For Schulz, this is not the case: at future times, the value of a propositional variable may be genuinely undefined.

Schulz spells out her proposal in terms of possibilities, which are characterized as follows:

- (65) A tuple $i = \langle w, t \rangle$, where w is a partially defined interpretation function, and t is a time, is a *possibility* iff:³⁹ (Schulz 2008: 703)
- a. w is completely defined up to t and;
 - b. for any property P and time $t' > t$: $P(\langle w, t' \rangle)$ is defined iff this follows from the past, the present, and non-defeasible general laws.

Schulz defines the ontic modal base $O_{\langle w, t \rangle}$ as the set of worlds that agree with w up to t , and at all future points t' for which w is defined:

$$(66) O_{\langle w, t \rangle} = \{\langle w', t' \rangle \mid t' \geq t \text{ and } w \subseteq w'\}$$

Ontic alternatives are ranked by an ontic preference order \leq_i , which favors earlier possibilities:

³⁸ Kaufmann, however, is not necessarily committed to the presence of \emptyset in the LF of tensed sentences. He hypothesizes that perhaps unmodalized sentences are interpreted with universal force as a default (Kaufmann 2005: fn. 8).

³⁹ In Schulz 2008, these possibilities are represented by the variable p , instead of i . I adopt the latter to avoid confusion with properties or propositions.

$$(67) \quad \forall \langle w, t \rangle, \langle w', t' \rangle \in O_i : \langle w, t \rangle \leq_i \langle w', t' \rangle \text{ iff } t \leq t'$$

Schulz’s definition of possibilities, coupled with her assumption that the present denotes non-past, predicts that future readings of the present should be severely constrained. They should only be admissible in sentences that describe scheduled events, or future facts that follow from the laws of nature. To explain why these constraints are lifted in conditional antecedents, Schulz adopts the restrictor view of conditionals (Kratzer 1986, 2012). According to this view, *if*-clauses serve to restrict the domain of a (potentially covert) modal. In Schulz’s system, this modal quantifies over ontic alternatives:

$$(68) \quad \llbracket \llbracket \text{If } A \llbracket \Box C \rrbracket \rrbracket \rrbracket^f = \lambda i_s. \forall i' : i' \in \text{Min}_{O, \leq_i} (f(i) \cap \llbracket A \rrbracket^f) \rightarrow \llbracket C \rrbracket^f(i') = 1^{40}$$

The possibilities that end up in the domain of \Box are the earliest possibilities that verify the truth of the antecedent. Unless the antecedent is settled (i.e., scheduled), these will be possibilities whose temporal coordinate lies in the future of t_c . These possibilities have a later temporal center, which then serves as the temporal anchor for the consequent, giving rise to temporal shift.

It should be clear that, despite significant differences between the proposals, the concerns I raised for Kaufmann’s account also apply to Schulz’s. For both authors, the special behavior of the morphological present in conditional antecedents is facilitated by the conditional itself; so is temporal shift. As a result, these two phenomena should be constrained to conditionals, which I have argued is not the case.

5.3 Rumberg & Lauer 2023

Rumberg & Lauer observe that the particular division of labor adopted by Kaufmann and Schulz leads to problematic predictions: since the possibility of a non-scheduled future-oriented reading of the present is tied to the semantics of the conditional, these two accounts incorrectly rule in past-of-the-future readings for conditionals with past antecedents, like (68):

⁴⁰ The operator *Min* picks out the set of earliest ontic alternatives ranked by \leq_i . It is defined as follows:

- (i) For a set of objects S with $s \in S$ and $S^* \subseteq S$, a binary accessibility relation R on S and a partial order \leq on S :
- $$\text{Min}_{R, \leq}(s, S^*) = \{s' \in R(s) \mid s' \in S^* \ \& \ \neg \exists s'' \in R(s) : s'' \in S^* \ \& \ s'' < s'\}$$

- (68) *Context:* John has an important job interview tomorrow.
 #If the interview went well, {John gets the job / John is happy}.

One of the main objectives of Rumberg & Lauer’s proposal, then, is to explain why the present and the past behave differently in conditionals. Their account is couched in transition semantics (Rumberg 2016, 2019), a novel approach to modeling the asymmetry between past and future. My presentation of this system will be brief, and it follows closely the one in Rumberg 2019.

In transition semantics, possible futures are understood as sequences of transitions. Transitions are defined as pairs consisting in a moment m and a set of histories H , and they are represented by the notation $\langle m \rightarrow H \rangle$. This set of histories contains the ways in which reality could unfold that are compatible with m . Sentences are evaluated at indices consisting in a moment m and a set of transitions T (m/T), both fixed by the utterance situation.

Rumberg & Lauer assume two basic temporal operators, past (Ps) and future (F): $\text{Ps}(p)$ is true at m/T iff there is some earlier moment m' where p is true with respect to T . $\text{F}(p)$ is true at an index m/T iff p is true in every history open at m that is *admitted* by T . For instance, in Figure 3, $\text{F}(p)$ is false at m/T because T does not rule out an open $\neg p$ -history. At m/T' , however, $\text{F}(p)$ is true: even though there is a $\neg p$ -history open at m , that history is ruled out by the transition set. A third temporal operator, present (Pr), is derived from F: $\text{Pr}(p) = p \vee \text{F}(p)$.

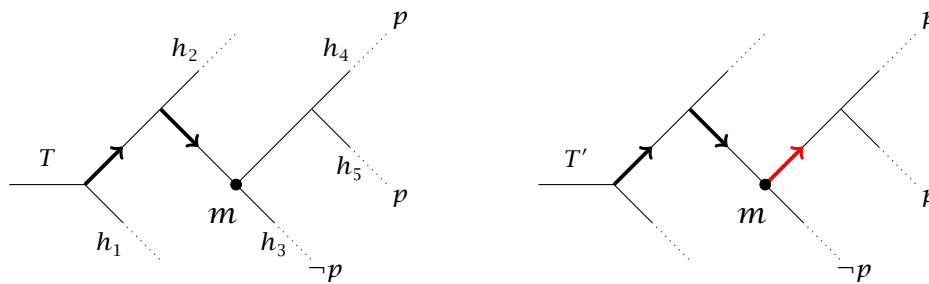


Figure 3 On the left: an index m/T where $\text{F}(p)$ is false. On the right: an index m/T' where $\text{F}(p)$ is true.

In addition to these temporal operators, Rumberg & Lauer also assume a modal operator, stability (S), which is unique to transition semantics. The intuition behind the operator S is that what is a future contingency at a certain point, may go on to become a settled fact. S quantifies universally over possible

extensions of a transition set T . In Figure 3, $F(p)$ is stably-true at m/T' : every transition that can be added to T' verifies the truth of p . When it comes to m/T , $F(p)$ is a contingency: one possible extension of T , namely, $\langle m \rightarrow \{h_4, h_5\} \rangle$, makes $F(p)$ true; another possible extension, $\langle m \rightarrow \{h_3\} \rangle$, makes $F(p)$ false.

Rumberg & Lauer's analysis of predictive conditionals assumes the same basic setup as Schulz's: antecedents also restrict the domain of a (potentially covert) modal in the consequent. For Rumberg & Lauer, this modal is the stability operator S . Rumberg & Lauer, however, depart from standard treatments of conditionals by letting the present tense in the antecedent lift the settledness requirement: this tense is responsible for extending the transition set T until it reaches a point that makes the antecedent true at m . The consequent is then interpreted relative not to m , but to the earliest moment m' that succeeds this extended transition set. That gives rise to temporal shift. Their semantics for conditionals is schematically represented in (69):

- (69) '[If A [S C]]' is true at an index m/T iff every possible extension of the transition set T where A is stably-true, C is also true.

Like the present work, Rumberg & Lauer ascribe a more significant role to the tense in the antecedent of conditionals. Thus, this theory might be in a better position to handle relative clauses. However, in this system, temporal shift is only possible when the antecedent restricts the modal base of S . Unless we postulate a counterpart of this operator in sentences with relative clauses, it is not immediately clear how the account could be extended to those cases.

Before I conclude this discussion, let me address how my proposal would handle the observation in (68). According to my theory, temporal shift is parasitic on the presence of a subjunctive mood morpheme. Sentences like (68) do not contain such a morpheme, and thus, would not be predicted to give rise to temporal shift. To illustrate this fact, I use data from Portuguese:^{41,42}

⁴¹ One might wonder why (69) cannot be paraphrased with the subjunctive past. The subjunctive past in conditionals gives rise to a counterfactual reading. However, the availability of this reading further depends on the presence of conditional morphology (i.e.: *would*) in the consequent. Therefore, a sentence like (69), which does not contain *would*, can only be translated with the indicative past. That points to a very interesting asymmetry between counterfactuals and predictive conditionals: the former require *would*, but the latter do not require *will*. At the moment, I do not have an explanation for this asymmetry.

⁴² As pointed out by an anonymous reviewer, Kaufmann (2005) considers some examples with past morphology in the antecedent that, nonetheless, refer to future events. Example (i) is a case in hand:

- (70) Se a entrevista foi bem, o João está feliz (#amanhã).
if the interview go.**IND.PST** well, the John is happy (#tomorrow)

Intended: If, at some time tomorrow, it is the case that the interview went well before that time, then John is happy at that time.

I agree with Rumberg & Lauer 2023 that a theory of temporal shift should establish a tight link between the phenomenon and the morphological present in conditional antecedents. I disagree however, with what the present represents. For me, this form is merely the morphological appearance of the subjunctive future in English.

5.4 Williamson 2021

Like the present work, Williamson also rejects the view that future-oriented uses of the present in matrix clauses and in conditional antecedents are two facets of the same phenomenon. Instead, he assumes that the future-oriented present we see in conditionals is part of the broader phenomenon of future orientation, which encompasses a wide range of data. For instance, in addition to accounting for the impossibility of non-scheduled future-oriented readings of the present in matrix clauses, Williamson also sets out to explain why certain attitude verbs can be future oriented and others cannot:

- (i) *Context:* We'll contact potential contributors next month to see which of these manuscripts are still available then. (Kaufmann 2005, ex. 4b)

If he submitted his paper to a journal, we won't include it in our book.

The most natural way of translating (i) into Portuguese would involve subjunctive future morphology on the perfect auxiliary *ter*, as shown below:

- (ii) Se ele **tiver** submetido esse artigo para um periódico, nós não vamos
if he **have.SUBJ.FUT** submitted this article to a journal, we NEG will
incluí-lo no nosso livro.
include=3S in the our book

'If he submitted this article to a journal, we won't include it in our book.'

I believe the morphology in (ii) gives us an indication of what is happening in these examples: the perfect is shifting the situation time to the past of the interval introduced by FUT. In colloquial English, past morphology is often used instead of present perfect morphology; that could be the reason why (i) is constructed with the past, instead of the present perfect.

Of course, developing this idea in full would require more articulated LFs and additional lexical entries. For reasons of space, I must leave that for future work. However, I hope this short discussion suffices to show that cases like (i) are not lethal to the present account.

- (71) a. *John is **thought** to win the match.
 b. John is **predicted** to win the match.

Williamson’s theory is very lean. He proposes that the lexicon of English contains a covert aspectual operator, FUT, with the following semantics:

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

The at-issue component of FUT simply shifts the temporal interpretation of its complement to the future. Most of the work is done by the presupposition in (72a). This presupposition can only be satisfied if FUT is interpreted relative to a modal context s that contains world-time pairs where P holds, and world-time pairs where it does not.⁴³ The modal context of FUT can be shifted by embedding operators, so the presupposition in (72a), in effect, requires FUT to be ‘buffered’ by an appropriate modal.

Which modals count as appropriate? As we saw above, an operator can only license FUT if its modal base is diverse with respect to P . If a universal modal quantifies directly over its modal base, without the intervention of an ordering source, this modal base has to be homogeneous with respect to P . Therefore modals of this kind are poor licensors for FUT. Williamson argues this is the case of *think*, for example. Possibility modals, and universal modals that include an ordering source, are compatible with diverse modal bases, and hence can provide an appropriate modal context for FUT. As Williamson recognizes, it is not immediately clear how this proposal could be extended to relative clauses.

The environments Williamson surveys are a superset of those I considered in this paper. Our agendas are also very different: Williamson focuses on the distribution of future-oriented clauses, I focus on the meaning and grammatical category of (some) future-oriented finite clauses. Because of these differences, it is difficult to provide a direct comparison between the proposals.

As far as I can see, my account is not in principle incompatible with Williamson’s. In fact, the insight that the SF contains a subjunctive morpheme could be integrated into Williamson’s account as a way to increase its empirical

⁴³ The term *modal context* was introduced by Portner (1997). 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} .

coverage: we could argue that the subjunctive *is* the modal that licenses FUT in relative clauses. In the next section, however, I raise a concern for the general strategy pursued by Williamson.

5.5 Summary

In this section, I compared my proposal to four prominent previous analyses. The biggest difference between the present work and extant accounts lies not in how the phenomenon was treated, but in how the phenomenon was individuated. I take the SF to be, at its core, a subjunctive form; as such, it merits a separate treatment from the scheduled present and from other forms of future reference.

Existing accounts could, in principle, be enriched to handle some of the new observations made here. However, I have cast doubt on the *generalizations* that drive these accounts. It is not clear how much of the machinery proposed would still be justified in the face of the taxonomy of future reference I assumed in this paper.

6 Conclusion and implications

This paper has focused on what I called Subordinate Future, a form of future reference found in conditional antecedents, relative clauses, among other environments. Drawing on data from Portuguese, I argued that the SF involves a subjunctive mood morpheme. Based on its interpretation in relative clauses, I showed that this morpheme has a modal meaning. I then examined the modal and temporal semantics of the SF in greater detail, and concluded that, on both dimensions, the SF displays unexpected binding possibilities. To account for this pattern, I took inspiration from the dynamic literature on indefinites; I proposed that the subjunctive introduces a situation *dref*, which is subsequently retrieved by a mood morpheme in the main clause.

Each of these claims is independent from one another: It is possible to maintain that the SF involves a subjunctive morpheme without committing to the particular treatment of the subjunctive I adopted here.⁴⁴ It is also possible

⁴⁴ Other proposals for the semantics of the subjunctive include Quer (2000), who proposes the subjunctive signals a model shift; Giannakidou (2009), who argues the subjunctive introduces a temporal variable, and Schlenker (2005), who suggests that the subjunctive is a default mood that makes no semantic contribution on its own. There is also a particularly prominent line of research according to which the subjunctive activates focus alternatives (Villalta 2000, 2008, Bondarenko 2022). Since some indefinites are known to activate alternatives, I see this view as

to embrace the view that the subjunctive is an indefinite without subscribing to a dynamic approach.

As discussed in Section 5, my approach departs radically from previous works, which have largely focused on the distribution of the SF and on the interpretation of predictive conditionals. In the remainder of this section, I return very briefly to these two issues and consider some possible extensions to my proposal.

We saw in the previous section that all existing proposals derive the limited distribution of the SF from the intuitive asymmetry between past, present and future. However, the subjunctive — which I take to compose the SF — also exhibits a constrained distribution: it is commonly licensed in conditional antecedents and other adverbial clauses, relative clauses, and in the complement of attitude verbs. The most parsimonious analysis, then, would be to reduce the distributional requirements of the SF to those of the subjunctive.⁴⁵ Assessing the feasibility of this approach will be by no means a trivial task, as it requires a firm grasp on the distribution of future-oriented finite clauses and of the subjunctive mood crosslinguistically.

A recurring theme of this paper is that focusing on conditionals may obscure the contribution of the SF; after all, conditionals themselves are very poorly understood. But with an independently-motivated analysis of the SF now in place, we can draw insights from the phenomenon for the taxonomy and semantics of conditionals.

Conditionals are typically divided between two groups: X-marked conditionals like (73a) are uncontroversially taken to be semantically and morphosyntactically distinct from O-marked conditionals like (73b).⁴⁶ The case of predictive conditionals like (73c) is less straightforward, and their correct classification remains largely an open issue.

- (73) a. If John had missed his flight, Mary would've had to cover his shift. **X-marked**
 b. If John missed his flight, Mary had to cover his shift. **O-marked**
 c. If John misses his flight, Mary will have to cover his shift. **predictive**

a natural extension of the indefinite approach. I refer the reader to Portner (2018) for a more thorough discussion of previous analyses of the subjunctive.

⁴⁵ I refer the reader to Romero (2024) for a recent approach to mood selection. Interestingly, Romero proposes that the subjunctive is only licensed in the scope of modals that have an ordering source; notice that this is nearly identical to Williamson's analysis of the distribution of FUT (see Section 5).

⁴⁶ I borrow the terms *X-marked* and *O-marked* from von Stechow & Iatridou (2023).

In this paper, I have shown that, although English has virtually no mood morphology, there is a compelling case for the presence of the subjunctive in the language. I have also brought evidence for a connection between the SF and the subjunctive past, which — in languages with richer mood marking — is found in the antecedent of X-marked conditionals (Iatridou 2000). Thus, if English has a semantically active subjunctive mood, it seems plausible that this morpheme is also present in X-marked conditionals. Under this view, then, predictive and X-marked conditionals should be grouped together on the basis of their morphosyntactic composition.⁴⁷ Presumably, there should also be considerable overlap in their semantics.

In fact, as noticed by Schulz (2008), X-marked conditionals also give rise to temporal shift, which is a direct prediction of my account. This is illustrated more clearly by *future-less-vivid* conditionals, like (74a-b):

- (74) a. If Caleb **studied** harder for the next exam, he would pass this course.
b. #If Caleb **passed** this course, he would study harder for the next exam.

Recall the rationale from Section 3.2: Conditionals should in principle allow for two temporal readings, one in which the antecedent precedes the consequent ($A >_t C$), and one in which the consequent precedes the antecedent ($C >_t A$). In (74a), however, only the latter is available. This is the case even when world knowledge favors the other construal, as shown in (74b). That suggests that temporal shift is also at play in X-marked conditionals. Extending my proposal to X-marked conditionals might reveal further analogies with predictive conditionals, while also shedding light on the division of labor between mood and temporal morphemes in conditional semantics. I take that to be a promising avenue for future work.

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⁴⁷ A version of this idea has been considered in the philosophy literature (Gibbard 1981, Bennett 1988, Khoo 2022, Ommundsen & Ciardelli 2022, Cariani & Santorio 2018). However, for these authors, what unifies (73a) and (73c) is the presence of *will/would* in their consequents, not the presence of a subjunctive morpheme in their antecedents.

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