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Modality and the Future

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1 Introduction

Are English future auxiliaries (like *will* and *be going to*) **modals** in some semantically interesting sense? Are they the semantic brethren of *might* and *should*, or are they more similar to the past and present tenses? According to the non-modal view, future auxiliaries merely serve to shift the time of evaluation forward, just as the past tense shifts the time of evaluation backward.

Perhaps the most familiar version of the modal view of future operators is the Peircean theory discussed by Prior (1967). One version of this theory says that FUT ϕ is true just in case ϕ is true at all future possibilities (more carefully: FUT ϕ is true at a world w and time t just in case every future possibility w' for w at t is such that there is a time t' later than t such that ϕ is true at w' and t'). But what is a future possibility? A schematic answer: given a possible world w and a time t, we say that w' is a *future possibility* for w at t iff w' is sufficiently similar to w up until and including t (so w' and w may differ significantly thereafter).[1]

But what is sufficient similarity? Often it is taken to mean that (i) w' and w are exactly alike in matters of particular fact up to and including t, and that (ii) w' and w share the same laws of nature. But if the laws of nature governing w are deterministic at t, this would seem to imply that w is the only future possibility for itself at t.[2] Thus, this account of sufficient similarity will only be of interest if determinism is false. If determinism is true, we might instead understand sufficient similarity in a less restrictive manner so that at least for some times t in the actual world w, there is more than one future possibility for

[1] What I am calling *future possibilities* are sometimes called *historical alternatives*.

[2] The laws of nature governing w are deterministic at t just in case: if w' is a future possibility for w at t and t' is any time later than t, then w' is a future possibility for w at t'. This prohibits 'future branching'.

w at t. We leave these options open, and simply assume an equivalence relation of sufficient similarity which allows that there are multiple future possibilities for the actual world at some times t.

Some recent modal theories of the future are variations on the Peircean theory. For example, Copley (2009) analyzes certain uses of *will* in terms of universal quantification over future possibilities that unfold in a sufficiently normal manner ('inertia worlds'). And Kaufmann (2005) analyzes future meanings in terms of universal quantification over future possibilities that are sufficiently likely. One important difference between these theories and the original Peircean view is that they allow that the set of worlds over which *will* quantifies at t in w to exclude w itself; this issue is important since it is connected to the question of whether future auxiliaries are *veridical* or not (roughly: whether FUT ϕ is true at t only if ϕ is true in the actual world at some time t'). But these views are all alike insofar as they hold that future auxiliaries express universal quantification over some set of future possibilities. In contrast, other authors argue that while future auxiliaries are modals, they are not *quantificational* modals; rather, a future auxiliary *selects* a single world out of a set of future possibilities.[3]

We focus in what follows on English future auxiliaries, leaving cross-linguistic questions as a topic for future research.[4] But even if we concentrate on English, using a future auxiliary is not the only way of achieving future reference. Consider the following:

(1) John leaves tomorrow.

(2) John must leave tomorrow.

(3) I want John to leave tomorrow.

(4) If John leaves tomorrow, I'll be happy.

(5) Everyone who leaves tomorrow will be happy.

If John is scheduled to leave tomorrow, the futurate (1) is felicitous and achieves future reference despite the absence of future auxiliaries. The other examples also demonstrate that future reference can be achieved in a variety of environments (the complements of some modals and attitude verbs, conditional antecedents, and relative clauses) in the absence of local future auxiliaries. Exactly how future reference is achieved in these environments is an important issue and one that no doubt bears on our topic. But in the interest of keeping the discussion manageable, we set these cases aside and focus narrowly on English future auxiliaries.[5,6]

[3]See Cariani and Santorio (2018), Cariani (2021), and Kratzer (2021).

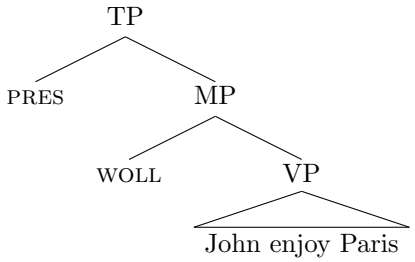
[4]For relevant cross-linguistic discussion, see Matthewson (2012), Mucha (2016), Bochnak (2019), Matthewson et al. (2022), and the references therein.

[5]On futurates, see Copley (2009). On the temporal interpretation of modals, see Condoravdi (2002). On conditional antecedents, see Kaufmann (2005).

[6]The use of future auxiliaries is neither necessary nor sufficient for future reference. On non-future uses of *will*, see 7.2 "Modality and Discourse Particles".

We begin by formulating two theories of future auxiliaries, a non-modal view and a quantificational modal view; we return to selection semantics in Section 3. In order to formulate these theories, it will help to state some syntactic assumptions, along with some assumptions about the past and present tenses.

For simplicity, I will treat both *will* and *be going to* as operators on VPs that include a determiner phrase in subject position.[7] We also adopt the hypothesis that both *will* and *is going to* decompose into two morphemes: the present tense and an underlying auxiliary. In the case of *is going to*, we will call the underlying auxiliary *be going to*, and in the case of *will*, we follow tradition and call it WOLL (Abusch, 1997). So *will* is PRES + WOLL and *is going to* is PRES + *be going to*. Both of these tenseless auxiliaries can also be combined with the past tense, and we assume that PAST + WOLL surfaces as *would*, and that PAST + *be going to* surfaces as *was going to*. We assume the following syntax for a sentence like *John will enjoy Paris*:



The tree for *John would enjoy Paris* results from substituting PAST for PRES in the above. Replacing WOLL with *be going to* yields trees for *John is/was going to enjoy Paris* depending on which tense is used.

For the moment, we assume the following lexical entries for PRES and PAST:

$$[\![\text{PRES}]\!]^{c,w,t,B} = \lambda p_{st}.\ p(w,t) = 1$$

$$[\![\text{PAST}]\!]^{c,w,t,B} = \lambda p_{st}.\ \text{there is a time } t' < t \text{ such that } p(w,t') = 1$$

Here B is a modal base, a function from world-time pairs to truth-values, and c is a context, a tuple which includes a world w_c, a time t_c, and a modal base B_c. Type s is the type whose associated domain is the set of world-time pairs. We also adopt the following account of *truth at a context* (Kaplan, 1989):

Truth at a Context

A sentence ϕ is true at a context c iff $[\![\phi]\!]^{c,w_c,t_c,B_c} = 1$.

Within this setup, we can begin by stating two theories of future auxiliaries like WOLL and *be going to*. For the moment, we will treat WOLL and *be going to* as equivalent, and we will let FUT stand in for either of them. Then a simple non-modal theory of future auxiliaries would simply be the mirror image of the above entry for PAST:

[7] In matters of syntax, we follow von Fintel and Heim (2023, Ch.4).

Non-Modal Future

$[\![\text{FUT}]\!]^{c,w,t,B} = \lambda p_{st}$. there is a time $t' > t$ such that $p(w, t') = 1$[8]

To state the modal theory we will initially consider, assume, for each time t, an equivalence relation $\sim_t$ on worlds, where $w' \sim_t w$ just in case w' is sufficiently similar to w up to and including t. We assume that there is no 'backwards branching' so that if $w' \sim_t w$ and $t' < t$, then $w' \sim_{t'} w$. Given this relation, we have, for any world w and time t, a set $F(w, t) = \{w' : w' \sim_t w\}$ of future possibilities for w at t. Then we can state a schematic version of the quantificational theory as follows:

Quantificational Future

$[\![\text{FUT}]\!]^{c,w,t,B} = \lambda p_{st}$. for all $w' \in B(w, t)$, there is a time $t' > t$ such that $p(w', t') = 1$

We assume that, for any context c and world-time pair (w, t), $B_c(w, t) \subseteq F(w, t)$. On the standard Peircean theory, $B_c(w, t) = F(w, t)$, for any context c and world-time pair (w, t), but more recent quantificational accounts deny this, allowing $B_c(w, t)$ to be a strict subset of $F(w, t)$. The most important issue for us is whether, for a given context c, $B_c(w, t)$ is 'realistic' in the sense that for any (w, t), w is an element of $B_c(w, t)$. On the standard Peircean view, this holds for all contexts c (w is always in $F(w, t)$ because $\sim_t$ is reflexive), but denied by Copley (2009) and Kaufmann (2005), at least for some contexts c. The issue is significant because it is connected to the question of whether future auxiliaries are veridical, an issue we return to later.

The remaining discussion is structured as follows. In Section 2, we look at one powerful argument against the non-modal theory—the argument from modal subordination—and examine how the quantificational modal theory handles this issue. Section 4 examines some arguments against quantificational modal theories and introduces selection semantics; we argue that the selectional account is superior, at least when we consider how future auxiliaries combine with the present tense. Section 5 considers the issue of veridicality, and argues that, when they combine with the present tense, future auxiliaries are veridical in default contexts. Sections 6 and 7 consider how these issues look when future auxiliaries combine with the past tense. Section 6 observes that *was going to* has clear non-veridical uses, and attempts to explain how this is compatible with the veridicality of *is going to*. Section 7 takes up the questions of quantification and veridicality in connection with *would*.

Our discussion is thus organized around two main issues: (i) whether future auxiliaries are quantificational modals or selection modals, and (ii) whether future auxiliaries are veridical or not. One methodological theme that emerges is that we should pay close attention to differences between different future auxiliaries (*be going to* vs. WOLL) and to differences that may only emerge when

[8] All of the entries for future operators that we consider involve existential quantification over future times. This assumption—adopted here for the sake of simplicity—is not unproblematic; see Cariani (2021, Ch. 7) and von Fintel and Heim (2023, Ch. 4) for discussion.

we consider the different tenses with which a future auxiliary might combine (present vs. past).

2 Modal subordination

One powerful argument for the modal view comes from the phenomenon of modal subordination:[9]

(1) If Edna forgets to fill the birdfeeder, the birds might get hungry. They might chirp very loudly.

(2) Stop tickling Jonny! He might vomit.

The second sentence in discourse (1) appears to be equivalent to a conditional: *If Edna forgets to fill the birdfeeder, the birds might chirp very loudly.* The discourse in (2) arguably has two readings: on one reading, the second sentence is also equivalent to a conditional: *If you do not stop tickling Jonny, he might vomit.* On the other reading, Jonny's possible vomiting is taken as given.

As a number of authors have noted, we see a similar phenomenon with future operators:

(3) (a) If Edna forgets to fill the birdfeeder, the birds will get hungry.
(b) They will chirp very loudly.

(4) (a) Stop tickling Jonny! (b) He is going vomit.[10]

Here, the most prominent reading of (3b) is again conditional: *If Edna forgets to fill the birdfeeder, the birds will chirp very loudly.* Like the discourse in (2), the discourse in (4) arguably has two readings: on the first, the second sentence is again equivalent to a conditional: *If you do not stop tickling Jonny, he is going to vomit.* On the other reading, Jonny's vomiting is a foregone conclusion so you might want to get your hands out of the way.

The quantificational modal view offers plausible predictions for (3) and (4) when combined with some additional assumptions. Take (4), for example. According to the quantificational view, the future operator *be going to* is sensitive to the modal base parameter B. We may assume that, in a *default context* c, $B_c(c) = F(c)$, the set of future possibilities at t_c in w_c.[11] But in some contexts c, it may be that $B_c(c)$ is the result of restricting $F(c)$ by some salient proposition p, i.e. $B_c(c) = F(c) \cap p$. Now assume that an utterance of *Stop tickling Jonny*

[9] The phenomenon of modal subordination was first discussed in Roberts (1989), who noted that future operators allow for modal subordination. The idea that this fact supports the claim that future operators are modals is due to Klecha (2014, 447-449), and further developed in Cariani and Santorio (2018) and Cariani (2021). See Klecha (2011), Boylan (2023), and Ninan (2024) for discussion.

[10] Thanks to Ben Holguín for suggesting an example similar to this one.

[11] We write $B_c(c)$ for $B_c(w_c, t_c)$, and similarly for $F(c)$.

For the moment, we assume that a default context is one in which no modal subordination occurs. We return to this issue in Section 6.

in a context c can make salient the proposition that the audience of c does not stop tickling Jonny. In that case, it may be that (4b) is interpreted in a context c such that $B_c(c)$ is the set of future possibilities at c in which the audience of c does not stop tickling Jonny. Given the quantificational modal analysis of *be going to*, the result is that, in such a context c, (4b) will be true at c iff every future possibility w at c in which the hearer of c does not stop tickling Jonny is such that there is a time $t > t_c$ such that Jonny vomits at t in w. Note that this does not imply that Jonny vomits at any time in the world of the context, since it may be that the hearer in fact stops tickling Jonny (perhaps in response to the speaker's instructions). Note also that, given certain not implausible assumptions about how conditionals work, this view will imply that (4b) is, in this context, equivalent to the conditional *If you don't stop tickling Jonny, he is going to vomit.*[12]

The non-modal analysis of the future appears to do less well with this example. Suppose again that an utterance of *Stop tickling Jonny* makes salient the proposition that the hearer does not stop tickling Jonny. How does that affect the interpretation of *He's going to vomit* according to the non-modal analysis? According to the non-modal analysis, the interpretation of *He's going to vomit* is not sensitive to the modal base parameter and so the above mechanism is inapplicable. Unless there is another mechanism by which that proposition can affect the interpretation of *He's going to vomit*, it looks like this approach simply predicts that (4b) is true at c iff there is a time $t > t_c$ such that Jonny vomits at t in w_c. While this arguably corresponds to one of the two readings of (4b), it misses the subordinated reading in which we are interested, the one on which (4b) is equivalent to a conditional.

Perhaps the defender of the non-modal analysis could say that sometimes a sentence is interpreted as the consequent of a conditional whose antecedent is somehow provided by the context.[13] The idea would be that uttering *Stop tickling Jonny* makes the sentence *You don't stop tickling Jonny* salient, and that, as a result, a subsequent utterance of a sentence ϕ can be interpreted as *If you don't stop tickling Jonny,* ϕ. Exactly how this happens is not completely clear, but a similar objection might be made against the modal theory of FUT: for it isn't completely clear on that theory how exactly uttering *Stop tickling Jonny* results in the restriction of a modal domain.[14]

The real difficulty with this version of the non-modal theory is that, unless something is said to restrict this mechanism, it over-generates. For example, it would seem to predict that (5b) has a reading on which it is equivalent to (6)

(5) (a) Stop smoking. (b) You have asthma.

(6) If you don't stop smoking, you have asthma.

[12] The idea would be to make the conditional a universal quantifier over the worlds in the set that results from updating the modal domain $B_c(c)$ with the antecedent of the conditional.

[13] See Cariani (2021, §3.4), Boylan (2023), and Ninan (2024) for discussion of this idea.

[14] By 'modal domain' I mean a set of worlds $B(w, t)$ that results from applying a modal base B to a world-time pair (w, t).

But I submit that (5b) has no reading on which it is equivalent to (6).

A natural conclusion to draw from this is that modal subordination can only occur across a two-sentence discourse when a proposition made salient by the first sentence restricts the default modal domain that figures in the truth-conditional computation of the second sentence. Thus, modal subordination will be available only when the second sentence contains a modal. The contrast between (1)–(4), on the one hand, and (5), on the other, is thus explained by the hypothesis that the former all contain modals, while the latter does not. This hypothesis supports the conclusion that both WOLL and *be going to* are modals, while the past tense is not.

3 Quantification vs. selection

That looks like a powerful argument in favor of the quantificational modal analysis, but that view also faces serious difficulties. The problems all seem to stem from the fact that the quantificational view assigns the wrong truth-conditions to sentences like *It will rain* and *It's going to rain*, sentences of the form PRES[FUT ϕ].[15] Imagine I look up at the sky and say, *It's going to rain.* Assume that I'm in a default context c (no modal subordination). According to the quantificational theory, my utterance is true iff for all worlds $w \in B_c(c) = F(c)$, there is a time $t > t_c$ such that it rains at t in w. That is, my utterance is true just in case it rains at some point in the future in all future possibilities at c. Now suppose that it does in fact rain, but that rain was not guaranteed: in some future possibilities at c (including the actual one) it rains, but in some it does not. Then what I say is false according to the quantificational theory, even though I said, *It's going to rain* and it did end up raining. That seems wrong: I said, *It's going to rain* and it rained, so what I said was true. Another example: I'm about to flip a coin and I say in default context c, *This coin will land heads.* I flip it and it lands heads. But the coin flip was chancy, and so in some future possibilities at c, the coin lands heads while in others it lands tails. So what I said is false according to the quantificational analysis. But this again seems like the wrong result.

The coin flip case can be used to illustrate a second problem. Again, I'm about to flip a coin and I say in default context c, *This coin will land heads.* How confident should you be in what I said, supposing that you know that the coin is fair? The natural answer is that you should be 50% confident, but it is not clear how the quantificational view can secure this verdict (Cariani, 2021, §4.4). For according to that view, what I said was that the coin will land heads in all future possibilities at c. But it is not clear that you should be at all confident in *that* claim, for you may know that there are future possibilities in which the coin lands tails; you may know that both outcomes are consistent with the past, the present, and the relevant laws. If that were the case, then your confidence that the coin lands heads in every future possibility ought to be much lower than 50%, perhaps even 0.

[15] See Prior (1976), Cariani and Santorio (2018), Cariani (2021), and Ninan (2022).

Note that the non-modal view of future auxiliaries faces neither of these problems. It seems to get the truth-conditions of *It's going to rain* and *This coin will land heads* exactly right. *This coin will land heads* is true at c iff there a time $t > t_c$ such that the coin lands heads at t in w_c. So if the coin lands heads in the actual world w_c, the sentence will be true, irrespective of what goes on at other future possibilities. All that matters to the truth of this sentence is what happens at the actual world. And if these are the truth-conditions of this sentence, then it seems reasonable for you to be 50% confident in what I said.

Thus, we seem to face something of a dilemma. The quantificational modal view offered a plausible account of the fact the future auxiliaries undergo modal subordination; in contrast, it is not obvious how the non-modal view can accommodate this fact. But when we examine the truth-conditions of sentences of the form PRES[FUT ϕ] in the absence of modal subordination, it looks like the quantificational modal view assigns the wrong truth-conditions to such sentences. In contrast, the non-modal view seems to assign precisely the right truth-conditions in these cases.

One way out of this dilemma is to retain the idea that future auxiliaries are modals while rejecting the idea that they are *quantificational* modals. This is the idea behind selection semantics (Cariani and Santorio, 2018; Cariani, 2021; Kratzer, 2021). According to selection semantics, a future auxiliary is a modal that is interpreted relative to a modal domain, as on the on quantificational view. But rather than quantifying over this modal domain, a future auxiliary simply selects a single world out of it. In the default case—when nothing restricts the modal domain—the auxiliary will simply select the actual world, and the resulting theory will agree with the non-modal view. But the possibility of restricting the modal domain allows a *non-actual* future possibility to be selected in certain linguistic environments and in certain non-default utterance contexts.

To state selection semantics, we assume a selection function s that maps a pair (p, w) of a proposition p (a set of worlds) and a world w to a world $s(p, w)$. We assume that our function s meets two conditions:

Success: If p is non-empty, then $s(p, w) \in p$.

Centering: If $w \in p$, then $s(p, w) = w$.

(Informally, when p is non-empty, we may think of $s(p, w)$ as the p-world that is closest to w.) With this function s in hand, we can state the selectional view as follows:

Selectional Future
$[\![\text{FUT}]\!]^{c,w,t,B} = \lambda p_{st}$. there is a time $t' > t$ such that $p(w', t') = 1$, where $w' = s(B(w, t), w)$.

Rather than quantifying over $B(w, t)$, the future operator now selects a world out of that set (assuming it is non-empty). We assume for the moment that, at a default context c, $B_c(w, t) = F(w, t)$, the set of future possibilities for w at t.

With these assumptions in place, this theory predicts the following truth-at-a-context conditions for *John will enjoy Paris*:

$[\![[\text{PRES}[\text{FUT}[\textit{John-enjoy-Paris}]]]]\!]^{c,w_c,t_c,B_c} = 1$ iff there is a time $t > t_c$ such that John enjoys Paris at t in w, where $w = s(B_c(c), w_c)$.

Now if c is a default context, then $B_c(c) = F(w_c, t_c)$. Since $w_c \in F(w_c, t_c)$, it follows from **Centering** that $s(F(w_c, t_c), w_c) = w_c$ (w_c is the closest future possibility at any time to itself). Thus, *John will enjoy Paris* is true at a default context c iff there is a time $t > t_c$ such that John enjoys Paris at t in w_c. Thus, for this sentence, in a default context, the selectional view and the non-modal view predict the same truth-conditions. This is a welcome result, one which means that the selectional view avoids the problems the quantificational view encountered above.

But the present theory also accommodates the fact that future operators undergo modal subordination. The mechanism is similar to the one we appealed to before when discussing the quantificational view. Recall the discourse in (4):

(4) (a) Stop tickling Jonny! (b) He is going$_B$ to vomit.

Assume that an utterance of *Stop tickling Jonny* makes salient the proposition p that the audience does not stop tickling Jonny. In that case, it may be that (4b) is then interpreted in a context c such that $B_c(c)$ is the set of future possibilities at c in which the audience of c does not stop tickling Jonny, i.e. $B_c(c) = F(c) \cap p$. Now, assuming that the set $F(c) \cap p$ is non-empty, the **Success** condition on selection functions means that $s(F(c) \cap p, w_c) \in F(c) \cap p$ (the selected world must be a future possibility in which p holds). In other words, the selected world will be one in which the audience of c does not stop tickling Jonny. Thus, (4b) will be true in context c iff there is a time $t > t_c$ such that Jonny vomits at t in w, where w is the closest world to w_c in which the audience of c keeps tickling Jonny. Note that if the audience of c stops tickling Jonny at w_c, the selected world $s(F(c) \cap p, w_c)$ will be distinct from w_c, the world of the context. Furthermore, given certain not implausible assumptions, this view predicts that, in this context, (4b) is equivalent to the conditional *If you don't stop tickling Jonny, he is going to vomit.*[16]

It thus looks like selection semantics has an advantage over the quantificational view: while both views accommodate the fact that future auxiliaries can undergo modal subordination, the selectional view does a better job of assigning truth conditions to sentences of the form PRES[FUT ϕ] in default contexts, i.e. when no modal subordination occurs. It seems, then, that if future auxiliaries are modals, they are selectional, rather than quantificational, modals.

The quantificational view we've been discussing is one on which future auxiliaries always quantify over a subset of future possibilities, and we presume that the subsets in question often contain more than one world. An alternative quantificational theory might hold that future auxiliaries are universal quantifiers, but that they often quantify over a singleton domain consisting only of the actual world. This view would evade our principal objections to the more robust quantificational view discussed above. We shall not try to decide between

[16] See Cariani (2021, Ch. 8) for a discussion of conditionals in the context of selection semantics for future auxiliaries .

this version of the quantificational view and selection semantics here.[17] Thus, in what follows, when we assess whether a use of a future auxiliary is 'quantificational' or not, we are asking whether it quantifies over a modal domain that contains multiple worlds.

4 Veridicality

The second main issue I want to discuss is whether future auxiliaries are *veridical* or not. To say that *will*, for example, is veridical, implies that if *John will enjoy Paris* is true at a context c, then it must be true at some point in the world of c that John enjoys Paris. It seems hard to deny that this implication of veridicality is true. If you say, *John will enjoy Paris* and John never does in fact enjoy Paris, then what you say is false. Let us say a complex operator TENSE[FUT] is *veridical over a set of contexts* C iff: for any context c in C and any ϕ, if TENSE[FUT ϕ] is true at c, then ϕ is true at some context c', where the world of c' is the world of c.

The above example suggests that PRES[WOLL] is veridical in *default* contexts. But things look different when we consider modal subordination contexts. Recall Roberts's example:

(3) (a) If Edna forgets to fill the birdfeeder, the birds will get hungry.
    (b) They will chirp very loudly.

Suppose Edna doesn't forget to fill the birdfeeder, the birds don't get hungry, and they don't chirp very loudly. I do not think that would show that (3b) is false. As we noted above, (3b) is equivalent to the conditional *If Edna forgets to fill the birdfeeder, the birds will chirp very loudly.* Since this conditional isn't made false simply by the birds failing to chirp very loudly, neither is (3b). But this means that *will* is not veridical in subordinated contexts. (Similar remarks apply to *is going to*.) In what follows, we will mainly focus on whether future auxiliaries are veridical in default contexts, though we will need to confront the question of what counts as a default context in the relevant sense. For the moment, we assume that if a context does not involve modal subordination, then it is a default context.

It seems that *is going to* (PRES + *be going to*) is also veridical in default contexts. Suppose I look at the gathering clouds and say, *It's going to rain.* If it doesn't rain, then what I say is false. Another example: I'm about to flip a coin and I say, *The coin is going to land heads.* Again, if the coin lands tails, then I what I say is false. The issue of veridicality for both *will* and *is going to* strikes me as relatively straightforward: both are veridical in default contexts.

Note also that all of the three theories discussed so far predict this. This is straightforward for the non-modal theory. For the quantificational theory, this result is obtained given the assumption that in default contexts c, the modal domain $B_c(c)$ is $F(w_c, t_c)$, since w_c is in $F(w_c, t_c)$. For selection semantics,

[17] See Willer (2025) for a defense of this version of the quantificational view.

this result follows from the fact that in default contexts $B_c(c)$ is $F(w_c, t_c)$, and $s(F(w_c, t_c), w_c) = w_c$, given **Centering** (and given that $w_c \in F(w_c, t_c)$).

5 *Was going to*

I want to pause here for a moment to comment on the picture that is emerging, a picture that is perhaps somewhat disappointing for a theorist who thinks there is a deep connection between future auxiliaries and modality. For if future auxiliaries are selection modals that are veridical in default contexts, then while they may technically be modals, they are not, so to speak, very modal. For in default contexts, they neither quantify over possibilities, nor do they select worlds other than the actual world; they do not achieve much in the way of 'displacement' away from the actual world. And in default contexts, the predictions of selection semantics and the non-modal theory essentially coincide.

But I think that this view of matters is somewhat misleading, and results from focussing only on what happens when future auxiliaries combine with the present tense. Note that the preceding discussion has solely focussed on *will* and *is going to*. But future auxiliaries start to look more interestingly modal when we turn our attention to *would* and *was going to*. We start with *was going to*, since the relevant empirical issues surrounding this expression are somewhat clearer than those surrounding *would*.

We consider two questions here: (i) Is *was going to* veridical in default contexts? (ii) Does *was going to* quantify over a (non-empty, non-singleton) set of possibilities? We begin with veridicality.

As a number of authors have observed, *was going to* has a non-veridical use, even in default contexts:[18]

(7) Mary was going to move to Baltimore, but she changed her mind at the last minute and did not end up moving.

(8) The coin was going to land heads, but a gust of wind blew in and so it landed tails.

(9) It was going to rain, but then Zeus intervened and it didn't rain in the end.

These sentences are consistent, and the intended contexts are not subordination contexts, nor is the modal domain of *was going to* restricted in any obvious way (it is not natural to hear the first conjuncts here as equivalent to conditionals). The apparent consistency of (7) suggests that *Mary was going to move to Baltimore* can be true even if Mary never moves to Baltimore. This is quite surprising in light of the fact that *is going to* seems to be veridical in default contexts: *Mary is going to Baltimore* is false if Mary never ends up going.

Schematically, one way to approach this puzzle is to think of *be going to* as a selection modal interpreted relative to a modal domain. When *be going to*

[18] See Binnick (1971), Klecha (2014, 449-450), and Grishin (2021).

combines with the past tense, the selected world should be the actual world. This will predict that *be going to* is both veridical and non-quantificational. But when *be going to* combines with the past tense, we should somehow allow for the selected world to be distinct from the actual world; this will allow for the non-veridical uses we see in (7)-(9). This will also predict that *was going to* is non-quantificational, a prediction I will later suggest is correct. There are no doubt a number of ways to fill in this schematic proposal; I shall suggest one particular way of filling it in, one that seems to me to have some independent motivation.

There are two key ideas to our proposal. One is that there is a connection between *be going to* and progresssive aspect (Copley, 2009; Matthewson et al., 2022). The second is that some uses of the past tense have the effect of expanding a nearby modal domain; this idea has been pursued in the literature on 'fake past tense' and 'X-marking'.[19]

Let's start with the connection to progressive aspect. Morphologically, *be going to* looks like the progressive form of the verb *to go*. But there seems to be a semantic similarity here as well. Imagine that Mary sets out in her car from Montreal, intending to drive to Baltimore.

(10) Mary was driving to Baltimore, but she was not able to cross the border and so she had to go back to Montreal.

As discussed in the literature on the 'imperfective paradox', (10) is consistent, which suggests that the past progressive *Mary was driving to Baltimore* does not entail that Mary drove to Baltimore (Dowty, 1979, §3.1). The similarity between (7) and (10) encourages the idea that there is some sort of semantic connection between the meaning of progressive aspect and the meaning of *be going to*.[20]

Inspired by Dowty's approach to the progressive, we suggest that *be going to* is interpreted relative to a domain of 'inertially best worlds' (Dowty, 1979; Portner, 1998). According to Dowty, w' is an inertia world for w at t just in case w' is a future possibility for w at t, and w' develops in a relatively normal manner after t, given what has happened in w up to and including t. Note that Dowty takes the relevant notion to be binary in the sense that any world w' is either an inertia world for w at t or it is not. But given the characterization of an inertia world, it is natural to think of the underlying notion as inducing an ordering on future possibilities (Portner, 1998). Given a world w and a time t, it might be that w' develops in a *more natural* or *more normal* way than w'' does, given the past course of events that took place in w up until and including

[19] See, for example, Iatridou (2000), von Fintel and Iatridou (2023), and Santorio (2024). See also 5.1 "Tense and Modality".

[20] But note one important difference: with the progressive, there is no asymmetry between the past and present tenses:

(11) Mary is driving to Baltimore, but she will not be able be to cross the border and so will have to go back to Montreal.

Like (7), (11) is also consistent, which suggests that *Mary is driving to Baltimore* does not entail that Mary will drive to Baltimore.

t. We write $w'' \succsim_{w,t} w'$ iff w'' and w' are future possibilities for w at t, and the way w'' develops after t is at least as natural as the way w' develops after t, given the past course of events in w up until and including t. We assume that, for each w and t, the relation $\succsim_{w,t}$ is reflexive and transitive. These relations $\succsim_{w,t}$ thus allow us to formulate a Kratzer-style entry for *be going to* (Kratzer, 1981, 1991, 2012).[21]

For any w, t, let S be any non-empty subset of future possibilities for w at t, i.e. $S \neq \emptyset$ and $S \subseteq F(w,t)$. Let us define the worlds in S that are best with respect to $\succsim_{w,t}$, $\text{BEST}_{w,t}(S)$, as follows:

$$\text{BEST}_{w,t}(S) = \{w' \in S : \neg\exists w'' \in S : w'' \succsim_{w,t} w' \;\&\; w' \not\succsim_{w,t} w''\}.$$

This is the set of maximal elements of S in the sense that no element of S is strictly better than any element of $\text{BEST}_{w,t}(S)$ with respect how naturally things unfold after t, given the past course of events in w up until and including t. We adopt a 'limit assumption': we assume that for each world-time pair (w,t) and any non-empty subset S of $F(w,t)$, $\text{BEST}_{w,t}(S)$ is itself non-empty. This precludes the possibility that some subset S of $F(w,t)$ contains an unending chain of elements $w_1, w_2, w_3, ...$ each of which is strictly better than its predecessor.

It is important to note that $\text{BEST}_{w,t}(S)$ need not contain w: w may not be among the best inertial continuations for itself at time t.[22] This is because something unexpected or abnormal might happen in w after t. Formally, this will happen when there is a w' in S such that $w' \succsim_{w,t} w$ and $w \not\succsim_{w,t} w'$. This fact plays an important role below, since it is needed in order to secure the non-veridicality of *was going to*.

I propose that the auxiliary *be going to* is interpreted relative to a modal domain $B(w,t)$ and selects a world from among the inertially best worlds in $B(w,t)$, i.e. it selects from $\text{BEST}_{w,t}(B(w,t))$.

Selectional *be going to*

$[\![\textit{be going to}]\!]^{c,w,t,B} = \lambda p_{st}$. there is a time $t' > t$ such that $p(w',t') = 1$, where $w' = s(\text{BEST}_{w,t}(B(w,t)), w)$

The domain $B_c(w_c, t_c)$ provided by a default context is now understood to be a singleton set consisting only of w_c (this revises our earlier assumption that $B_c(c) = F(c)$ for default c). This assumption is needed in order to predict that *be going to* is veridical and non-quantificational (we discuss this assumption in more detail below).

Our entry for the present tense remains unchanged, which means that the present tense does nothing to alter the default modal domain:

$[\![\text{PRES}]\!]^{c,w,t,B} = 1$ iff λp_{st}. $p(w,t) = 1$

Thus, for any default context c, we have the following truth-at-a-context conditions for *It's going to rain*:

[21] See also 1.3 "The Construction of Modal Domains—the Kratzerian View".

[22] The assumption that w might not be an inertia world for itself at a time t plays an important role in Dowty's treatment of progresssive aspect .

$[\![[\text{PRES}[\textit{be going to}[\textit{it rains}]]]]\!]^{c,w_c,t_c,B_c} = 1$ iff

there is a time $t > t_c$ such that $[\![\textit{it rains}]\!]^{c,w,t,B_c} = 1$, where $w = s(\text{BEST}_{w_c,t_c}(B_c(w_c,t_c)),w_c)$ iff

there is a time $t > t_c$ such that it rains in w at t, where $w = s(\text{BEST}_{w_c,t_c}(B_c(w_c,t_c)),w_c)$

Since this is a default context, $B_c(w_c,t_c) = \{w_c\}$, which means that $\text{BEST}_{w_c,t_c}(B_c(w_c,t_c)) = \text{BEST}_{w_c,t_c}(\{w_c\}) = \{w_c\}$. Since $w_c \in \{w_c\}$, it follows from the **Centering** condition on s that $s(\{w_c\},w_c) = w_c$; thus $w_c = s(\text{BEST}_{w_c,t_c}(B_c(w_c,t_c)),w_c)$. So at a default context c, this theory predicts that *It's going to rain* is true at c iff it rains at some time after t_c in the world of w_c. More generally, it seems that this theory will predict that *is going to* is veridical and non-quantificational in default contexts, as desired.

The second key component of our proposal is the idea that the past tense can expand a nearby modal domain. This idea plays an important role in the literature on counterfactual conditionals, since it appears that English counterfactuals are somehow derived from indicatives by adding a layer of past tense, and the effect of this addition seems to be a 'widening' of the default modal domain relative to which the conditional is interpreted (Stalnaker, 1975; von Fintel and Iatridou, 2023). Santorio (2024) develops a particular version of this idea: on his approach, the past tense does two things: it shifts the evaluation time backwards and it expands a default modal domain to a superset. Here is a syncategorematic entry for the past tense, inspired by Santorio's proposal:

Base-Expanding PAST

$[\![\text{PAST } \phi]\!]^{c,w,t,B} = 1$ iff there is a time $t' < t$ such that $[\![\phi]\!]^{c,w,t',F} = 1$

Note that here the modal base parameter B has been shifted to F, where $F(w,t)$ is the set of future possibilities for w at t.[23] Thus, PAST + *be going to* ends up selecting from the set of inertially best future possibilities, a set that need not include the actual world.

Let's examine under what conditions *Mary was going to move to Baltimore* is true at a context c:

$[\![[\text{PAST}[\textit{be going to}[\textit{Mary moves to Baltimore}]]]]\!]^{c,w_c,t_c,B_c} = 1$ iff

there is a time $t < t_c$ such that
$[\![[\textit{be going to}[\textit{Mary moves to Baltimore}]]]\!]^{c,w_c,t,F} = 1$ iff

there is a time $t < t_c$ such that there is a time $t' > t$ such that
$[\![\textit{Mary moves to Baltimore}]\!]^{c,w,t',F} = 1$, where $w = s(\text{BEST}_{w_c,t}(F(w_c,t)),w_c)$
iff

[23] Santorio's approach is similar to 'past-as-past' approaches to X-marking insofar as the past tense always shifts the time of evaluation backwards. But Santorio classifies his account as a 'past-as-modal' theory since this is not all the past tense does; it also operates on the modal base parameter. For past-as-past approaches, see Condoravdi (2002), Ippolito (2002), Arregui (2005), and Ippolito (2013). For past-as-modal approaches, see Iatridou (2000), Schulz (2014), and Mackay (2019).

there is a time $t < t_c$ such that there is a time $t' > t$ such that Mary moves to Baltimore at t' in w, where $w = s(\text{BEST}_{w_c,t}(F(w_c,t)), w_c)$ iff

Note that $F(w_c, t)$ is the set of future possibilities for w_c at time t (where t is some time earlier than t_c), and note that $\text{BEST}_{w_c,t}(F(w_c,t))$ is the inertially best subset of $F(w_c,t)$. As we noted above, w_c need not be an element of $\text{BEST}_{w_c,t}(F(w_c,t))$. If it is not, then the selected world, $s(\text{BEST}_{w_c,t}(F(w_c,t)), w_c)$, will not be w_c, given the **Success** condition on s.[24] This means that the foregoing theory predicts that *Mary was going to move to Baltimore* can be true at a context c even if Mary never sets foot in Baltimore at any point in the world of that context w_c, since the selected world need not be w_c. It follows that *was going to* is not veridical over default contexts.

Note that, according to this view, the modal domain $B_c(c)$ of a default context consists only of the actual world w_c. One consequence of this is that it looks like that an advocate of this view will have to say that, in subordination contexts, the modal domain is not in in general determined by simply taking the default modal domain and restricting it via some salient proposition. For if the proposition p made salient in the modal subordination context is false at the world of the context w_c, the result of intersecting $\{w_c\}$ and p is the empty set. It is not clear what this view would then predict, since we have not said what $s(q, w)$ is when q is empty. Thus, modal domains in such contexts would need be to determined in a more complex way than we had been envisaging; they would not in general be determined by taking the default modal domain and restricting it via some salient proposition.

While the foregoing view assumes that *was going to* is a selectional modal, it is possible to offer a quantificational version of this account:

Quantificational *be going to*

$[\![\textit{be going to}]\!]^{c,w,t,B} = \lambda p_{st}$. for all worlds $w' \in \text{BEST}_{w,t}(B(w,t))$, there is a time $t' > t$ such that $p(w', t') = 1$

If we swap out the selectional lexical entry for this one, the resulting theory will again predict the veridicality of *be going to* over default contexts and the non-veridicality of *was going to* over those contexts, as the reader may verify.

Which (if either) of these views is correct? Is *was going to* a selectional modal or a quantificational modal? Here is a piece of evidence in favor of the selectional view. Imagine I flip a fair coin, but then snatch it out of the air at time t and stick it in my pocket; the coin thus does not count as ever having 'landed'. Now consider these two sentences:

(12) The coin was going to land heads or tails.

PAST[*be going to*[*the coin lands heads or tails*]]

[24] Note that since, for any w and t, $F(w,t)$ is non-empty (w is always an element of it), our limit assumption implies that $\text{BEST}_{w,t}(F(w,t))$ is always non-empty.

(13) Either the coin was going to land heads or it was going to land tails.

[PAST[*be going to*[*the coin lands heads*]]] *or* [PAST[*be going to*[*the coin lands tails*]]]

Suppose that it was indeterminate whether the coin would land heads or tails, in the sense that in some of the inertially best worlds at t it lands heads and in some it lands tails.

Suppose the quantificational theory is true. Then (12) is predicted to be true, since presumably in all inertially best worlds w at t, the coin either lands heads in w or it lands tails in w. This prediction seems correct since (12) seems true. But (13) should (by the lights of the quantificational theory) be false, since it says that either in all inertially best worlds at t the coin lands heads, or in all such worlds, the coin lands tails. But this condition does not hold—in some of these worlds, it lands heads, in some, tails—which means that (13) is predicted to be false. This prediction is arguably incorrect, since it is hard to hear a difference between (12) and (13). The selectional theory, on the other hand, correctly predicts that both of these sentences are true. This seems, then, like a reason for thinking that *be going to* is a selectional, rather than a quantificational, modal.

Let me close this section by returning to the issue of veridicality. While it seems clear that *was going to* has non-veridical uses, as we've been emphasizing, it may also have veridical uses. Imagine I have a technologically-enhanced coin over which I have complete control via a remote control. I press the "heads" button on the remote control and throw the coin high into the air. If I do nothing, the coin will land heads. But I don't do nothing: as soon as the coin reaches its peak, I press the "tails" button on the remote control, forcing the coin to land tails. Now consider two sentences:

(14) The coin was going to land heads, but then I pressed the "tails" button.

(15) We didn't know it at the time but the coin was going to land tails.

To my ear, these both have true readings. The truth of (14) is expected, given the discussion thus far. But the truth of (15) is unexpected. The 'time' being referred to in (15) would seem to be prior to my pushing the "tails" button, since after I pushed that button, we did know that the coin was going to land tails. This suggests that *was going to* may also have a veridical reading in addition to the non-veridical reading we've been exploring. This reading would also seem to be non-quantificational, since all it takes for the second conjunct of (15) to be true is for the coin to eventually land tails.[25]

Perhaps what this shows is that the past tense does not, by itself, widen the associated modal domain. Perhaps the past tense simply shifts the evaluation time backwards and *optionally* combines with a covert operator that widens the relevant modal domain. When this operator is present, we get the non-veridical reading; when absent, we get the veridical reading.

[25]Note that (15) seems more or less equivalent to: *Even though we didn't know it at the time, the coin would land tails.*

6 *Would*

We suggested above that, like *be going to*, *will* is also non-quantificational and veridical in default contexts (Sections 3 and 4). What about *would*—is it similar to *will* in these respects? The issue turns out to be complicated, due to the fact that there are a wide variety of uses of *would*, and these various *would*'s do not appear to form a very natural semantic class. We examine a number of these uses of *would*, though we make no claim to an exhaustive taxonomy.

There is a purely temporal use of *would*, one which often arises when *would* appears (i) in a relative clause, or (ii) in the complement clause of an attitude verb in the past tense:[26]

(16) At that party, I met a woman who would later marry a Kennedy.

(17) Sally said she would join the circus when she turned eighteen.

In these sentence, *would* seems to behave more or less as we would expect given the discussion of *will* in Sections 3 and 4. First, note that (16) is false if, at the party in question, the speaker did not meet a woman who later married a Kennedy. Thus, it appears that the *would* in (16) is veridical. Note also that if at the party in question, the speaker did meet a woman who later married a Kennedy, then (16) is true—nothing more is required. This suggests that the *would* in (16) is not quantificational—all that matters for settling its truth is what happens at the actual world.

Note that (17) would be true if Sally had uttered the sentence, *I will/am going to join the circus when I turn eighteen.* Assuming Sally's utterance was made in a default context c, the content of Sally's utterance is the set of worlds w such that there is a time $t > t_c$ such that Sally joins the circus at t in w and Sally turns eighteen at t in w. If (17) reports Sally as having asserted this proposition, then presumably the *would* in (17) is simply the past tense of *will*, and so is acting again as a veridical, non-quantificational modal.

But many uses of *would* seem more clearly modal. Consider the following examples:

(18) *Context: the speaker is planning a trip to an amusement park.*
It's too bad Mary isn't coming. She would enjoy the roller coasters.

(19) *Context: said prior to, during, or after a trip to an amusement park.*
It's too bad Mary couldn't come. She would have enjoyed the roller coasters.

These uses of *would* are not veridical: the second sentence in each of the discourses can be true even if Mary does not ride the roller coasters and so cannot be said to enjoy them. Indeed, the discourses in question suggest that Mary does not ride the roller coasters and so cannot be said to enjoy them.

[26] See Mendes (n.d.) for a discussion of these uses.

But it is not clear that this is a problem for the selection semantics of WOLL laid out in Section 3. For it is not implausible that these uses of *would* involve something similar to modal subordination. What seems to be going on in these examples is that the initial sentence in each discourse makes salient the proposition that Mary goes to the amusement park. The modal domain relative to which the *would* in the second sentence is interpreted is restricted to worlds in which this proposition is true. This helps to explain why the second sentence in each discourse appears to be equivalent to a conditional. For example, the second sentence in (18) appears to be equivalent to *If Mary came, she would enjoy the roller coasters*.

It is worth emphasizing that the initial sentences in these discourses are doing crucial work. As Williamson (2020, 181) and von Fintel and Iatridou (2023, 1484) observe, 'out of the blue' uses of *would* are often difficult to interpret:

(20) Plato would go to Rome.

(21) I would plant an apple tree.

These are hard to interpret unless one imagines a contextually supplied restriction for the modal. In this respect, *would* seems to differ from *will*.

How do (18) and (19) bear on the veridicality of *would*? Earlier, we said that *will* is veridical in default contexts. Whether we can say the same about *would* depends on whether or not the above contexts count as default or not. On the one hand, these contexts are similar to modal subordination contexts insofar as the relevant modal domain is restricted by a proposition made salient by a preceding utterance. On the other hand, it may be that the mechanism involved in these cases is not the same as the one involved in modal subordination cases. Furthermore, contexts like the ones specified in (18) and (19) seem to be the natural home of *would*; as we just noted, without some contextual background, *would* is often difficult to interpret. In any case, I am not sure that it matters much how we settle the question of whether the contexts specified in (18) and (19) count as default or not, since this seems to be partly a terminological matter. The important thing is that (18) and (19) do not seem to challenge the picture of WOLL developed in Section 3. Note also that, on that picture, WOLL is not quantificational; the examples in (18) and (19) do not seem to pose a problem for this claim either.

That said, we do encounter uses of *would* that do seem to be quantificational. Consider the following exchange:

(22) (a) *A*: Did you/are you going to buy those shoes?

(b) *B*: I would never buy those.

Notice here that while (22b) is false if B does buy the shoes in question at some point in the future, it is not true simply if B never does in fact buy them. Rather, it seems that (22b) is true just in case B does not buy the shoes across a range of unspecified future possibilities. Thus, a natural account of this would be to say that *would* expresses universal quantification over some set S of future

possibilities. While S should include the actual world w_c ((22b) is false if she does in fact buy the shoes), it should include additional worlds as well ((22b) is not true simply if B never does in fact buy the shoes). That looks like a strong argument that this occurrence of *would* is a quantificational modal.

Here is another example, this one from Williamson (2020, 192):

(23) (a) Speaker 1: Jasper told/is going to tell his wife.
(b) Speaker 2: He would tell her.

As Williamson (2020, 193) points out, "Speaker 2 is adding something non-trivial to what Speaker 1 has just said." Williamson maintains that this use of *would* is quantificational, and that the domain of quantification includes both the actual world and some additional worlds, worlds in which Jasper has his actual character and is faced with similar circumstances. Thus, Williamson's view predicts that if it turns out that Jasper did not tell his wife, Speaker 2 has spoken falsely.

So perhaps these last two examples suggest that some uses of *would* are quantificational, something that would presumably be a problem for the theory of WOLL sketched in Section 3. One possibility is something we mentioned earlier: perhaps WOLL is a universal quantifier, but one that often ends quantifying over a singleton domain consisting of the actual world. But it is not implausible to think that these last two examples involve special constructions or idioms. If that is right, then we may not want to alter our core theory of WOLL in order to account for them. I will not try to settle this issue here.

7 Conclusion

The fact that future auxiliaries undergo modal subordination is strong evidence that such expressions are modals. Most of our discussion has focussed on what kind of modals they are. What we've seen is that, when future auxiliaries combine with the present tense they are not *very* modal: they do not (non-trivially) quantify over a set of future possibilities, and they are veridical in default contexts. They thus do not achieve much in the way of 'displacement' away from the actual world. But the modal character of future auxiliaries emerges more clearly when they combine with the past tense. To my mind, the most striking instance of this is the fact that *was going to* is not veridical over default contexts. But even with *would*, we have just seen some evidence that is has non-veridical uses and that it has quantificational uses, though the evidence here is arguably more difficult to interpret. Thus, one upshot of our survey is that the character of 'future modality' varies with lexical item (*be going to* vs. WOLL) and with the embedding tense (present vs. past).

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