Modality and the Future
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1. Introduction

According to a familiar picture, time is like a line, extending from the past into the future. Accompanying this picture is a simple story about how temporal language works. According to this story, when we say 'It was raining' at time t_1, what we say is true just in case it rains at some time t_0 earlier than t_1. And when we say 'It will rain' at t_1, what we say is true just in case it rains at some time t_2 later than t_1. The past tense shifts us back along the timeline while the future tense shifts us forward. There are many challenges to this picture, some from metaphysics, some from physics, some from semantics. For example, what if, as many philosophers have suggested, there is not a unique way things will go on from here, but only a tree of branching future possibilities? Given that metaphysical picture, one might wonder how we ought to interpret an utterance of a sentence like 'There will be a sea battle tomorrow'. If a sea battle occurs on some of these future branches, but not on others, should we say that this utterance is true, false, or neither? According to one theory, what Prior (1967, 132) called the 'Peircean' theory, we should say that it is false. For to say that there will be a sea battle tomorrow is to say that there is a sea battle on *all* future branches. Advocates of this theory appear to hold that future operators are, at least in part, modal operators of some kind, insofar as they quantify over future possibilities.

In *The Modal Future* (Cariani, 2021), Fabrizio Cariani argues that this way of setting up the debate ignores a third option: that future operators are modals, but not quantificational modals. For example, we might classify the modal logician's 'actually' operator as a modal operator, even though it does not quantify over possible worlds: 'actually φ' is true at a world w iff φ is true at the actual world. What 'actually' does do is shift the world of evaluation, and so might be counted as a modal operator on those grounds. Thus, it is a theoretical possibility that 'will' is another species of non-quantificational modal. This is the view for which Cariani argues in *The Modal Future*.

Cariani's book is an impressive and wide-ranging discussion of issues in the semantics, pragmatics, metaphysics, and epistemology of future discourse. He makes detailed proposals concerning the semantics of future operators, epistemic modals, and conditionals. He discusses the theory of speech acts, the metaphysical issues surrounding the 'open future', and evidential aspects of predicates of personal taste. But what unifies these disparate threads is Cariani's central claim that future operators are modals, albeit non-quantificational modals.

In order to defend his principal thesis, Cariani must fight a battle on two fronts: against Peirceans and their ilk who treat 'will" as a quantifier over future possibilities, and against those who maintain that future operators are simply temporal operators that do nothing more than shift the evaluation time forward. Cariani makes significant progress on both fronts. His objections to the Peircean are powerful; they constitute a strong case that sentences of the form 'will φ' do not have the content the Peircean assigns to them. And he offers an array of forceful arguments in favor of the view that future operators are non-quantificational modals.

One problem Cariani raises for the Peircean view is what he calls the 'zero credence problem' (§4.4).[1] Suppose for a moment that there are multiple future possibilities, multiple ways things might unfold given the past, the present, and the laws of nature (and suppose that I know this).[2] Furthermore suppose that the Peircean is right that future operators like 'will' universally quantify over these future possibilities. You are about to flip a fair coin and you say, 'This coin will land heads.' How confident should I be in what you said, supposing that I know that the coin is fair? The natural answer is that I should be 50% confident, but it is not clear how the Peircean can secure this verdict. For according to the Peircean, what you said was that the coin will land heads in *all* future possibilities. But it is not clear that I should be at all confident in *that* claim, for I may know that there are future possibilities in which the coin lands tails; I may know that both outcomes are consistent with the past, the present, and the laws of nature. If that were the case, then my confidence that the coin lands heads in every future possibility ought to be much lower than 50%, perhaps even 0. As Cariani points out, more sophisticated variants of the Peircean approach that one finds in the linguistics literature do nothing to resolve the problem (66).

But if we reject the claim that future operators are quantificational modals, why think they are modals at all? Building on earlier work by Klecha (2014), Cariani marshals a number of arguments in favor of the modal hypothesis.[3] Together with the claim that 'will' is not a quantificational modal, these arguments support the view that it is a non-quantificational modal.

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[1] All section and page references are to Cariani (2021) unless otherwise noted.

[2] What I call 'future possibilities' (possibilities for how things might go, given the past, the present, and the laws) are what Cariani calls 'historical possibilities'.

[3] Cariani's book also develops some of the ideas he first explored in a co-authored paper (Cariani and Santorio, 2018).

2. *Modal subordination*

But what sort of non-quantificational modal is 'will', according to Cariani? We can approach this question by examining 'the argument from modal subordination' (§3.4), which Cariani takes to be the best argument in favor of the modal hypothesis. Here are two examples of modal subordination:[4]

(1) If Kengo goes to France this summer, he might visit Marie. He might also see Reza.

(2) Please don't throw paper towel into the toilet. It might clog.

In each discourse, the second sentence appears to be equivalent to a conditional: 'If Kengo goes to France, he might see Reza' in (1) and 'If you throw paper towel into the toilet, it might clog' in (2). As a number of authors have noted, we see a similar phenomenon with future operators:

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

(4) Please don't throw paper towel into the toilet. It will clog.

Again, the second sentence in each of these discourses is in interpreted in the scope of a supposition ('If Edna forgets to fill the birdfeeder, the birds will go hungry', 'If you throw paper towel into the toilet, it will clog').

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[4] The phenomenon of modal subordination was first discussed in Roberts (1989), who also 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).

We sketch a simplified version of Cariani's semantics for 'will' and indicate how it handles examples like (3) and (4).[5] Let a *proposition* be a set of worlds. Suppose we are given a particular *selection function s*, a function that takes a proposition $\mathbf{A}$ and a world w and returns a world w'. Cariani assumes selection functions are subject to two constraints:

Success: If $\mathbf{A}$ is non-empty, then $s(\mathbf{A},w) \in \mathbf{A}$.

Centering: If $w \in \mathbf{A}$, then $s(\mathbf{A},w) = w$.

The notion of a selection function comes from Stalnaker's work on conditionals (Stalnaker, 1975). In Stalnaker's work, $s(\mathbf{A},w)$ is understood to be the $\mathbf{A}$-world most similar to w, an interpretation that can be used to motivate the Success and Centering constraints. Cariani rejects this interpretation (79), though he says surprisingly little about the intuitive interpretation of the selection function.

In any case, Cariani hypothesizes that 'will' syntactically combines with a covert variable whose value at a context c is a modal domain (a set of worlds). A simplified version of Cariani's semantics for 'will' can then be stated as follows:

$[[will_h \varphi]]^{c,w,t} = 1$ iff there is a $t' > t$ such that $[[\varphi]]^{c,s(\mathbf{h(c)},w),t'} = 1$.[6]

Here $\mathbf{h(c)}$ is the value of the variable h in context c;[7] note that $s(\mathbf{h(c)},w)$ is a world.

[5] The view sketched here is similar to ones Cariani discusses in Chs. 5 and 7. He ultimately discards these in favor of a more sophisticated alternative (§7.6), but the differences between these views have little bearing on the present discussion.

[6] Kratzer (2021) offers a similar account of 'will'.

[7] We follow Cariani in suppressing reference to variable assignments.

Given a context c, let **fut(c)** be the set of future possibilities at wc and tc (the world and the time of the context, respectively). In a *default context* c, the value of variable h is **fut(c)** (i.e. **h(c)** = **fut(c)** in a default context c).[8] This is the set of worlds that are like wc with respect to all matters up until and including tc. Since wc is like itself with respect to all matters up until and including tc, wc is an element of **fut(c)**. Given Centering, this means that $s(\mathbf{fut(c)}, wc) = wc$. Thus, for default contexts, we have the following truth-at-a-context conditions:

$[[will_h \varphi]]^{c,wc,tc} = 1$ iff

there is a $t' > tc$ such that $[[\varphi]]^{c,s(\mathbf{fut(c)},wc),t'} = 1$ iff

there is a $t' > tc$ such that $[[\varphi]]^{c,wc,t'} = 1$

This means that, in default contexts, this approach yields the same truth-at-a-context conditions for sentences of the form 'will φ' that we get from standard, non-modal approaches to 'will'. This is what enables Cariani's view to avoid the various problems he raises for the Peircean view.

The advantage of Cariani's view over *non-modal* views emerges in its treatment of modal subordination. For Cariani's account allows that, in cases of modal subordination, the context may supply a value for the variable h different from **fut(c)**. In particular, it allows that the value of the variable h may be the result of restricting **fut(c)** by a proposition made salient by the preceding discourse (90). For example, we might imagine that the second sentence of (4) is interpreted in a context c in which the value of h is **fut(c)** ∩ **throw**, where **fut(c)** ∩ **throw** is the set of future possibilities at wc and tc in which you throw paper towel into the toilet some time

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[8] Although Cariani takes the modal domain at a default context c to be the set of future possibilities, he actually provides compelling arguments for taking it to be a set of epistemic possibilities; see §6.7 and §8.6. That also seems to fit better with the connections he later draws between 'will' and epistemic 'must' (discussed below).

after *tc*. Thus, if *c* is such a context, we get the following truth-at-a-context conditions for the second sentence of (4):

$[[will_h \ (it \ clogs)]]^{c,wc,t,wc} = 1$ iff there is a $t' > tc$ such that

$[[it \ clogs]]^{c, \ s(\textbf{fut(c)} \cap \textbf{throw}, \ wc), \ t'} = 1$.

Of course, it might be that in the actual world *wc* you don't throw paper towel into the toilet after *tc*, in which case *wc* will not be an element of **fut(c) ∩ throw**. Thus, given Success, the selected world, $s(\textbf{fut(c)} \cap \textbf{throw}, wc)$, will be distinct from the world of the context; it will be some non-actual future possibility in which you throw paper towel into the toilet after *tc*. Thus, the sentence is true at *c* just in case in *that* world, the toilet clogs. Given Cariani's semantics for conditionals (which allows conditional antecedents to restrict the modal base), the second sentence of (4) ends up being equivalent to 'If you throw paper towel into the toilet, it will clog,' as desired.

A similar mechanism will handle the other cases of modal subordination, (1) and (2). The only differences are in the nature of the modal base and how the relevant modal shifts the world of evaluation. For example, 'might' existentially quantifies over the worlds in the relevant modal base rather than simply selecting one particular world out of it. Thus, this story, which assumes that 'will' is a modal, gives us a unified story for how these different cases of subordination work.

One theme in *The Modal Future* is that future operators are modals whereas the past and present tense are not (xxiii). Thus, it would be a problem for Cariani if we observed a similar subordination phenomenon with either the past or present tense. The extant literature seems to assume that this is not generally possible, but Cariani discusses some potential counterexamples to this assumption (54):

(5) If he went to the park yesterday, he had a sandwich. He had a beer, too.

(6) If the supplies arrived yesterday, it was late in the day. But it was before 11pm.

These examples pose a potential dilemma for Cariani, assuming the second sentence in each discourse is interpreted in the scope of the relevant supposition. For either they show that the past tense is a modal or they do not. If they do show that, then Cariani is wrong to think that an important asymmetry between future operators and the past tense is that the former are modals while the latter is not. But if they do not show that the past tense is a modal, why should we take (3) and (4) to show that 'will' is a modal? What's the difference between (3) and (4), on the one hand, and (5) and (6), on the other?

Cariani's answer to this question, as I understand it, is as follows (53-54). We can treat (5) and (6) as involving not subordination, but another phenomenon whereby a discourse of the form:

If *A*, then *B*. *C*.

gets interpreted as a single conditional with a conjunctive consequent:

If *A*, then *B* and *C*.

Sentence (5), for example, is being interpreted as:

(7)   If he went to the park yesterday, he had a sandwich and he had a beer, too.

Of course, this raises an obvious question. If this what is going on with (5) and (6), why not say that this is what is going with the future examples, (3) and (4)? And if we say that, don't we undermine Cariani's argument from modal subordination, since the hypothesis that 'will' is a modal will no longer be needed to explain (3) and (4)? All we need to explain those examples is

this mechanism which allows certain two-sentence discourses to be interpreted as conditionals of the appropriate form.

Cariani's answer is that this strategy will not work for all cases of future subordination; in particular, it will not work for (4). For *the 'single conditional' strategy only applies to discourses in which the first sentence of the discourse is a conditional*, and in (4), the first sentence is an imperative. More generally, Cariani's overall view here makes an important prediction, one which is arguably borne out. The prediction is that putative cases of 'past subordination' will only be available when the first sentence of the discourse is a conditional, but that future subordination will not be subject to this restriction.

Cariani argues that question-initial discourses provide some evidence for this (53). Consider, for example, this pair:

 (8) Did Mary leave Peter? He will be very upset.

 (9) Did Mary leave Peter? He was very upset.

It seems to me that the second sentence of (8) is naturally interpreted as 'If Mary left Peter, he will be very upset.' On other hand, it doesn't seem to me that the second sentence of (9) can be interpreted as 'If Mary left Peter, he was very upset.' Rather, the natural interpretation of (9) is that the speaker believes that Peter is very upset, and is wondering if this is because Mary left him.[9]

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[9] Cariani suggests that the important difference between future subordination and 'past/present subordination' is that the former is available 'across clause types' (53) whereas the latter is not. Boylan (Forthcoming) argues that this last claim is false on the basis of the following example:

Imperative-initial discourses also seem to support the point. We know from (4) that future subordination is possible across imperative-indicative sequences, but this does not seem possible with the past tense. Consider this discourse:

(10) Give me money. You got a large bonus this year.

This cannot be interpreted as:

(11) Give me money. If you give me money, you got a large bonus this year.

And this despite the fact that (11) might be a reasonable thing to say in certain circumstances.

(a) If Cinderella doesn't leave before midnight, her carriage turns into a pumpkin. Do the footmen turn back into mice?

Boylan thinks the second sentence here can be interpreted as a conditional question, 'If Cinderella doesn't leave before midnight, do the footmen turn back into mice?'. If this is right, it does show that 'present subordination' is possible across clause types, but that isn't the real issue. For the single conditional strategy would predict that (a) has a reading on which it is equivalent to:

(b) If Cinderella doesn't leave before midnight, her carriage turns into a pumpkin and do the footmen turn back into mice?

The key issue isn't whether 'past/present subordination' is available across clause types, but whether it is possible across discourses whose initial sentence is not a conditional. Of course, there remains the question of whether (a) can be interpreted as (b) as the single conditional strategy predicts.

So Cariani's response to the initial challenge looks promising, but some questions remain. For one thing, Cariani never explains how the single conditional strategy works; what precise semantic or pragmatic mechanism allows us to interpret a two-sentence discourse as a single conditional? One possibility is that the mechanism at work here *is* the same mechanism at work in examples (1)-(4), namely modal subordination. It might simply be that there is lexical variation as to when subordination can occur, and that the circumstances under which past and present tense can undergo subordination are more restricted than they are for future operators. For even in the case of clear modals, subordination is not always possible (Klecha, 2011, 378):

(12) There might be blood in Sue's apartment. She must be the murderer.

It doesn't seem as though the second sentence here can be interpreted as 'If there is blood in Sue's apartment, she must be the murderer.' So it seems that there are still some important open questions in this vicinity, and that the ultimate success of Cariani's argument might turn on the answer to these questions.

3. 'Will' and 'would'

Another argument in favor of the modal hypothesis concerns the connection between 'will' and 'would' (§3.2).[10] According to an influential idea, 'will' and 'would' are simply inflectional variants of an underlying morpheme WOLL: 'will' is PRESENT + WOLL and 'would' is PAST + WOLL (Abusch, 1997). Among other things, this helps to explain why you can report Jane's utterance

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[10] See also Klecha (2014, 449-450).

of 'Sam will love Cairo,' by saying, 'Jane said that Sam would love Cairo.' If 'would' is a modal and 'would' is merely the past tense of 'will', that strongly suggests that 'will' is a modal too.

One complication with Cariani's employment of this argument is that some of the modal uses of 'would' appear to be quantificational. 'I would never buy those shoes' appears to say that I would not buy those shoes under a range of possible circumstances, a range that includes the actual circumstance. For that sentence is not true simply if I never do in fact buy those shoes, though it would seem to be false if I do buy them. This suggests that that WOLL—at least in its guise as 'would'—is a quantificational modal after all (Williamson, 2020, §10.2, §11.2).

But how are we to reconcile this claim with Cariani's arguments that WOLL, in its guise as 'will', is not a quantificational modal? One possibility would be to say that WOLL is a universal quantifier over possibilities, but one whose contextually-provided modal domain is often the singleton set whose sole element is the actual world. If 'will' (PRESENT + WOLL) has this singleton domain in the examples Cariani uses against the Peircean view, this view will not be vulnerable to the objections stemming from those examples. When WOLL combines with the true past tense, it may likewise often have this singleton domain. This is arguably what we see in 'Jane said that Sam would love Cairo' and in sentences like 'In college, I met a woman who would later marry a Kennedy.' When WOLL combines with the 'fake past tense', its domain may include multiple worlds, and thus we get a non-degenerate quantificational use of 'would'.[11]

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[11] On the notion of the 'fake past tense', see Iatridou (2000). The basic idea is that, in certain environments, the past tense does not shift the time of evaluation backward, but, rather, has an effect on the relevant modal domain. In the case of WOLL, the effect of the fake past tense might be to widen the relevant modal domain (Mackay, 2019; von Fintel and Iatridou, forthcoming).

This view needs to be filled out; in particular, it would be good if we could specify precisely when 'will' and 'would' combine with a singleton domain and when they do not. In any case, this is not Cariani's view. As we saw above, he maintains that WOLL is a 'selectional' modal, not a quantificational modal. But it is unclear how Cariani proposes to handle the apparent quantificational force that 'would' very often carries. So it would be worth exploring whether there really is any reason to favor Cariani's selectional view over flexible versions of the quantificational view like the one just sketched.[12]

4. Evidential aspects of 'will'

Cariani has two further arguments in favor of the modal hypothesis, both of which concern what we might call 'evidential aspects' of 'will'.

'Will' is not always used to talk about the future. If one knows that the clothes dryer will finish its cycle at 5pm, and it is 5pm now, one can say, 'The laundry will be done now.' These present-directed uses of 'will' typically imply that the speaker does not have direct evidence for the embedded claim. Note, for example, that it is odd to say 'The laundry will be done now' if one is staring at the dry clothes in the dryer. As Cariani points out, the epistemic modal 'must' has a similar feature: it is also odd to say 'The laundry must be done now' if one has direct evidence for this (48). Both 'must' and 'will' impose an indirect evidence requirement.

Cariani doesn't offer an account of this requirement, nor is he explicit about why this feature of 'will' should count in favor of the modal hypothesis. He points out that 'Either the laundry will

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[12] One relevant issue here concerns whether 'conditional excluded middle' is a valid schema for 'would'-conditionals (Chapter 8). If it is, then that may be a reason to favor a selectional semantics over a quantificational one.

be done now or it won't be' is a logical truth, a fact that suggests that if 'will' is a modal, it is not a quantificational modal (92). That seems right, but it doesn't really support the claim that 'will' is a modal; given an appropriate non-modal semantics for 'will', that sentence will still come out as a logical truth.

Furthermore, extant accounts of the evidential requirement imposed by 'must' do not reveal any deep connection between this requirement and the fact that 'must' is a modal that shifts the world of evaluation. For example, according to the theory of von Fintel and Gillies (2010), the indirect evidence requirement imposed by 'must' is written into its lexical entry as a presupposition, while the modal aspect of 'must' is a feature of its 'at-issue meaning'. Here is a simplified version of their analysis:

$[[must\ \varphi]]^{c,w,t}$ is defined iff the speaker of c lacks direct evidence for $\{w': [[\varphi]]^{c,\ w',\ tc} = 1\}$.

If defined, $[[must\ \varphi]]^{c,w,t} = 1$ iff for all worlds w' compatible with the total evidence in c,

$[[\varphi]]^{c,\ w',t} = 1$.

On such an analysis, the evidential meaning and the modal meaning appear to be wholly modular, and one could easily imagine having one without the other. So we might imagine a non-modal analysis of 'will' along the following lines:

$[[will\ \varphi]]^{c,w,t}$ is defined iff the speaker of c lacks direct evidence for $\{w': [[\varphi]]^{c,\ w',\ tc} = 1\}$.

If defined, $[[will\ \varphi]]^{c,w,t} = 1$ iff there is a time $t' \geq t$ such that $[[\varphi]]^{c,w,\ t'} = 1$.[13]

Furthermore, there are expressions that (a) impose a similar evidential requirement, and (b) are not obviously modals. For example, it is odd to observe the dry clothes in the dryer and say,

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[13] Note that the use of '$\geq$' here means that the reference time need not be later than the utterance time.

'Apparently, the laundry is done.' But it is not immediately clear that 'apparently' is a modal. So perhaps 'will' is like 'apparently'—perhaps both are non-modals that impose an indirect evidence requirement.[14]

Cariani's other argument in this vein falls prey to similar worry. The argument concerns the ability of 'will' to suppress the 'acquaintance inference' associated with predicates of personal taste. As has often been noted, simple taste sentences like 'The bread pudding is tasty' suggest that the speaker has actually tasted the item in question and is not simply basing their judgment on indirect evidence, such as the testimony of others. But, as Klecha (2014, 450451) observes, this acquaintance inference is obviated by both epistemic modals and future operators:

(13) The bread pudding is tasty.

⇒ *the speaker has tasted the bread pudding*

(14) The bread pudding must be tasty[—everyone is ordering it].

⇏ *the speaker has tasted the bread pudding*

(15) The bread pudding will be tasty[—it was made my Mary's father.]

⇏ *the speaker has tasted the bread pudding*

Note that sentence (15) doesn't seem to imply that the speaker *will* taste the bread pudding either, since it is fine to continue that speech by saying, 'It's a shame I won't get to try it.'

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[14] The evidential restrictions in play here are similar, but not identical. For example, unlike 'Must φ, 'Apparently, φ' is felicitous when one's evidence testimonial (von Fintel and Gillies, 2010, 354, n.3). 'Will' seems to pattern with 'must' in this respect, but there are still subtle differences between the evidential meanings of these two expressions; see Winans (2016) for discussion.

On Cariani's account of this phenomenon, the acquaintance inference associated with simple taste sentences is traceable to an evidential requirement that is written into the lexical entry for taste predicates (273). This is understood to be part of the not-at-issue meaning of these sentences, i.e. not part of what they assert, but nevertheless part of what they convey as a matter of their conventional meaning.[15] For example, it is part of the not-at-issue meaning of (13) that the speaker's 'acquaintance evidence' settles the question of whether the bread pudding is tasty (273). But then why do (14) and (15) fail to imply that the speaker has tasted the bread pudding? Cariani hypothesizes that, as a part of *their* lexical meaning, modals obviate this evidential inference by replacing it with a different one (274). For example, perhaps (14) only implies that the speaker has reasonably good grounds for thinking that the bread pudding is tasty (e.g. the fact that everyone is ordering it).

Cariani does not offer a detailed story about how exactly modals obviate the acquaintance inference, but his account is modeled on the work of Anand and Korotkova (2018) and Willer and Kennedy (2020). But when we turn to those works, we again see that the ability of epistemic modals to obviate the acquaintance inference is not intimately connected with the fact that they shift the world of evaluation. For example, on the account developed by Anand and Korotkova, the modal 'must' shifts both the world of evaluation *and* a 'direct evidence' parameter (Anand and Korotkova, 2018, 68).[16] But there is no reason why an expression could not simply shift one of these parameters without shifting the other. Someone who favored a non-modal account of 'will' might hypothesize that it shifts the direct evidence parameter without shifting the world

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[15] Think perhaps of a conventional implicature in Grice's sense.

[16] See also Ninan (2020) and Ninan (Forthcoming, §3).

parameter. In that case, 'will' would still obviate the acquaintance inference, despite not being a modal. And, again, we see that 'apparently' obviates the acquaintance inference, even though it is not clear that it is a modal:

(16) Apparently, the bread pudding is tasty.

      ⇏ the speaker has tasted the bread pudding

So I am not persuaded that the evidential aspects of 'will' support the hypothesis that it is a modal, at least not given our current state of knowledge concerning these matters.[17] But, as the preceding discussion might reveal, there are a number of issues concerning assertion, evidence, epistemic modality, and the future that we don't have a complete grip on just yet.[18] For example, it is arguably a shortcoming of von Fintel and Gillies's analysis of 'must' that its evidential meaning and its modal meaning are modular in the way described above. As they themselves observe, this makes it somewhat mysterious why every epistemic necessity modal they have observed imposes an indirect evidence requirement (von Fintel and Gillies, 2010, 368). So it seems possible that the extant theories discussed above are not the whole story, and that, once we have a more accurate view of these matters, we'll see that only modals can impose an indirect evidence requirement, and that only modals can obviate the acquaintance inference.[19]

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[17] Cariani himself seems to have reservations about these arguments (50, 56-57).

[18] Another important issue in this connection is a puzzle concerning assertion and the passage of time that Cariani discusses in Chapter 13, and that I discuss in Ninan (2022).

[19] Thanks to David Boylan and Matt Mandelkern for helpful comments.

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