Assertion, Evidence, and the Future

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Abstract: This essay uses a puzzle about assertion and time to explore the pragmatics, semantics, and epistemology of future discourse. The puzzle concerns cases in which a subject is in a position to say, at an initial time $t$, that it will be that $\phi$, but is not in a position to say, at a later time $t'$, that it is or was that $\phi$, despite not losing or gaining any relevant evidence between $t$ and $t'$. We consider a number of approaches to the puzzle, and examine in detail the possibility that subjects in these cases lose knowledge simply by moving through time.

1 Introduction

It seems that there are cases in which a subject is in a position to say, at an initial time $t$, that it will be that $\phi$, but is not in a position to say, at a later time $t'$, that it is or was that $\phi$, despite not losing or gaining any relevant evidence between $t$ and $t'$. Assertions about the future cannot always be reiterated (adjusting for tense) at a later time unless the speaker acquires more evidence in the meantime. Here is the sort of case I have in mind:

**Beth case**

Andy is a personal chef to a wealthy entrepreneur, Beth. Andy is making a new dish for Beth’s dinner tonight (suppose that it’s a Friday). Based on his knowledge of the sorts of foods that Beth usually likes, Andy says to his friend Chris:

(1) Beth will enjoy this when she eats it.

Andy finishes preparing the dish, and heads home for the night, before Beth gets back from work. When Beth returns, she eats the dish Andy has prepared, and thoroughly enjoys it.
The next morning (Saturday), another one of Andy’s friends asks Andy, *Did Beth enjoy the dish you made for her yesterday?* Andy hasn’t heard from Beth or anyone else whether or not she enjoyed the dish.

I think it would seem odd here for Andy to flat-out assert that Beth enjoyed the dish, i.e. to say,

(2) Yes, she enjoyed it.

In order to make that claim, Andy would need to be more directly connected to the fact that Beth enjoyed the dish in question. For example, Andy would need to have been told by Beth or someone else that she did in fact enjoy the dish. Absent evidence of that sort, it would be better for Andy to hedge in some way, i.e. to say one of the following:

(3) She probably enjoyed it.

(4) She must have enjoyed it—it was just the sort of thing she usually likes.

In this example, it seems that Andy loses his standing to say something despite not losing or gaining any relevant evidence. It is worth mentioning that the general contrast seems to be between assertions about the future, on the one hand, and assertions about the past and present, on the other. For example, it doesn’t seem that Andy can say, at dinner time on Friday, *Beth is enjoying the meal right now.* But for simplicity, I will for the most part set assertions about the present aside and focus on the contrast between the past and the future.

Although most of our discussion will concern the Beth case, it is not the only example of this phenomenon. Once one sees the general structure of these cases, new examples are not difficult to construct. Here is another:

**Rain case**

It’s Friday. Ellen has been visiting her friend Frank in Chicago for the last few days, but the visit is over and he is driving her to the airport. He’s telling Ellen about an outdoor concert he’s planning to attend tomorrow, but he’s worried about the weather. He asks Ellen if she can check the forecast. Ellen looks on her phone, and says,
Bad news—it’s going to rain tomorrow.

Frank replies, *Oh, that’s too bad.* Ellen catches her flight back to Boston.

It does indeed rain all weekend in Chicago, and Frank’s concert gets cancelled.

On Monday, Ellen goes to work and bumps into a co-worker who is also a friend of Frank’s. The co-worker also knew about Frank’s plan to attend the concert, but hasn’t yet heard whether or not it was cancelled. He asks Ellen what the weather in Chicago was like on Saturday. Ellen hasn’t heard from Frank or anyone else what it is was like in Chicago on Saturday.

Again, it seems to me that it would be inappropriate for Ellen to flat-out assert that it rained on Saturday in Chicago, i.e. to say to her co-worker:

(6) Unfortunately, it rained in Chicago on Saturday.

This is so even if she makes it clear what her evidence for that assertion is. If she wants to make a comment about what the weather was like in Chicago on Saturday, she needs to hedge, e.g.:

(7) It was supposed to rain on Saturday.

Now while the phenomenon here is quite general, I should emphasize that I am not suggesting that *any* case in which (i) one is, at an initial time $t$, in a position to say that it will be the case that $\phi$, and (ii) one does not gain or lose any relevant evidence between between $t$ and later time $t'$, is a case in which (iii) one is not in a position to say, at $t'$, that it is or was the case that $\phi$. I am merely claiming that *there are* cases in which (i)–(iii) all hold. The corresponding universal claim is false, a point to which we shall return.

What is going on in these cases? How can it be that Andy loses his standing to assert something as he moves from Friday afternoon to Saturday morning, despite not gaining or losing any relevant evidence between those two times? In what follows, we examine three answers to this question.

*The epistemic view.* Suppose knowledge is the ‘norm of assertion’ in the sense that one is in a strong enough epistemic position to assert $p$ iff one knows $p$. Then perhaps Andy loses his standing to assert the proposition that Beth enjoys the dish because he loses knowledge of this proposition
as he moves through time. On Friday, Andy knows that Beth will enjoy the dish, but he no longer
knows this on Saturday morning, and this despite not losing or gaining any relevant evidence in
the interim. Alternatively, the point might be put in terms of justification rather than knowledge,
but either way, the epistemic view sees our puzzle as primarily an epistemic one: the phenomenon
arises because Andy loses some salient epistemic property as he moves through time.

*The modal view.* This view says that Andy doesn’t lose knowledge of the fact that Beth enjoyed
the dish—he can’t lose this knowledge because he never had it to begin with. What Andy *does*
know on Friday afternoon is something weaker: that Beth will *probably* enjoy it, or that she will
enjoy it *if things unfold normally.* But knowing this on Friday afternoon is all Andy needs to know
in order to utter the sentence *Beth will enjoy the dish,* because all that Andy would say in uttering
that sentence is that she will probably enjoy it, or will enjoy it if things unfold normally. According
to the modal view, the present phenomenon arises because of a feature of the semantics of future
operators.

*The implicature view.* This view says that Andy knows, throughout the case, that Beth enjoys
the dish. According to this view, Andy is prevented from asserting this proposition on Saturday
morning because assertions about the past typically implicate (in Grice’s sense) that one’s relevant
evidence is suitably direct. Thus, were Andy to say, on Saturday morning, that Beth enjoyed the
dish, his utterance would implicate that he had heard from Beth or someone else that she enjoyed
the dish. Since he has not heard this from Beth or anyone else, it would be misleading for him to
utter this sentence. The implicature view sees the present phenomenon as arising from a pragmatic
feature of utterances about the past.

There may be other approaches to our puzzle, but in what follows we restrict ourselves to
investigating these three. We proceed in reverse order, starting with the implicature view and
ending with the epistemic view. My main aim in this essay is to begin developing and assessing
various theoretical options for accommodating the present phenomenon. I am less concerned to
reach a definitive conclusion about its proper explanation. That said, I am not completely neutral
either: my view is that the epistemic view is the most promising of the aforementioned views, and I
shall try to justify this claim in what follows. But I will also point out some important problems for
the epistemic view, problems that may persuade others that the correct explanation lies elsewhere.

We begin by putting in place some preliminary assumptions, assumptions that help to bring
the issues here into sharper focus.\footnote{As an anonymous referee observes, the phenomenon discussed in this essay bears some resemblance to the ‘acquaintance inference’ associated with predicates of taste. See Pearson (2013), Klecha (2014), \textsc{author} (XX), and Anand and Korotkova (2018) for discussion. I hope to examine the relationship between the two phenomena in future work.}

2 Preliminaries

Although I said above that Andy lost his standing to assert something as he moved from Friday afternoon to Saturday morning, that claim turns out to be somewhat controversial, a point we shall discuss later. But let us begin by examining a simple argument in favor of it. The argument requires a few assumptions about propositions and the semantics of temporal expressions, as well as some further stipulations about the Beth case.

It will help to stipulate that Andy knows throughout the case that Beth eats the dish in question at 7pm on Friday. So his initial utterance of (1) is essentially equivalent to:

(1') Beth will enjoy the dish at 7pm on Friday.

in the sense that he is in a position utter (1’) just in case he is in a position to utter (1). Similarly, (2) is, for Andy on Saturday morning, essentially equivalent to:

(2') Beth enjoyed the dish at 7pm on Friday.

in the sense that he is in a position utter (2’) just in case he is in a position to utter (2). In what follows, we will often focus on (1’) and (2’) instead of their more natural counterparts (1) and (2). The explicit temporal adverbial at 7pm on Friday in the former pair makes it easier to compare the propositions expressed by those two sentences in the relevant contexts.

If we are content to waive some of the compositional complexities that temporal adverbials like at 7pm on Friday raise (Dowty 1982), we can regiment (2’) as follows:

\[ \mathcal{P}_{f_7} (\text{Beth enjoys the dish}) \]

(We use \( f_7 \) to abbreviate 7pm on Friday, \( s_9 \) to abbreviate 9am on Saturday, and \( f_4 \) to abbreviate 4pm on Friday.) Here we treat the past tense and the temporal adverbial at 7pm on Friday as forming a sort of compound operator, and we assume the following semantics for such operators:

\[ [\mathcal{P}_i \phi]^{w,t} = 1 \text{ iff } i < t \text{ and } [\phi]^{w,i} = 1 \]

\footnote{Here we use \( i \) in the object language as a \textit{time nominal}, an expression that names a time (Braüner 2017). We also use \( i \) in the metalanguage as a singular term that refers to the denotation of object language \( i \).}
We adopt the following account of the proposition expressed by a sentence at a context:

The proposition expressed by $\phi$ at $c$ is: \( \{ w : [\phi]_{w,t,c} = 1 \} \).

Now there are many objections to taking propositions to be sets of possible worlds, but this account is adopted here mainly for expository convenience: it makes it easier to connect the notion of a proposition to standard semantic theories of tense. We could avoid making this assumption, but this would complicate the exposition without offering any compensating benefit. Note also that this account of propositions assumes the truth of eternalism, the doctrine that no proposition varies in truth value over time. The reason we assume eternalism is that we are interested in comparing what an agent knows or is in a position to assert at various points in time, and such comparisons are more easily carried out assuming eternalism. Given eternalism, the question of whether a person loses knowledge as they move through time, for example, reduces to the question of whether there is a proposition they once knew but no longer know. Temporalism’s account of knowledge loss is more complex, and so we set that view aside here for the sake of simplicity.

For the sake of concreteness, let us suppose that Andy’s Saturday morning context is located at 9am on Saturday. Then, relative to that context, these assumptions imply that (2′) expresses proposition (8):

(8) \( \{ w : f_{7} < s_{9} \text{ and Beth enjoys the dish at } f_{7} \text{ in } w \} \)

Note that this proposition is essentially equivalent to the conjunction (intersection) of the following two propositions:

(i) the proposition that Friday 7pm is earlier than the time of the context (Saturday 9am), and

(ii) the proposition that Beth enjoys the dish at 7pm on Friday.

The first of these propositions simply relates the event time to the context time; the second tells us something about the world, namely that Beth enjoys the dish at 7pm on Friday.

If Andy were to utter (2′), he would assert proposition (8). Since (8) is equivalent to the conjunction of (i) and (ii), it is relatively harmless to treat the question of whether Andy is in a position to utter (2′) on Saturday at 9am as equivalent to the question of whether he is in position
to assert propositions (i) and (ii). Furthermore, I shall stipulate that Andy never loses track of time at any point in the case, which means that he is in a position to assert proposition (i) on Saturday morning.³ Thus, the question of whether he is in a position to utter (2′) on Saturday morning reduces to the question of whether he is in a position to assert proposition (ii). We use “β” to denote proposition (ii):

\[ β := \{ w : \text{Beth enjoys the dish at } f_7 \text{ in } w \} \]

I shall sometimes refer to β as the proposition that Beth enjoys the dish at 7pm on Friday or simply as the proposition that Beth enjoys the dish.

We also assume the following standard definition of truth at a context (Kaplan 1989):

A sentence φ is true at a context c iff \( Jφ^{w,c,t_c} = 1 \).

Note that this assumes that there is a unique ‘world of the context,’ which, in the present setting, amounts to the assumption that there is a unique actual future. Proponents of a ‘branching time’ metaphysic might deny this, but how these issues look within that metaphysical framework is an issue I leave for another time.⁴

The foregoing assumptions will be held fixed for the remainder of the essay.

According to the preceding theory, past tense operators simply serve to shift the time of evaluation backwards. A parallel theory of future operators says that future operators simply serve to shift the time of evaluation forwards. This is in some sense the standard theory of the future in tense logic and natural language semantics. We shall examine an alternative approach in Section 4, but for the moment, let us assume a simple time-shifting semantics for the future.

We regiment (1′) as follows:

\[ F_{f_7} (\text{Beth enjoys the dish}) \]

and offer the following semantics:

\[ [F_t φ]_{c,w,t}^{w,t} = 1 \text{ iff } t < i \text{ and } [φ]_{c,w,i}^{w,i} = 1. \]

³Actually, within our framework, proposition (i) turns out to be the necessary proposition, and so Andy trivially knows it. We make no serious attempt to model temporally indexical knowledge here; we abstract away from that issue by simply stipulating that Andy never loses track of time.

⁴On branching time, see, for example, Prior (1967), Thomason (1970, 1984), Burgess (1978), Belnap et al. (2001), MacFarlane (2014, Ch. 9), and Todd (2016).
Note that I have subscripted the double-brackets here with an \( e \). This indicates that this clause is accepted by only one of the two semantic theories we shall be discussing, namely the \textit{epistemic view}. Clauses, like the clause for \( P_i \) given above, that are not subscripted in this way are assumed to be endorsed both theories (again, see the appendix for details).

Assume, for the sake of concreteness, that Andy utters \((1')\) at 4pm on Friday afternoon. Then given our assumptions this implies that, relative to Andy’s Friday 4pm context, \((1')\) expresses the following proposition:

\[(9) \{ w: f_4 < f_7 \text{ and Beth enjoys the dish at } f_7 \text{ in } w \} \]

As before, this proposition is essentially equivalent to the conjunction (intersection) of a pair of propositions:

(i) the proposition that Friday 7pm is later than the time of the context (Friday 4pm), and

(ii) the proposition that Beth enjoys the dish at 7pm on Friday.

As before, the first proposition simply relates the time of the context to the event time. The second proposition is ‘about the world.’ And note, in particular, that this second proposition is just \( \beta \) again. This means that \((1')\), considered at 4pm on Friday, is equivalent to \((2')\), considered at 9am on Saturday, \textit{modulo} the information each contains about how each context time relates to the time of Beth’s eating.

Since Andy never loses track of time in the Beth case, he knows, at 4pm on Friday, that the time of the context precedes 7pm on Friday. Thus the question of whether he is in a position to utter \((1')\) on Friday afternoon again reduces to the question of whether he is in a position to assert \( \beta \) on Friday afternoon. Thus, given these assumptions, the fact that Andy is in a position to utter \((1')\) on Friday afternoon, but not in a position to utter \((2')\) on Saturday morning, means that he is in a position to assert \( \beta \) on Friday morning, but not in a position to assert that same proposition on Saturday morning. So, according to this approach, there is something that Andy loses his standing to assert as he travels from Friday afternoon to Saturday morning.

One final preliminary. It is a familiar idea that assertions are subject to an epistemic norm of propriety (e.g. Grice 1989, 27); this idea will play an important role in what follows. I shall assume
in what follows the familiar view that knowledge is the norm of assertion, in the sense that a speaker \( x \) is in a strong enough epistemic position to assert proposition \( p \) at time \( t \) in world \( w \) iff \( x \) knows \( p \) at \( t \) in \( w \).\(^5\) While this view is quite influential, it is not uncontroversial, and a number of theorists maintain instead that justification (or some similar non-factive notion) provides the norm of assertion.\(^6\) My assumption of the knowledge norm is largely for expository convenience: for the most part, the dialectic of this essay could equally well be conducted under the alternative assumption that justification is the norm of assertion. While we could proceed by trying to remain neutral on this matter, it will greatly simplify matters if we concentrate our attention on just one epistemic state, and knowledge is the state I have chosen. But for each of the views discussed in this essay—all of which make claims about knowledge—there is a counterpart view concerning justification. Readers who favor the idea that justification is the norm of assertion may wish to consider which of those counterpart views they favor.

But before we leave the issue of the norm of assertion, I should pause here to discuss the possibility that what is going on in our cases is that the subject’s initial utterance is not in fact an assertion at all, but some sort of speech act that is subject to a weaker norm.\(^7\) Perhaps Ellen, for example, is merely making a prediction or a conjecture about the weather, and perhaps these speech acts are subject to a norm that is weaker than the norm governing assertion.

In the literature on the speech of act of prediction, the claim that some sincere utterances of declarative sentences are predictions and not assertions is typically supported by noting that it sometimes inappropriate to reply to such utterances by asking, How do you know? For example:

Suppose we’re skipping stones at the lake. I find a really flat stone and say, This one will skip at least five times. Here it would be odd for you to ask me, How do you know? If you did, I might say: Well, I don’t know, it’s just a prediction. Let’s see what happens.

In contrast, the question How do you know? is usually thought to be appropriate in response to genuine assertions (Benton and Turri 2014).

But if this is the diagnostic we use to distinguish (non-assertoric) predictions from genuine assertions, then the question How do you know? is typically supported by noting that it is sometimes inappropriate to reply to such utterances by asking, How do you know? For example:

Suppose we’re skipping stones at the lake. I find a really flat stone and say, This one will skip at least five times. Here it would be odd for you to ask me, How do you know? If you did, I might say: Well, I don’t know, it’s just a prediction. Let’s see what happens.

In contrast, the question How do you know? is usually thought to be appropriate in response to genuine assertions (Benton and Turri 2014).

\(^5\)Views along this line are defended in Unger (1975), Williamson (1996, 2000), DeRose (2002), and Hawthorne (2004) among others. Williamson takes the knowledge norm to be constitutive of assertion; I prefer to think of it as a proposal for how to formulate the Maxim of Quality (Gazdar 1979, Benton 2016).

\(^6\)See Douven (2006), Lackey (2007), Kvanvig (2009), and Brown (2010), among others.

\(^7\)Thanks to an anonymous referee for raising this possibility, and for suggesting the 'skipping stones' example used below.
assertions, then it seems that some instances of our puzzle really do involve assertions about the future. Consider the Rain case. If Frank doesn’t notice Ellen checking the weather on her phone, he might be surprised when she answers, *It’s going to rain tomorrow*—surprised because he’s wondering how she knows this despite not having checked the forecast. He might then ask, *How do you know?* to which Ellen can say, *Oh, I just checked the forecast on my phone.* The appropriateness of Frank’s question suggests that Ellen’s utterance is in fact an assertion, not merely a (non-assertoric) prediction.8

3 The implicature view

According to the implicature view, Andy knows throughout the story that Beth enjoys the dish. Given that knowledge is the norm of assertion, this helps to explain why he is in a position to assert this on Friday afternoon. But if he still knows this on Saturday morning, why isn’t he in a position to assert it then? One possibility is that his doing so would violate one or more non-epistemic norms governing assertion. I may know that Jane broke Jill’s heart, but I may not be in a position, on a particular occasion, to assert this. Perhaps doing so would be irrelevant to the conversation at hand, or would be relevant but unnecessarily cruel. One may know something, but not be in a position to assert it for any number of reasons.

But in our vignette, Andy’s telling his friend, on Saturday morning, that Beth enjoyed the dish would not be irrelevant (his friend just asked him whether she enjoyed it) nor would it be cruel. So why isn’t Andy in a position to assert that she enjoyed it? One answer is that it would be misleading for Andy to flat-out assert that Beth enjoyed the dish. For if he were to do that, his audience would likely conclude that Andy’s evidence was more directly connected to the underlying fact than it in fact is. For example, Andy’s interlocutor might conclude that Andy had heard from Beth or someone else that she enjoyed the dish. Since he has not heard from Beth or anyone else about this, the implicature would be misleading.

That all seems plausible, but the crucial question is *why* Andy’s assertion would generate this misleading implicature. Note that one natural answer to this question is not available to the advocate of the implicature view. For suppose that Andy could only know, on Saturday morning, that Beth enjoyed the dish if his evidence was more directly connected to the underlying fact than

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8 These remarks may also cast doubt on the account of the Beth case offered in Besson and Hattiangadi (2019).
it in fact is, and that this known by both Andy and his hearer. Suppose further that the hearer
assumes that knowledge is the norm of assertion and also assumes that Andy is attempting to
comply with that norm. In that case, the hearer will naturally assume that Andy takes himself
to have ‘direct evidence’ for the fact that Beth enjoyed the dish. Since Andy does not have such
evidence, and knows this, his assertion would be misleading.

But this answer implies that Andy does not know, on Saturday morning, that Beth enjoyed
the dish. For it relies on the claim that Andy could only know, on Saturday morning, that Beth
enjoyed the dish if his evidence was more directly connected to the underlying fact than it in fact
is. Since advocates of the implicature view maintain that Andy does know that Beth enjoyed the
dish, they need to find an alternative account of how this implicature is generated.

One such alternative begins by returning to our earlier observation that, although Andy isn’t
in a position to utter (2), *Beth enjoyed the dish* he is in a position to utter a hedged variant of that
sentence, namely (4):

(4) Beth must have enjoyed the dish—it was just the sort of thing she usually likes.

Now suppose, as Mandelkern (2019) suggests, that *must* φ and φ are ‘informationally equivalent’
in the sense that the essential effect of uttering either of these sentences is to make the common
ground entail φ.9,10 If that is correct, then there is perhaps a sense in which *must* φ and φ are in
competition with each other, insofar as a speaker who wishes to make the common ground entail φ
can do so by uttering either one of these sentences (Mandelkern 2019, 253–254). But even if *must*
φ and φ are informationally equivalent, they are obviously different. In particular, an utterance of
*must* φ suggests that one’s evidence for φ is in some sense indirect (von Fintel and Gillies 2010,
353–354). It is, for example, odd to walk in from the pouring rain and say, *It must be raining—
I’m absolutely soaked.*11 So perhaps the competition between φ and *must* φ is sometimes resolved
by exploiting this particular difference between them. For example, for a speaker who wants to
communicate φ and who has direct evidence for φ, the competition will naturally be resolved in

9The relevant equivalence between φ and *must* φ follows from three assumptions: (i) *must* φ entails φ; (ii) an
utterance of *must* φ in a context c expresses the proposition that the common ground in c entails φ; and (iii) the
S4 principle for the common ground in c entails. See Mandelkern (2019, 253) for discussion. The claim that *must* φ
entails φ is a common, though not uncontroversial, position; I will return to discuss it later in the essay. The proposal
that follows is suggested by Mandelkern’s remarks (Mandelkern 2019, 258–260); he may not endorse it in detail. On
the ‘common ground’ framework, see Stalnaker (2002).
10We assume here that φ does not itself contain *must*.
11von Fintel and Gillies (2010) encode indirectness via a semantic presupposition of *must* φ.
favor of φ—for such a speaker is in some sense prohibited from using must φ. This might also suggest, conversely, that for a speaker who wants to communicate φ and who has only indirect evidence for φ, the competition will tend to be resolved in favor of must φ. For if such a speaker uses φ instead, she leaves open the nature of her evidence; if she uses must φ, she does not.

So perhaps what is going on in the Beth case is this. Suppose Andy were to utter (2) on Saturday morning. Then his audience might reason as follows:

Andy could have conveyed the information that Beth enjoyed the dish by saying either (2), *Beth enjoyed the dish*, or by saying (4), *Beth must have enjoyed the dish*. Given that he didn’t say the latter, that must be because his doing so would have been inappropriate. The most natural explanation for why it would have been inappropriate for him to say (4) is that Andy’s evidence for the claim that Beth enjoyed the dish is direct, and (4) would have been appropriate only if his evidence for that claim is indirect. So his evidence for the claim that Beth enjoyed the dish must be direct.

Thus, if Andy were to utter (2) on Saturday morning, it would naturally lead his audience to a false conclusion about the nature of his evidence.

This is an interesting idea, but I’m not sure how well it withstands further scrutiny. One worry about this proposal is that it threatens to predict that one can never say must φ if one is in a position to say φ. But that prediction simply isn’t correct. For example: A and B are inside the house and hear a noise in the distance. B recognizes the sound as that of a lawnmower.

(10)  (a) [A]: What’s that?
      (b) [B]: Someone’s mowing the lawn.
      (c) [B]: Someone must be mowing the lawn.

It seems to me that B may say either (10b) or (10c) in this situation. But suppose B says (10b). The foregoing view would seem to imply that this utterance should prompt A to reason as follows:

B could have conveyed the information that someone is mowing the lawn either by saying *Someone is mowing the lawn*, or by saying, *Someone must be mowing the lawn*. Given that she didn’t say the latter, that must be because her doing so would have been inappropriate....
But that last claim just seems false: as we just observed, it seems fine for B to say *Someone must be mowing the lawn* in this scenario. Sometimes *must* is optional, a point often made in the literature (e.g. Mandelkern 2019, 226).

Where did things go wrong? One possibility is that things went wrong at the beginning: \( \phi \) and *must* \( \phi \) are not informationally equivalent after all. But even if we accept this claim and the accompanying story about how the competition between \( \phi \) and *must* \( \phi \) is sometimes resolved, we should reject the conversational reasoning displayed above. From the fact that a speaker didn’t say *must* \( \phi \), it doesn’t follow from the competition story that it would have been inappropriate for her to do so. All the competition story says is that for a speaker who wants to communicate \( \phi \) and who has indirect evidence for \( \phi \), the competition will *tend* to be resolved in favor of *must* \( \phi \). The use of *tend* to suggests that it will sometimes *not* be resolved in favor of *must* \( \phi \). And there is an obvious reason why a speaker with indirect evidence might choose to say \( \phi \) instead of *must* \( \phi \): \( \phi \) is shorter. Thus, in situations in which brevity matters more than conveying information about one’s evidence, speakers with indirect evidence for \( \phi \) might well choose \( \phi \) over *must* \( \phi \). Thus, uttering \( \phi \) does not invariably convey that one has direct evidence for \( \phi \).

Let us say that an account of cases like the Beth case is *anti-skeptical* just in case it maintains that, on Saturday morning, Andy knows that Beth enjoyed the dish (and, more generally, that subjects in our cases know the target proposition at the later of the two relevant times); otherwise a view is *skeptical*. The implicature view is an anti-skeptical view, but it may not be the only one. It is thus worth mentioning two problems that would appear to apply to any anti-skeptical account, for these objections target the claim that Andy knows, on Saturday morning, that Beth enjoyed the dish.

First, a number of philosophers hold—quite plausibly—that knowledge is a norm of practical

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12 An anonymous referee suggests that what might be going on in our lawnmower example is that it is unclear whether or not B’s evidence for that claim that someone is mowing the lawn is indirect or not. It may then be up to B to decide whether or not that evidence should count as indirect or not. If he decides to count it as direct, he may not utter (10c) and so must utter (10b) (if he is to answer the question); if he decides to count it as indirect, he may utter either. This is plausible, but it is not clear how it helps the implicature view. For suppose we say it is unclear whether Andy’s evidence on Saturday counts as indirect. Then we predict (falsely) that he may utter either (2) or (4) on Saturday: for Andy may choose to count his evidence as indirect, in which case he may (according to this account) utter either. Suppose we say instead that it is clear that his evidence is indirect. Then we again predict (falsely) that he may utter either. What is needed is an account that yields the result that one may not utter bare \( \phi \) if it is clear that one’s evidence is indirect. That would explain why Andy is not in a position to utter (2), at least on the assumption that it is clear that Andy’s evidence is indirect. But no such account has been given. Moreover, if we had such an account, that would directly explain what needs explaining, and the additional story about how \( \phi \) competes with *must* \( \phi \) would not be needed.
reasoning, in the sense that one may use \( p \) as a premise in one’s practical reasoning iff one knows \( p \) (e.g. Hawthorne 2004, 30). Now, it seems to me that, on Saturday morning, Andy is not in a position to use the proposition that Beth enjoys the dish as a premise in his reasoning about what to do. Suppose, for example, he is planning the menu for the upcoming week. Imagine him reasoning as follows: If Beth enjoyed last night’s dish, I should make it again on Friday. Beth enjoyed last night’s dish. So I should make it again on Friday. It seems to me that Andy is not entitled to reason in this way; the most obvious explanation of this fact is that Andy doesn’t know that Beth did indeed enjoy the dish in question.

Second, a number of philosophers hold—again quite plausibly—that ignorance is a norm of inquiry, in the sense that one may inquire into the question of whether \( \phi \) iff one does not know whether \( \phi \).\(^{13}\) To a first approximation, to inquire into whether \( \phi \) is to attempt to find out whether \( \phi \). Then the foregoing norm may be supported by examples like the following. Suppose you want to know how many counties there are in Ireland. To find out, you undertake an inquiry: you walk to your computer and Google the answer to your question. You find yourself on Wikipedia and read there that there are 32 counties in Ireland. Now, does it make sense for you to keep inquiring into this question? For example, would it make sense for you to keep going and check that the first dozen Google hits all agree on the answer? Would it make sense to keep going further, calling up every Irish acquaintance you know, checking with the local Irish consulate, etc.? It seems not. Quite early on in your inquiry you learned the answer to your question. Why waste your energy inquiring into a question to which you already know the answer?

Thus, if ignorance is a norm of inquiry, and, as the anti-skeptic claims, Andy knows, on Saturday morning, that Beth enjoyed the dish in question, it would seem to follow that it is inappropriate for Andy to inquire into the question of whether she enjoyed it. But that just seems false. There would be nothing odd about Andy checking with Beth to see whether or not she enjoyed the dish—that might be a perfectly reasonable thing for Andy to do if, say, he’s trying to decide whether or not to make that dish again. If ignorance is a norm of inquiry, that suggests, contra the anti-skeptic, that Andy does not in fact know on Saturday that Beth enjoyed the dish.

\(^{13}\)For views in this vicinity, see Whitcomb (2010) and Friedman (2019).
4 The modal view

I will return to anti-skepticism later in the essay, but I take the preceding discussion to cast some doubt on the viability of that approach, particularly when it comes in the guise of the implicature view. So let us turn now to what I earlier called the modal view.

In Section 2 we presented a simple semantics for future operators, one on which future operators simply serve to shift the time of evaluation forward. But while that semantics is in some sense the standard one, it is not wholly uncontroversial. One reason to doubt that approach is that, unlike the past tense, future operators often exhibit behavior characteristic of modals—epistemic modals in particular. This seems potentially relevant in the present context, since, as we noted, it is sometimes easier to assert must $\phi$ than it is to flat-out assert $\phi$. Perhaps future operators like will are similar in this respect, and perhaps this helps to account for our puzzle.

To introduce the specific proposal I have in mind, let us begin with the notion of a future possibility. Given a possible world $w$ and a time $t$, a world $w'$ is a future possibility for $w$ at $t$ only if $w'$ is exactly like $w$ up to (and including) $t$; $w$ and $w'$ may diverge thereafter. As Lewis (1979) puts it, $w$ and $w'$ “match perfectly in matters of particular fact” up to (and including) $t$. We may require other similarities to hold between $w$ and $w'$, but we won’t go into more detail on the notion of a future possibility here; see the appendix for a formal implementation. If $w'$ is a future possibility with respect to $w$ and $t$, we write $w \approx_t w'$. We assume that, for any time $t$, $\approx_t$ is an equivalence relation on the space of worlds (it is reflexive, symmetric, and transitive).

The views I want to consider are ones on which will quantifies over a distinguished subset of future possibilities. For example, according to Kaufmann (2005), will quantifies over the set of future possibilities that are sufficiently likely. According to Copley (2009), the uses of will in which we are interested quantify over the future possibilities that are sufficiently normal, or what are sometimes called the inertial worlds (Dowty 1979). Either approach would suit our purposes, since both views imply that the actual world need not be amongst the worlds over which will quantifies. This feature of these accounts enables them to give a particular kind of explanation of what’s going on in cases of like the Beth case. But it will simplify the exposition if we focus on just one of these views, and so I shall focus on Copley’s approach, since the notion of an inertial possibility—a future possibility that is sufficiently normal—will play an important role in our later discussion of

\footnote{For discussion, see Klecha (2014), Winans (2016), and Cariani and Santorio (2018), among others.}
the epistemic view (Section 6).

Let us say that \(w'\) is an \textit{inertial possibility} 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 \(t\). David Lewis (p.c. to Dowty) glosses an inertial world (for \(w\) at \(t\)) as one in which a “natural course of events” takes place after \(t\) (Dowty 1979, 148).\(^{15}\) Although I will use informal glosses like this to motivate some formal constraints on inertial worlds later, I shall for the most part simply follow Copley and Dowty in relying on a rough-and-ready understanding of this notion.

Given a world \(w\) and time \(t\), let \(N_{w,t}\) be the set of worlds that are inertial for \(w\) at \(t\). Note that if \(w' \in N_{w,t}\), then \(w \approx_t w'\). And note that although for all \(w\), \(w \approx_t w\) (since \(w\) is just like \(w\) up until \(t\)), there may well be worlds \(w\) and times \(t\) such that \(w \not\in N_{w,t}\). This will happen if \(w\) fails to develop in a sufficiently normal manner after \(t\), given what happened in \(w\) up to and including \(t\).

The modal view offers the following account of \(\mathcal{F}_i\):

\[
[F_i \phi]_{m}^{w,t} = 1 \text{ iff } t < i \text{ and } \forall w' \in N_{w,t} : [\phi]_{m}^{w',i} = 1.
\]

The subscript \(m\) on the double-brackets here indicates that this the semantics accepted by the modal view, but not by the epistemic view, which instead accepts the simple time-shifting semantics presented earlier.\(^{16}\)

Given the definition of the proposition expressed by a sentence in a context adopted in Section 2, it follows from the modal view that Andy’s utterance of (1′) at 4pm on Friday expresses the following proposition:

\[
(10) \ \{w : \forall w' \in N_{w,f_4} : f_4 < f_7 \text{ and Beth enjoys the dish at } f_7 \text{ in } w', \}. \]

Note that, as before, this proposition is essentially equivalent to the conjunction (intersection) of two propositions:

(i) the proposition that Friday 7pm is no earlier than the utterance time (Friday 4pm), and

(ii) the proposition that in all inertial possibilities at \(f_4\), Beth enjoys the dish at 7pm on Friday.

Let \(\alpha\) be the second of these propositions; so we have:

\(^{15}\)See also Portner (1998, 762).

\(^{16}\)This semantics of the future is similar to the Peircean semantics for branching time, though the Piercean holds that future operators quantify over all future possibilities, not just the inertial ones. See the works cited in n. 4 for discussion.
\[ \alpha := \{ w : \forall w' \in N_{w,f_4} \text{ Beth enjoys the dish at } f_7 \text{ in } w' \} \]

Note that since we have stipulated that Andy never loses track of time, he knows, at 4pm on Friday, that his temporal location precedes the time of Beth’s eating. Thus, the question of whether he is in a position to utter (1′) is essentially equivalent, on this view, to the question of whether he is in a position to assert \( \alpha \).

Modal theories of future operators are typically combined with a non-modal semantics for the past tense, like the one presented in Section 2. So, given our assumptions, Andy will be in a position to utter (2′) on Saturday morning just in case he is in a position to assert \( \beta \), the proposition that Beth enjoys the dish at 7pm on Friday. Thus, according to this view, it is not the case that (1′)-on-Friday is equivalent to (2′)-on-Saturday, \textit{modulo} the information each contains about how its context time relates to the event time. For \( \alpha \) is not equivalent to \( \beta \), and neither entails the other.

The modal view can offer the following account of the Beth case. Suppose that, throughout the case, Andy knows proposition \( \alpha \): he knows (roughly) that if things unfold normally after 4pm on Friday, Beth enjoys the dish in question.\(^\text{18}\) That Andy knows this is plausible given what we said in our description of the Beth case. After all, Andy is Beth’s personal chef, and so he knows quite a bit about what sorts of things she generally likes to eat, and he knows (we may suppose) what the dish in question tastes like. Since we are assuming that knowledge is the norm of assertion, it follows that Andy is in a position to assert \( \alpha \) on Friday afternoon, which, given the modal theory’s assumptions, means that he is in a position to utter (1′) on Friday afternoon.

But it is consistent with the above that, at no point in the story, does Andy know \( \beta \). For \( \alpha \) does not entail \( \beta \): even if it’s true that Beth will enjoy the dish if things unfold normally, it might be false that Beth will in fact enjoy the dish—for things might not unfold normally. More formally, it might be that Beth enjoys the dish at every world in \( N_{w,f_4} \) without it being the case that Beth enjoys the dish in \( w \)—for \( w \) need not be an element of \( N_{w,f_4} \). In that case, \( \alpha \) will be true at \( w \).

\(^{17}\)The view just presented derives the result that Andy’s Friday afternoon utterance of \textit{Beth will enjoy the dish} expresses \( \alpha \) from a specific claim about the semantics of future operators. But there is a pragmatic variant of this view. For example, MacFarlane (2014, 230–231) adopts a view which agrees with the time-shifting semantics on the literal semantic content of utterances of the form \( \mathcal{F}_i \phi \), but agrees with the modal view that what one asserts in uttering such a sentence is typically a modalized proposition. When we say, \textit{It will rain tomorrow} we often speak loosely; what we really mean is that it will \textit{probably} rain tomorrow, or that it will rain tomorrow \textit{if things unfold normally}. This suggests that, on MacFarlane’s view, when Andy utters \textit{Beth will enjoy the dish} on Friday afternoon, he might well be asserting proposition \( \alpha \) described above. Thus, an advocate of this view could adopt the account of the Beth case discussed below; it is also vulnerable to the same objections.

\(^{18}\)I will sometimes gloss \( \alpha \) as \textit{the proposition that if things unfold normally after 4pm on Friday, Beth enjoys at 7pm on Friday}, but this should not be taken as a serious proposal about the semantics of that English conditional.
while $\beta$ is false at $w$.

So suppose Andy does not know $\beta$ at any point in the case, perhaps because he cannot rule out the possibility that some abnormal course of events that obtains after $f_4$ causes Beth not to enjoy the dish. In that case, Andy is not in a position to assert $\beta$ on Saturday morning, and so not in a position to utter (2') on Saturday morning. According to this account, Andy knows $\alpha$ throughout the story, but does not know $\beta$ at any point in the story; Andy’s epistemic relations to these propositions remain invariant throughout the story. On this approach, the fact that Andy can utter (1') on Friday, but cannot utter (2') on Saturday is largely due to the fact that these two sentences-in-context make different claims about the world.

That is the modal account of the Beth case. Now, while I think we should reject this view for reasons to be offered presently, I also think there is a kernel of truth in this view. The kernel is this: in many ordinary situations, it seems that if one knows that [it will be that $\phi$, if things unfold normally], then one is in a position to utter, $\text{It will be that } \phi$. The modal view arguably captures something important about the typical assertability conditions of sentences about the future.

I shall return to this point later, but I want to concentrate here on a serious problem facing the modal view: it assigns the wrong truth-conditions to assertions about the future (Cariani and Santorio 2018; see also Prior 1976). There are several points to be made here, but I refer the reader to the case against this view offered in Cariani and Santorio (2018) and confine myself to the following observation.

Suppose Andy says $\text{Beth will enjoy the dish}$ at 4pm on Friday in world $w$. But suppose that Beth does not in fact enjoy the dish in world $w$. Then it would seem to follow that what Andy said is false. But the modal view does not predict this; it allows that what Andy said might well be true. For suppose that if things had unfolded normally after 4pm on Friday in $w$, Beth would have enjoyed the dish—she only failed to enjoy it because of some unexpected event that happened after 4pm on Friday. In that case, it might be that in all worlds $w'$ that are inertial for $w$ at 4pm on Friday, Beth enjoys the dish when she eats it. And that, in turn, would mean that what Andy said is true according to the modal view. But this is quite clearly wrong: Andy said that Beth would enjoy the dish, but she didn’t, and so what Andy said is false.

Thus, the proposed truth-conditions are not sufficient: they can be satisfied even when Andy speaks falsely. It seems that ordinary utterances about the future are not typically understood
in the way in which this proposal suggests. When we assess whether \( \text{It will be that } \phi \) is true, all we care about is what happens in the actual world; other worlds—whether inertial continuations of the actual world or not—simply don’t enter into it. The time-shifting semantics for future operators discussed in Section 2 avoids this problem. Thus, I shall assume in what follows that future operators simply serve to shift the time of evaluation forward.\(^{19}\)

5 Knowledge and available evidence

The final view to be considered here is the epistemic view. According to this view, Andy loses his standing to assert that Beth enjoys the dish as he moves from Friday afternoon to Saturday morning because he loses his knowledge of this proposition as he moves between these two times. Andy loses knowledge despite not losing or gaining any relevant evidence.\(^{20}\) The claim that one can lose knowledge despite no change in one’s relevant evidence might seem surprising, but it actually isn’t that distinctive in the context of contemporary epistemology. For a number of other theories of knowledge also allow for knowledge to be lost without a change in one’s evidence. Do any of these theories cast light on the present phenomenon?

For example, according to some versions of ‘sensitive invariantism’, whether an agent \( x \) knows \( p \) at \( t \) may depend on how important it is for \( x \) at \( t \) that \( p \) be true, or on how salient certain \( \neg p \)-possibilities are to \( x \) at \( t \) (Fantl and McGrath 2002, 2009, Hawthorne 2004, Stanley 2005). Either of these factors may change over time even if \( x \)’s evidence does not; as a result \( x \) may lose knowledge despite not gaining or losing any evidence. But neither of these factors seems to be the source of knowledge loss in our cases. We may stipulate that the relevant practical stakes do not change for Andy as he moves from Friday afternoon to Saturday morning. And we may likewise stipulate that the possibilities salient to Andy don’t change as he moves from Friday to Saturday. Neither stipulation seems to make a difference to what Andy is in a position to assert at those two times.

Philosophers impressed by Harman’s cases involving ‘evidence one does not possess’ (Harman

\[^{19}\]Cariani and Santorio (2018) defend a version of the view that future operators are modals. But on their version of that view, when a sentence of the form \( \mathcal{F}_i \phi \) occurs unembedded, it is assigned the same sort of content that the simple, time-shifting semantics assigns to \( \mathcal{F}_i \phi \) (see pp. 147–148 of their article). Thus, the idea that future operators are modals in their sense does not seem to help with our puzzle.

\[^{20}\]If one’s evidence is just what one knows (Williamson 2000, Ch. 9), then if Andy loses knowledge, he loses evidence, evidence that is presumably relevant to the question of whether Beth enjoyed the dish. Still, none of the epistemic factors that usually explain knowledge loss appear to be present here: Andy hasn’t forgotten anything, hasn’t remembered something he previously forgot, nor has he gained any new misleading evidence. That is all I mean by saying that Andy ‘hasn’t lost or gained any relevant evidence’.\)
1973, 143–144) might also agree that an agent can lose knowledge without gaining or losing any relevant evidence, and even if the practical stakes and the salient possibilities are held fixed. But in Harman’s cases, the agent’s knowledge is undermined by the presence of easily accessible evidence that, if obtained, would defeat the agent’s evidence. But this is not a feature of our cases.

That said, ‘evidence one does not possess’ might be relevant to our puzzle in a slightly different way. To see how this might go, first note although the evidence Andy possesses doesn’t change as he moves through time, the evidence available to him does. For example, on Saturday morning, Andy could call up Beth and ask her whether she liked the dish he had prepared for her. She could tell him that she did indeed like it, in which case Andy would know that she liked it (or so it seems to me). Two observations are potentially relevant here. First, it seems that, on Saturday morning, Andy is in a position to get evidence for proposition β that is stronger than the evidence he in fact has. This is suggested by the fact that, were Andy to obtain that testimonial evidence, it would be rational for him to increase his confidence in β. Second, the evidence Andy is in a position to get on Saturday morning is of a different kind than the evidence he in fact has. The evidence he has is causally upstream from the fact that Beth enjoys the dish: it consists of facts that concern the causes of Beth’s liking the dish (her tastes, the nature of the dish). The testimonial evidence he could get, on the other hand, is causally downstream from the fact that Beth enjoys the dish: that evidence would be an effect of Beth’s liking the dish.

In contrast, on Friday afternoon, Andy can’t get evidence that is much stronger than the evidence he already has. He could get more evidence, of course: he could learn a bit more about Beth’s tastes, he could learn a bit more about the ingredients he is using. That might make him a bit more confident in β, but it wouldn’t seem to make him much more confident than he already is. And he can’t really get evidence of a different kind, at least not if ‘kinds’ are individuated causally (and we ignore possibilities involving time-travel, divine revelation, etc.). The only relevant evidence available to Andy on Friday afternoon is broadly inductive evidence, and he already has evidence of that kind.

We can summarize these points by saying that, on Saturday morning, Andy could be in a much stronger epistemic position with respect to β than he is in fact in, whereas this isn’t true of Andy on Friday afternoon. Perhaps it is this difference that explains why Andy knows β on Friday afternoon, but not on Saturday morning. On this approach, what one knows is sensitive not just to
the evidence one has, but also to the evidence one could get. How strong of an epistemic position with respect to a proposition $p$ one needs to be in in order to know $p$ partly depends on how strong of an epistemic position one could be in with respect to $p$.

We should distinguish two claims. One is the claim that what epistemic position one needs to be in in order to know $p$ depends how strong of an epistemic position one could be in with respect to $p$. The second claim is that this is what explains what’s going on in the Beth case. While the first of these claims might be true, I have my doubts about the second.

My reason for doubting this second claim is that we can replicate the judgments about the Beth case even if we change the case so that no more relevant evidence is available to Andy on Saturday morning than was available to him on Friday afternoon. To see this, consider the Death case:

**Death case**

The Death case is exactly like the Beth case, except that Beth dies immediately after eating and enjoying the dish. She leaves no trace of the fact that she enjoyed her last meal. On Saturday morning, Andy learns of Beth’s death.

I take it that, in respect of what Andy is in a position to assert, the Death case is just like the Beth case. On Friday afternoon, Andy can say, *Beth will enjoy the dish when she eats it*, but on Saturday morning he is not in a position to say, *Beth enjoyed the dish*, even once he learns that Beth is dead. But it doesn’t seem that Andy could get into a much stronger position with respect to $\beta$ on Saturday morning than he is in fact in. What could he do? Beth is gone and has left no trace of the fact that she enjoyed the meal. Despite this, if we accept these claims about what Andy is in a position to assert, it would seem to follow from the logic of the epistemic view that Andy knows, on Friday afternoon, that Beth enjoys the dish, but no longer knows this on Saturday morning. But Andy’s loss of knowledge in the Death case cannot be explained by appealing to the fact that the evidence available to him has changed.

According to the available evidence approach, the temporal structure of the Beth case is not, in a certain sense, essential to the underlying phenomenon. For we could have cases in which $x$ knows $p$ at $t$, but $x'$ does not know $p$ at $t$, with the only difference between $x$ and $x'$ being that more evidence concerning $p$ is available to the latter than to the former. Or we could have a case in which $p$ concerns $x$’s past at $t$, $x$ knows $p$ at $t$, and $x$ loses this knowledge simply by moving
forward through time. Similarly, if evidence was ‘destroyed’—if evidence that was once available became unavailable—then one might gain knowledge as a result.

What the Death case seems to show is that time matters. In the Death case, what is the relevant difference between Andy on Friday afternoon and Andy on Saturday morning? Not the evidence Andy possesses, not what’s at stake for Andy, not the salient possibilities of error, not the presence of potential defeaters, not the evidence available to Andy. The only relevant difference seems to be Andy’s temporal location with respect to Beth’s meal: that meal lies in his future on Friday and in his past on Saturday. If this is right, then the conclusion that presents itself is that one’s location in time can, by itself, affect what one knows. One can lose knowledge simply by moving through time. The remainder of the essay is devoted to developing and exploring a theory of knowledge—the future normality view—that permits knowledge to be lost in this way. In the next section, we state the view and examine a number of its consequences. In the section that follows, we look at some objections to the view, and see what might said in response to them.

6 Knowledge and future normality

6.1 The future normality view

The core idea of the future normality view is that we enjoy a default entitlement to assume that the future will unfold in a relatively normal manner.\footnote{\textsuperscript{21}Compare Goodman and Salow (2018, 191) who propose that “we have a default entitlement to assume that things are relatively normal.” For other recent applications of the notion of normality in epistemology, see Smith (2010, 2017), Greco (2014), and Beddor and Pavese (2018). The principal difference between these approaches and ours is that we emphasize future normality over past and present normality.} When you consider what is going to happen on a given occasion, you are (according to this view) typically permitted to ignore possibilities in which the future fails to develop in a sufficiently normal manner. But since what counts as ‘the future’ is constantly changing, possibilities that are properly ignored at one time may not necessarily be ignored at a later time, even if one’s epistemic situation is otherwise the same. This allows one to lose knowledge simply by moving through time, i.e. with no change in the factors usually thought relevant for knowing.

We shall attempt to implement this idea by borrowing some ideas from the ‘relevant alternatives’ tradition in epistemology (Dretske 1970, Stine 1976, Cohen 1988), though I suspect the underlying idea could be equally well expressed in alternative frameworks (e.g. ‘safety’). Following Lewis (1996), we assume the following:
RELEVANT ALTERNATIVES

An agent $x$ knows proposition $p$ at time $t$ in world $w$ iff $p$ is true in every possibility $w'$ such that: (i) $w'$ is relevant for $x$ at $t$ in $w$, and (ii) $w'$ is not eliminated by $x$’s evidence at $t$ in $w$.

For simplicity, I will take the notions of evidence and of a possibility’s being eliminated by one’s evidence as primitives. But I will assume that the agent’s evidence never eliminates the actual world; this is needed to ensure the factivity of knowledge.22

Lewis lays down a set of principles—‘rules of relevance’—which constitute a partial theory of which possibilities count as relevant for a given agent on a given occasion. One uncontroversial rule is the Rule of Actuality, which says that the actual world is always relevant ($w$ is always relevant for $x$ at $t$ in $w$); this is again needed to ensure the factivity of knowledge. We may also suppose that all relevant possibilities are sufficiently similar to the actual world (cf. Lewis’s Rule of Resemblance), and that, other things being equal, if a proposition $p$ is salient to a subject, then some possibility in which $p$ is true is relevant for that subject (cf. Lewis’s Rule of Attention). Earlier we noted that some epistemologists hold that other ‘non-evidential’ factors can affect whether one knows (e.g. the practical stakes); these factors may also play a role in determining relevance.

According to the future normality view, we enjoy a default entitlement to assume that the future will unfold in a relatively normal manner. In the relevant alternatives setting, this default entitlement can be formulated as a constraint on relevance, on which possibilities must be ruled out in order to know. Let us say that a possibility is prima facie relevant for $x$ at $t$ in $w$ iff it would it be deemed relevant on that basis of the aforementioned considerations (actuality, similarity, salience, etc.). Then the ‘Rule of Future Normality’ tells us how to get from the set of prima facie relevant alternatives to the set of alternatives that are relevant tout court:

FUTURE NORMALITY

Other things being equal, a possibility $w'$ is relevant for an agent $x$ at time $t$ in world $w$ just in case:

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22Lewis offers a contextualist account of knowledge ascriptions, whereas the account presented here is better classified as a version of sensitive invariantism. But I am not necessarily opposed to a contextualist version of the account to come; I simply set contextualism aside for the sake of simplicity. I also set aside the question of whether belief is required for knowledge.
(i) \( w' \) is *prima facie* relevant for \( x \) at \( t \) in \( w \), and

(ii) if \( w' \neq w \), then \( w' \) is inertial for itself at \( t \), i.e. \( w' \in N_{w',t} \).

The ‘other things being equal’ proviso reflects the fact that our entitlement to assume that things will develop in a suitably normal manner is merely a *default* entitlement, one that can be over-ridden in certain situations. For example, if a determined skeptic succeeds in making the proposition that I will be killed by a falling piano tomorrow salient to me, some possibility \( w' \) in which that proposition is true may be relevant for me, even if \( w' \) is not inertial for itself right now. Or perhaps if a great deal hangs on whether it will rain tomorrow, some possibility \( w' \) in which it rains tomorrow might be relevant for me even if \( w' \) is not inertial for itself right now. But having acknowledged this proviso, I propose to ignore it for the remainder of the essay for the sake of simplicity. So we restrict the discussion in what follows to \((w, t, x)\)-triples for which other things are equal. Note also that we restrict clause (ii) in *future normality* to worlds other than \( w \); in order to ensure the factivity of knowledge, \( w \) must always count as relevant for \( x \) at \( t \) in \( w \).

Now, having presented an initial characterization of how relevance should be understood—and having proposed a novel rule of relevance—I should say that I do not think our grip on the needed notion of relevance is completely independent of our grip on the notion of knowledge. Note, for example, that many of the rules of relevance—including the Rule of Future Normality—are imprecise in a number of ways. One rule speaks of sufficient similarity, but how dissimilar from actuality can a world be and still count as relevant? (And which dimensions of similarity matter?) And when exactly are ‘other things equal’ for the purpose of applying the Rule of Future Normality? It seems to me that when we confront these questions in particular cases—when we try to determine just which possibilities are relevant on a given occasion—we may often be unable to answer them without relying on our antecedent judgments concerning what the agent knows.\(^{23}\)

Thus, our relevant alternatives theory is not intended as an *analysis* of knowledge in the traditional sense; we have not attempted to give a set of non-circular necessary and sufficient conditions for knowing. Despite this, the foregoing account turns out to be informative on certain structural features of knowledge, as I shall now proceed to demonstrate. But I will return to this issue later, since it is connected to a potential explanatory limitation of the present approach.

\(^{23}\) Compare Williamson (2009, 305–307) on the notion of similarity in safety-theoretic approaches to knowledge. And see Ichikawa (2011) for a similarly modest version of the relevant alternatives approach.
6.2 Normality and knowledge loss

If this account of knowledge is correct, then there are two structural features of knowledge that are relevant for understanding cases like the Beth case. First, on this approach, the following holds in any situation in which the Rule of Future Normality is in force:

**KNOWING THE FUTURE**

If it will be that \( \phi \) and you know that [if things unfold normally, it will be that \( \phi \)], then you know that it will be that \( \phi \).

(This follows from a claim—**Proposition 2**—which is discussed in the appendix.) Recall that in our discussion of the modal view (Section 4), we noted that it was plausible to hold that Andy knows, on Friday afternoon, that if things unfold normally, then Beth will enjoy the dish. After all, he is Beth’s personal chef, he knows what he has prepared, and he knows what sorts of things she usually likes. Given that Beth does indeed enjoy the dish, it follows from this and knowing the future that Andy knows, on Friday afternoon, that Beth will enjoy the dish.

But, when combined with a plausible claim about inertial worlds, the future normality view also predicts that this knowledge can be lost simply by moving through time. The needed claim about inertial worlds is this:

**ABNORMALITY NEEDN’T PERSIST**

There are worlds \( w \) and times \( t, t' \) such that \( t < t' \), \( w \notin N_{w,t} \), and \( w \in N_{w,t'} \).

This says that there are worlds that are not inertial continuations of themselves at some time \( t \) but then become inertial continuations of themselves at a later time \( t' \). The reason this is plausible is that although something out of the ordinary might happen in \( w \) after \( t \) that prevents it from counting as inertial for itself at \( t \), that abnormality may be confined to the interval between \( t \) and \( t' \). Things in \( w \) may then ‘return to normal’ after \( t' \) in such a way that \( w \) counts as inertial for itself at \( t' \).

The resulting account allows knowledge to be lost simply by moving through time. To see this, suppose you know at time \( t_0 \) that some event \( e \) will occur at \( t_1 \). But suppose that the Rule of Future Normality plays a role in securing your knowledge—you wouldn’t have known this if the Rule of Future Normality hadn’t been in effect. What I mean by this is that your evidence at \( t_0 \)
doesn’t eliminate all possibilities in which $e$ fails to occur at $t_1$, and some such possibilities are \textit{prima facie} relevant for you at $t_0$. For simplicity, let us suppose that there is exactly one such possibility, $w'$. So $w'$ is a world in which $e$ fails to occur at $t_1$; your evidence at $t_0$ doesn’t rule $w'$ out; and $w'$ is \textit{prima facie} relevant for you at $t_0$. All this is still consistent with your knowing, at $t_0$, that $e$ will occur at $t_1$, since it may be that $w'$ fails to develop in a suitably normal manner after $t_0$, and so may not count as inertial for itself at $t_0$. If so, it will thus be rendered irrelevant for you at $t_0$ by the Rule of Future Normality, and you will count as knowing, at $t_0$, that $e$ will occur at $t_1$.

But now suppose you simply move forward in time from $t_0$ to $t_2$. You neither gain nor lose any relevant evidence between $t_0$ and $t_2$. And the usual factors thought to determine relevance—similarity, salience, practical stakes, etc.—remain unchanged for you between $t_0$ and $t_2$. Thus, your evidence at $t_2$ will not eliminate $w'$—your evidence at $t_0$ did not eliminate it, and your relevant evidence hasn’t changed. Furthermore, $w'$ remains \textit{prima facie} relevant for you at $t_2$—it was \textit{prima facie} relevant for you at $t_0$ and the factors determining \textit{prima facie} relevance haven’t changed for you. All this is consistent, on the present approach, with your \textit{not} knowing, at $t_2$, that $e$ occurred at $t_1$. For everything we’ve said up until now is consistent with $w'$’s being relevant for you at $t_2$. For what we said earlier about $w'$ was that it failed to develop in a suitably normal manner after $t_0$, and that this prevented it from being relevant for you \textit{at that time}. But it might be that whatever unusual occurrence in $w'$ prevented it from being relevant for you at $t_0$ is confined to the interval between $t_0$ and $t_2$—it may be that, after $t_2$, things go back to normal in $w'$, so that $w'$ counts as inertial for itself at $t_2$ (\textit{abnormality needn’t persist}). And if that happens, the Rule of Future Normality implies that $w'$ will be relevant for you at $t_2$. But if $w'$ is relevant for you at $t_2$, then you do not know, at $t_2$, that $e$ occurred at $t_1$. For $w'$ is now a relevant possibility that is not eliminated by your evidence in which $e$ fails to occur at $t_1$.

Thus, the present account permits knowledge to be lost simply by moving through time, since it allows the passage of time to render a once irrelevant possibility relevant. Thus, this theory gives us a model of how Andy could have lost knowledge in the Beth case. The situation there would be exactly analogous to the one schematically described above: just take ‘you’ to be Andy, $t_0$ to be Friday afternoon, $e$ to be Beth’s enjoyment of the dish, $t_1$ to be dinner time on Friday, and $t_2$ to be Saturday morning.
6.3 Normality and knowledge gain

We have been discussing cases in which one can assert, at an initial time $t$, that it will be that $\phi$, but one cannot assert, at a later time $t'$, that it is or was that $\phi$, despite no change in the factors usually thought relevant to knowledge. But are there cases in which the reverse happens, cases in which one cannot assert, at an initial time $t$, that it will be that $\phi$, but one can assert, at later time $t'$, that it is or was that $\phi$, again with no change in the factors usually thought relevant to knowledge? It would seem not. At any rate, such cases are hard to imagine. When combined with an independently plausible claim about inertial worlds, the present theory predicts that such cases are indeed impossible.

The further plausible claim is the reverse of abnormality needn’t persist:

NORMALITY PERSISTS

For all worlds $w$ and times $t, t'$, if $t < t'$, then if $w \in N_{w,t}$, then $w \in N_{w,t'}$.

This says that if $w$ is inertial for itself at time $t$, it can’t lose this status. To see why this is plausible, imagine that it failed, and that $w$ is inertial for itself at $t$ but not at later time $t'$. Now ask: why is $w$ not inertial for itself at $t'$? Well, it must be because some course of events that takes place after $t'$ is unusual enough to prevent $w$ from counting as inertial for itself at $t'$. But since $t$ is earlier than $t'$, that unusual course of events lies in $w$’s future at $t$ as well. Thus, that unusual course of events will presumably also deprive $w$ from counting as inertial for itself at $t$. While there is more to be said about the matter, this line of thought is, I think, quite plausible. And if we accept this constraint, the resulting theory predicts that knowledge cannot be gained simply by moving through the time. Assuming, as we are, that knowledge is the norm of assertion, this, in turn, implies that one cannot gain the license to assert something simply by moving through time.

To see this, it will be useful to adopt some further terminology and notation. Let $N^*(w,t)$ denote the following set:

$$N^*(w,t) = \{ w' : w' \in N_{w',t} \} \cup \{ w \}.$$ 

And let’s say that a world $w'$ is a prima facie alternative for $x$ at $t$ in $w$ iff (i) $w'$ is prima facie relevant for $x$ at $t$ in $w$, and (ii) $w'$ is not eliminated by $x$’s evidence at $t$ in $w$. Then if $R(w,t,x)$ is the set of $x$’s prima facie alternatives at $t$ in $w$, then the set of $x$’s epistemic alternatives at $t$ in
$w$ is given by: $R(w,t,x) \cap N^*(w,t)$. So according to the future normality view, $x$ knows $p$ at $t$ in $w$ just in case $p$ is true at every world in $R(w,t,x) \cap N^*(w,t)$.

To see how the resulting view predicts that knowledge cannot be gained simply by moving through time, note that \textsc{normality persists} implies:

($\star$) For all worlds $w$ and times $t, t'$, if $t < t'$, then $N^*(w,t) \subseteq N^*(w,t')$.

Now suppose that $x$ is an agent whose evidence in $w$ does not change between $t$ and later time $t'$, and whose \textit{prima facie} relevant alternatives in $w$ do not change between $t$ and $t'$. Then we have:

$$R(w,t,x) = R(w,t',x).$$

But since $t < t'$, this together with ($\star$) implies that:

$$R(w,t,x) \cap N^*(w,t) \subseteq R(w,t',x) \cap N^*(w,t').$$

So $x$'s epistemic alternatives at $t$ in $w$ are a subset of his alternatives at $t'$ in $w$. This means that anything $x$ knows at $t'$ in $w$ is something he already knew at $t$ in $w$—$x$ didn’t gain any knowledge as he moved from $t$ to $t'$.

6.4 Normality and assertability

Earlier I suggested that there was a kernel of truth in the modal theory of Section 4. Here I shall try to explain how the future normality theorist can acknowledge this fact. Comparing the two theories is a slightly delicate matter, given that they disagree on what future operators mean. But we can get around this complication by ascending to the formal mode where appropriate.

It will help to first introduce a modal $N$ quantifying over inertial worlds: 25

\footnote{An anonymous referee objects to \textsc{normality persists} on the following grounds. Suppose things unfold normally in $w$ for a very long time after $t$ (say ten billion years) and then some bizarre event occurs in $w$. Should an unexpected event so distant in the future really prevent $w$ from counting as inertial for itself at $t$? The referee finds an affirmative answer implausible. One alternative would be to delimit the notion of an inertial world so that a world $w$ can count as inertial for itself at $t$ so long as things in $w$ proceed in a relatively normal manner over the interval $(t, t + \delta)$, where $\delta$ is some sufficiently large unit of time. It would be interesting to investigate the consequences of making this alteration. But I shall not adopt this alternative here. Two reasons justify this choice. First, given our conception of an inertial world, we predict, apparently accurately, that one cannot gain the license to assert something simply by moving through time. Given the alternative conception, this result doesn’t hold in full generality; in particular, it won’t hold for propositions $p$ that only concern the distant future (times after $t + \delta$). But is there a reason to think that I can gain knowledge of the distant future simply by moving through time? If not, that is a reason to prefer our conception of an inertial world to the time-delimited one. Second, our view is formally simpler and more elegant than the proposed alternative. For example, it means that, if $t < t'$, the set of worlds that are inertial for themselves at time $t$ is a subset of the set of worlds that are inertial for themselves at $t'$. The time-delimited conception of inertial worlds lacks this attractive formal property.

25 I will sometimes pronounce $N \phi$ as \textit{if things unfold normally, $\phi$}, but this should not be taken as a serious claim about that English construction.}

28
\[ [N \phi]^{w,t} = 1 \text{ iff for all } w' \in N_{w,t}, \text{ then } [\phi]^{w',t} = 1 \]

Then, as I shall presently argue, the modal theory is committed to the following claim:

NORMALITY-ASSERTABILITY

If \( x \) knows that [if things unfold normally, it will be that \( \phi \)], then \( x \) is in a position to utter \( \text{It will be that } \phi \).

If \( [K_x N F_i \phi]_e^{w,t} = 1 \), then \( x \) is in a position to utter \( F_i \phi \) at \( t \) in \( w \).

Now this claim is not true in full generality, according to the future normality theory, but a restricted version of it is:

RESTRICTED NORMALITY-ASSERTABILITY

If it will be that \( \phi \), then if \( x \) knows that [if things unfold normally, it will be that \( \phi \)], then \( x \) is in a position to utter \( \text{It will be that } \phi \).

If \( [F_i \phi]_e^{w,t} = 1 \), then if \( [K_x N F_i \phi]_e^{w,t} = 1 \), then \( x \) is in a position to utter \( F_i \phi \) at \( t \) in \( w \).

Note that this restricted principle follows from NORMALITY-ASSERTABILITY. According to the future normality theorist, this restricted principle is the kernel of truth contained in the modal theory.

To see that the modal theory is committed to NORMALITY-ASSERTABILITY, at least modulo the assumption that knowledge is the norm of assertion, note that the modal theory’s future operator is definable within the semantics of the epistemic theory in a particular way. More specifically, from the perspective of the epistemic theorist, the modal theorist has mistakenly identified the temporal claim \( F_i \phi \) with the modal-temporal claim \( NF_i \phi \). For we have the following result:

EQUIVALENCE

For any formula \( \phi \), world \( w \), and time \( t \): \( [F_i \phi]_m^{w,t} = [NF_i \phi]_e^{w,t} \).

(This is discussed as Proposition 1 in the appendix.) So assuming as we are that all parties accept that knowledge is the norm of assertion, the modal theorist presumably accepts the following:

\(^{26}K_x \phi \) translates \( x \) knows \( \phi \).

\(^{27}\)This is reminiscent of Shorter's observation (p.c. to Prior) that the Peircean future operator is a fusion of the future necessity operator and the simple time-shifting future operator (Prior 1967, 130–131; MacFarlane 2014, 215).
(†) If \([K_x \mathcal{F}_i \phi]^w_{t} \cdot m = 1\), then \(x\) is in a position to utter \(\mathcal{F}_i \phi\) at \(t\) in \(w\).

But then it follows from EQUIVALENCE that the modal theorist accepts NORMALITY-ASSERTABILITY as well—for we may obtain the latter from (†) by replacing \([K_x \mathcal{F}_i \phi]^w_{t} \cdot m\) with the equivalent \([K_x \mathcal{N} \mathcal{F}_i \phi]^w_{t} \cdot e\).\(^{28}\)

Finally, to see that the future normality view is committed to RESTRICTED NORMALITY-ASSERTABILITY, recall KNOWING THE FUTURE, which is reproduced here, along with a more formal statement of it:

KNOWING THE FUTURE

If it will be that \(\phi\) and you know that [if things unfold normally, it will be that \(\phi\)], then you know that it will be that \(\phi\).

For any world \(w\) and time \(t\): if \([\mathcal{F}_i \phi]^w_{t} \cdot e = 1\) and \([\mathcal{K}_x \mathcal{N} \mathcal{F}_i \phi]^w_{t} \cdot e = 1\), then \([\mathcal{K}_x \mathcal{F}_i \phi]^w_{t} \cdot e = 1\).

(Again, see the proof of Proposition 2 in the appendix.) RESTRICTED NORMALITY-ASSERTABILITY follows from this, given that knowledge is the norm of assertion.

6.5 Stable foreknowledge
In both the Beth case and the Rain case, three conditions obtain. (i) A subject is in a position to say, at an initial time \(t\), that it will be that \(\phi\). (ii) The subject’s relevant evidence does not change between \(t\) and later time \(t’\). (iii) The subject is not in a position to say, at \(t’\), that it was that \(\phi\).

But, as I noted in Section 1, it is not true that in every case in which (i) and (ii) hold is a case in which (iii) holds. An example illustrates the point:

Jack case

Jack tells me on Thursday morning that he’s leaving tomorrow to go to New York for the weekend. On Thursday evening, I run into Jill, a mutual friend of mine and Jack’s. She asks me how Jack is doing. I reply by saying, *He’s great. He’s going to spend the weekend in New York.*

Jack does indeed spend the weekend in New York, though I don’t hear from him (and didn’t expect to). On Monday morning, Jane, another mutual friend of mine and Jack’s,

\(^{28}\)Note that our knowledge operators are intensional, not hyperintensional.
also asks me how Jack is doing. Here it seems fine for me to say, *He’s great. He spent the weekend in New York.*

Let’s agree that my final utterance is acceptable here. Then given the acceptability of my two utterances in this scenario, it would seem to follow from the logic of the epistemic view that I know that Jack spent the relevant weekend in New York both on Thursday (prior to the weekend in question) and on Monday (after the weekend in question). Let us call cases like this cases of *stable foreknowledge*, and let us call cases like the Beth case cases of *easy foreknowledge*.

The existence of cases of stable foreknowledge should not be surprising if the future normality view is true, since the structure of that view predicts that we should encounter such cases. For suppose that no possibility in which a particular event $e$ fails to occur at $t_1$ is even *prima facie* relevant for you at time $t_0$—perhaps such possibilities are too dissimilar from the actual world to count as relevant for you at $t_0$. Then you will automatically know, at $t_0$, that $e$ will occur at $t_1$. If the various standard factors determining relevance (salience, similarity, etc.) do not change for you between $t_0$ and $t_2$, then no possibilities in which $e$ fails to occur at $t_1$ will be relevant for you at $t_2$ either. And in that case, you will retain your knowledge that $e$ occurred at $t_1$, as you travel forward in time from $t_0$ to $t_2$.

So the future normality view predicts that you can lose knowledge of a fact $F$ as the passage of time transforms $F$ from a fact about the future into a fact about the past (easy foreknowledge), and it also predicts that you can retain knowledge of a fact $F$ as the passage of time transforms $F$ from fact about the future into a fact about the past (stable foreknowledge). Thus, the fact that we encounter both types of cases thus provides some evidence for the future normality view.

But cases of stable foreknowledge may also reveal an important limitation of the future normality view, one that emerges when we ask why Andy loses knowledge in the Beth case, while I retain my knowledge in the Jack case. What is the difference between the two cases? Assuming that in the Jack case my evidence does not eliminate all possibilities in which Jack fails to spend the weekend in New York, the difference is presumably that, in the Jack case, all possibilities of error fail to be *prima facie* relevant throughout the case, whereas in the Beth case, some possibilities of error are *prima facie* relevant for Andy throughout the case. But what, in more concrete terms, does this difference amount to?
Are possibilities in which Jack fails to spend the New York too dissimilar from the actual world to count as relevant? But cases in which Beth fails to enjoy the dish are also dissimilar from the actual world in various respects, so it is not clear that appealing to similarity gives us a clear independent explanation of why Andy loses knowledge, while I do not. Is the method by which Andy formed his belief less reliable than the method by which I formed mine? If so, then perhaps Lewis’s ‘Rule of Reliability’ could be used to distinguish the cases (Lewis 1996, 558). But the judgment that Andy’s method is less reliable than mine is not obvious, and would in any case depend in part on answering difficult questions about how the relevant ‘methods of belief formation’ are to be individuated (Conce and Feldman 1998). It is again unclear whether appealing to reliability would give us a clear independent explanation of the difference between the two cases.29

I suspect that some things can be said in defense of these attempted explanations, but I do not know how to persuade a critic who finds them completely wrong-headed. So let me step back to make some more general remarks about this situation. Note first that none of this shows that the future normality view is false; all it shows is that the future normality view—at least as we’ve been able to develop it—is less explanatory than we might like. This is perhaps a weakness of the future normality view, but two points should be kept in mind when assessing the significance of that concession.

First, given the dialectical context of the present essay, this limitation of the future normality view is of limited significance. For it seems that none of the views discussed in this essay provide much illumination on the difference between these two types of cases. Consider the modal view. Given the logic of that view, it too would say that, in the Jack case, I know throughout the case that Jack spends the weekend in New York. And it says that, in the Beth case, Andy never knows that Beth enjoys the dish. But what, according to the modal view, is the difference between the Jack case and the Beth case? Why do I know while Andy does not? The modal view, by itself, is silent on this question.

The implicature view doesn’t help here either. For that view would have to say that while Andy’s utterance on Saturday morning implicates that he has direct evidence concerning Beth, my utterance on Monday does not implicate that I have direct evidence concerning Jack. But since that view struggled to explain how the former implicature was supposed to arise in the first

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29 Thanks to an anonymous referee for impressing this point upon me.
place (recall the failure of the ‘competition story’), it gives us little guidance as to why a similar implicature fails to arise in the Jack case.

So the explanatory weakness of the future normality view here is not a reason to prefer one of its rivals. This is important because it means that this limitation of the future normality view is still consistent with our claim that that view is the most promising of the ones we’ve been considering.

The second point I want to emphasize is that this limitation of the future normality view should not really be all that surprising. For as the post-Gettier literature in epistemology reveals, we are not very good at constructing counterexample-free epistemological theories that always yield clear independent explanations of why case $X$ is a case of knowledge when similar case $X'$ is not. Once we reflect on that point, it is not too surprising that we should sometimes struggle to explain why exactly a particular case of easy foreknowledge is a case of easy, rather than stable, foreknowledge, and conversely. This is unfortunate, but it may simply be our lot in epistemology. Moreover, this concession does not make the future normality view vacuous. For we have already seen that the theory makes a number of non-trivial predictions concerning various structural aspects of knowledge. For example, the theory predicts that knowledge can be lost simply by moving through time, that it cannot be gained simply by moving through time, and that it can be retained as one moves through time.\footnote{My general perspective on what epistemological theories might hope to achieve is strongly influenced by Williamson (2000, 30-31, 100) and Williamson (2009, 305–307).}

7 Objections and replies

7.1 Must, counterfactuals, and entailment

Recall our division of views into skeptical and anti-skeptical. An anti-skeptical view is one that holds that Andy knows, on Saturday morning, the Beth enjoys the dish, whereas skeptical views deny this. Both the epistemic and the modal views are skeptical in this sense; the implicature view is anti-skeptical. Here we consider an objection that targets any skeptical view, the epistemic view included.

Recall that although Andy isn’t in a position, on Saturday morning, to flat-out assert that Beth enjoyed the dish, he is in a position to say that she must have enjoyed it. But according to a well-known view about epistemic must, it is factive: must $\phi$ entails $\phi$. If that’s right, then Beth must have enjoyed the dish entails Beth enjoyed the dish. And given that knowledge is the norm of
assertion, if Andy is in a position to assert that Beth must have enjoyed the dish, he presumably knows that she must have enjoyed it. And if he knows this, then it seems that he’s in a position to infer that Beth did enjoy it. Suppose he preforms this inference. Then—assuming knowledge is closed under competent deduction—it should follow that he knows that Beth enjoyed the dish. If that line of reasoning is correct, then it suggests that whatever it is that explains why Andy isn’t in a position to assert that Beth enjoyed the dish, it isn’t his lack of knowledge. For that argument seems to show that Andy does know this—or could easily come to know this by performing a simple deduction. But even if Andy were to perform this inference, he wouldn’t be in a position to say, on Saturday, that Beth enjoyed the dish.31

This is perhaps the most serious challenge to any skeptical view. The reason I say this is that there are powerful arguments for the claim that must is factive. That said, that claim is still quite controversial in the literature, and many philosophers and linguists reject it, quite independently of the issues under discussion in the present essay. So one way to resist this argument is to reject the claim that must is factive. Of course, it is not enough merely to reject that claim; one would want to examine whether there is a non-factive theory of must that can accommodate the data that has been used as evidence in favor of the claim that must is factive. That task is beyond the scope of this essay, though I do hope to pursue it future work.32

I have one more general remark to make about this, but let me first examine another argument in this vein, one that uses not must but a counterfactual conditional. Suppose we alter the Beth case so that Andy does not know whether or not Beth will make it home in time to eat the dish he has prepared for her. On Saturday morning, he then comes to believe, for reasons we needn’t enter into, that she probably didn’t eat it. In this scenario, it seems acceptable for Andy to say:

(11) Beth would have enjoyed that dish if she had eaten it.

The story continues: Suppose now that Andy learns, contrary to what he suspected, that Beth did in fact eat it. Then assuming, as is standard, that counterfactual modus ponens is a valid form of inference, Andy should be able to infer, and so come to know, that Beth enjoyed the dish. And

31 Thanks to an anonymous referee for raising this challenge, along with the problem involving counterfactuals discussed below.
32 von Fintel and Gillies (2010) highlighted the question of whether must is factive, and defended an affirmative answer; see also von Fintel and Gillies (2021). Non-factive views of must are developed in Veltman (1985), Kratzer (1991), and Lassiter (2016), among others.
yet even if he were to perform this inference, he still wouldn’t be in a position to assert that Beth enjoyed the dish. So his inability to assert that, the objection goes, does not appear to be explained by his lack of knowledge.

In this case, it seems to me that the advocate of a skeptical view should not deny the theoretical principle being appealed to—counterfactual *modus ponens*—but should instead deny that Andy’s knowledge of that counterfactual survives his learning that its antecedent is true. That this should be so would not, I think, be that surprising, given that we know that learning \( \phi \) often undermines one’s rational confidence in the counterfactual *If \( \phi \), \( \psi \)*. Consider this example:

\[ (12) \text{ If Oswald hadn’t shot Kennedy, Kennedy would have celebrated Thanksgiving that year.} \]

I strongly suspect that this counterfactual is true (Kennedy died only days before Thanksgiving in 1963). But were you to present me with convincing evidence that Oswald didn’t shoot Kennedy, I would not conclude that Kennedy celebrated Thanksgiving in 1963 after all, since I would remain quite sure that Kennedy was dead by then. Instead, I would become much less confident in (12).

I think there is more to be said about this, for the cases here are admittedly rather different. But there is still a general lesson to extract from the Kennedy example, which is that one’s body of evidence might initially support a counterfactual conditional, but fail to support it once one learns that its antecedent is true. If that is generally true, then it should not be that surprising if one could know a counterfactual, and then lose that knowledge upon learning that its antecedent was true.

Does the claim that Andy loses knowledge of (11) after learning that its antecedent true conflict with pre-theoretic judgment? It is not clear that it does. For it is not that easy to directly assess the question of whether Andy knows that counterfactual once he learns that its antecedent is true. For note that, on anyone’s view, Andy wouldn’t be disposed to assert it, since, certain well-known cases aside, we do not standardly assert counterfactuals when we believe their antecedents to be true. So it is not clear how costly it is to maintain that Andy no longer knows that counterfactual once he learns that its antecedent is true. That said, it would be nice to provide some independent motivation for the claim that Andy loses his knowledge of this counterfactual in the way that I am suggesting.

Clearly there is more to be said about the details of each of these cases, but let me close this
discussion by adding one final observation. Suppose we regard it as a cost of the epistemic view that it forces us to deny that *must* is factive and that it forces us to hypothesize that Andy loses knowledge of (11) once he learns that its antecedent is true. Whether or not that motivates rejecting the skeptical approach entirely depends in part on what the alternatives are. But note that any alternative view—any anti-skeptical view—is likely to come with its own costs. For as we noted in Section 3, it seems appropriate for Andy (in the original case) to ask Beth, on Saturday morning, whether or not she enjoyed the dish. If that judgment is accepted, then anyone who holds that Andy knows that Beth enjoyed the dish will have to reject a plausible norm on inquiry.

Thus, there appears to be a very general dilemma that any view must contend with. If we say that Andy does not know, on Saturday, that Beth enjoyed the dish, we seem pressured into denying the factivity of *must* and into making various non-obvious claims about knowledge of counterfactuals. But if we go the other way and say that Andy *does* know this on Saturday, we come under pressure to deny plausible norms concerning deliberation and inquiry. Thus, it seems doubtful that there will be a completely ‘cost-free’ solution to our puzzle. Our task then is to consider various theoretical packages and compare then on the standard grounds of empirical coverage, simplicity, elegance, etc. We have, of course, yet to complete this task. But as things stand, the future normality view seems to be in better shape than the one anti-skeptical view we’ve considered, the implicature view, for reasons already given. That being said, I recognize that these objections—perhaps the point about *must* in particular—might motivate some readers to seek an alternative anti-skeptical account of our puzzle. The present discussion at least clarifies some of the challenges facing those who would undertake that project.

7.2 Future normality, inquiry, and deliberation

It might be conceded that if knowledge is governed by the Rule of Future Normality, then we can explain what is going on in cases like the Beth case. But how plausible is it, really, that knowledge should be subject to a rule like this one? Is there any independent motivation for thinking that possibilities with abnormal futures can be ignored when assessing what a given agent knows, whereas possibilities with abnormal pasts cannot be ignored in this way? Why is a past-future asymmetry built into our concept of knowledge in this way?\(^{33}\)

\(^{33}\)Thanks to an anonymous referee for pressing me to think about this.
I shall attempt to respond to these questions presently, but I first want to point out that it isn’t clear whether this really is something that a defender of the future normality view needs to respond to. For we have already given several arguments in favor of the future normality view. That view predicts that knowledge can be lost simply by moving through time, and so predicts that we should encounter cases like the Beth case. The view also predicts that knowledge cannot be gained simply by moving through time, and so also predicts, apparently accurately, that we should not encounter cases in which someone gains the license to assert something simply by moving through time. It also predicts, again correctly, that we should encounter cases of stable foreknowledge, cases like the Jack case. The view also assigns plausible assertability conditions to sentences about the future, and thereby explains some of the appeal of rival views.

Isn’t that enough? Why does the future normality view need to be independently motivated? And what does that mean anyway? That it ought to be motivated independently of all of the foregoing arguments? But why think that? The objector seems to be holding the future normality view to an excessively demanding standard. But even if that’s right—even if the tenability of the future normality view does not hang on our ability to answer the objector’s question—that question is interesting in its own right. I shall thus close by proposing a tentative answer to it.

If the future normality view is true, then we use the word *knows* to pick out a relation $K_1$ that is future-biased: it is, in a certain sense, easier to bear $K_1$ to $p$ when $p$ concerns one’s future than it is to bear $K_1$ to $p$ when $p$ concerns one’s past or present. But it seems that we might have used *knows* in a closely-related, but slightly different, way: to pick out a relation $K_2$, where $K_2$ is like $K_1$ except that it is not future-biased in this way. So one stands in $K_2$ to a proposition $p$ at time $t$ just in case $p$ is true in all relevant possibilities uneliminated by one’s evidence at $t$, but ‘relevance’ here is not subject to our Rule of Future Normality. $K_2$-relevance would be what we earlier called *prima facie relevance*, determined only by the sorts of factors that relevant alternatives theorists have traditionally countenanced.

Assuming that we do use *knows* to pick out a future-biased relation like $K_1$ rather than an egalitarian relation like $K_2$, why is this so? Are there any important roles that knowledge ascriptions and denials play that they could not play if *knows* picked out $K_2$ rather than $K_1$? Of course, these questions have a trivial answer: if *knows* picked out $K_2$ rather than $K_1$, knowledge ascriptions and denials could not be used to ascribe and deny $K_1$-states. But do they have a non-trivial answer as
well? Is there anything else we do with knowledge ascriptions and denials that we could not do if knows picked out $K_2$ rather than $K_1$?

Earlier we discussed the fact that knowledge ascriptions and denials play a role in our assessment of practical reasoning and inquiry:

**DELIBERATION NORM**

One may use $p$ as a premise in one’s practical reasoning iff one knows $p$.

**INQUIRY NORM**

One may inquire into the question of whether $\phi$ iff one does not know whether $\phi$.

It seems to me that knowledge ascriptions and denials could not play both of these roles if knows picked out an egalitarian relation like $K_2$ rather than a future-biased relation like $K_1$. The reason I say this is that it seems that it is sometimes perfectly legitimate to treat a question as settled at one time and then re-open it at a later time, even when one’s epistemic situation hasn’t changed in any relevant way. More specifically, it is sometimes permissible to treat a question about the future as settled when it is a question about the future, and then re-open that question at a later time, once that question becomes a question about the past, even when one’s epistemic situation has not changed. One treats a question as settled, in the relevant sense, just in case one no longer inquires into that question and one is disposed to use a particular answer to that question as a premise in one’s practical reasoning. One re-opens a question at a time $t_1$ just in case one treated the question as settled at some earlier time $t_0$, and one no longer treats it as settled at $t_1$.

To appreciate the point, imagine a creature $C$ who lives in an environment that is in some ways hospitable, in some ways hostile. Imagine that $C$ is trying to reach a decision about where to look for food on a particular occasion $t_0$. She needs to consider where food is likely to be found, and where predators are not likely to be found. In the course of this deliberation, it may make sense for $C$ to treat a particular question

*whether there will be a predator of kind $K$ in location $L$ at time $t_1*

as settled in the affirmative (where $t_1 > t_0$). We may suppose that her past evidence supports this hypothesis fairly strongly, and that a predator of kind $K$ will almost certainly be prowling around $L$ at $t_1$ unless something abnormal or unlikely happens between $t_0$ and $t_1$. Furthermore, we may
suppose that, for various reasons, it will complicate C’s reasoning about what to do if she leaves this possibility open (even leaving it open and assigning it a low probability may complicate her deliberative task). There are many predators and many locations to keep track of, and given C’s cognitive limitations, she cannot quickly and efficiently come to a decision about where to seek food if she does not treat some such questions as settled one way or the other. Let “k(t₁)” be an ambiguous sign that may stand either for the tenseless sentence there is a predator of kind K at location L at time t₁ or for the proposition that sentence expresses. At t₀, C uses k(t₁) as a premise in her practical reasoning, and let us suppose that it is permissible for her to do so.

Now suppose C eventually reaches a decision about what to do: she decides to look in location L’ for food (L’ ≠ L). Things go well for her: she finds food in L’ and does not encounter any predators. Furthermore, she was right that a predator of kind K was in location L at t₁, and so she was wise to avoid that area. Now, even though she has achieved her goal, it may make sense for C to re-open the question, at time t₂ > t₁, of whether there was indeed a predator of kind K in location L at t₁. It may make sense for her to re-open this question even if she hasn’t gained or lost any relevant evidence, even if the practical stakes haven’t changed, even if the salient possibilities of error haven’t changed. For she might hope to obtain stronger evidence as to whether there was indeed such a predator at that location at that time. Although obtaining such evidence may not be immediately practically relevant for C, it may well result in her getting a more accurate picture of the relevant predators’ habits, and thereby promote her long-term prospects for survival. More generally, we can suppose that having a general practice that involves sometimes treating a question about the future as settled, and then re-opening that question at a later time is a good one for creatures like C to have, a practice that is reasonable for them to have given their goals, their cognitive limitations, and their environment.

Now suppose we accept that it was permissible for C to employ k(t₁) as a premise in her practical reasoning at t₀, and also permissible for C to inquire into whether k(t₁) at t₂. And imagine that knows picked out an egalitarian relation K₂, a relation that C bears to k(t₁) at t₀ iff she bears it to k(t₁) at t₂. In that case, knowledge ascriptions and denials would not be able to play the role they in fact play in assessing deliberation and inquiry. For suppose we say that C bears K₂ to k(t₁) at t₀. Then she bears K₂ to k(t₁) at t₂. In that case, it would be true to say, C knows k(t₁) at t₂, but she may nevertheless inquire into whether k(t₁). Thus, the sentence expressed by INQUIRY NORM
would be false in that situation, and knowledge ascriptions would not be able to the role they in
fact play in assessing inquiries. A parallel argument shows that if C does not bear K_2 to k(t_1)
at t_0, then the sentence expressed by DELIBERATION NORM would be false, and knowledge denials
would be able to play the role they in fact play in assessing instances of practical deliberation.

Thus, the fact that knows picks out a future-biased relation is not a mere linguistic quirk; this
feature of knows appears to be intimately related to two of the central social functions of knowledge
ascriptions and denials.

While I think the foregoing argument is basically correct, there is a hole in it that needs filling.
The problem is that there is arguably one egalitarian relation that could play the needed role.
For suppose that knows behaved as the ‘available evidence’ theory of Section 5 envisions, and let
K_3 be the relation that knows would pick out under that supposition. In that case, it would the
permissibility of closing and then re-opening a question would not obviously conflict with the role
of knowledge ascriptions and denials in assessing inquiry and deliberation. For in that case, C
might bear K_3 to k(t_1) at t_0, but not at t_2, since the evidence available to C bearing on whether
k(t_1) might have increased sufficiently between t_0 and t_2. So why does knows express K_1 rather
than K_3?

Let me close by very briefly sketching an answer to this question, an answer whose proper
elaboration I leave for another occasion. It seems to me that, once properly spelled out, the
available evidence approach is likely to conflict with the claim that that knowledge is closed under
competent deduction. To see why I say this, suppose that you know p in a situation in which there
is not a great deal of evidence available for p. Suppose further that there is a great deal of available
evidence for some other proposition q, but that you possess none of that evidence. In that case, it
would seem to follow that there is a great deal of evidence for p ∨ q that you do not possess. Now
suppose you infer p ∨ q from p. You know p; you inferred p ∨ q from p; but are you guaranteed to
know p ∨ q? It is not obvious that the available evidence approach will secure an affirmative answer
to this question. For it seems possible that you might still fail to know p ∨ q, for the reason that
you may not possess a sufficient amount of the available evidence.

Of course, to really make this argument stick, we would need to spell the available evidence
view out in more detail; I believe that once this is done, the threat here is real. In any case,
suppose this is correct, and that if knows picked out K_3, knows would express a relation that isn’t
closed under competent deduction. In that case, if knows picked out $K_3$, it would again be unclear whether knowledge ascriptions and denials could play the roles they in fact play in our lives. For example, it seems that if $x$ knows $p$, and $x$ competently deduces $q$ from $p$, then $x$ may use $q$ as a premise in her practical reasoning. Suppose you know that if the temperature in the room drops below 65F, you may turn on the heat. You check the thermometer, and it reads 60F. You deduce from known premises that you may turn on the heat. That now seems like a premise you can use in your practical reasoning. But if knowledge isn’t closed under competent deduction, you may not know that you may turn on the heat. In that case, it would be true for me to say to you, You may use the proposition that you may turn on the heat as a premise in your practical reasoning even though you don’t know that proposition. In that case, the sentence expressed by deliberation norm would be false, and knowledge denials would be able to play the role they in fact play in assessing instances of practical deliberation.

Appendix: The modal view and the epistemic view

This appendix formalizes the modal view (Section 4) and the epistemic view (future normality version, Section 6), and discusses some of the claims appealed to in Section 6.4. The two theories take the form of alternative semantic theories for a common language $\mathcal{L}$.

**Definition 1.** The *vocabulary* of $\mathcal{L}$ consists of atomic formulas $p, q$, etc., time nominals $i, j$, etc., and the logical symbols: left and right parentheses, the truth-functional connectives $\neg, \wedge$, a knowledge operator $K$, a future normality modal $N$, and for each time nominal $i$, three temporal operators $P_i, F_i, A_i$.

**Definition 2.** The *formulas* of $\mathcal{L}$ are defined as follows:

1. Each atomic formula is a formula of $\mathcal{L}$.

2. If $\phi$ and $\psi$ are formulas of $\mathcal{L}$, and $i$ is a time nominal, then the following are also formulas of $\mathcal{L}$: $\neg \phi, (\phi \wedge \psi), K\phi, N\phi, P_i\phi, F_i\phi, A_i\phi$.

3. Nothing else is a formula of $\mathcal{L}$.

Both theories use the same definition of a model; they diverge on the definition of truth relative to a model and a point of evaluation.
Definition 3. A model for $\mathcal{L}$ is a tuple $\mathcal{M} = \langle W, T, <, \approx, N, R, I \rangle$ consisting of:

1. a non-empty set $W$ of worlds,
2. a non-empty set $T$ of times,
3. a strict total order $<$ on $T$ (the earlier-than relation),
4. a function $\approx$ from $T$ into $\mathcal{P}(W \times W)$ meeting the following conditions:
   (i) for all $t \in T$, $\approx_t$ is a binary equivalence relation on $W$, and
   (ii) if $w \approx_t w'$ and $t' < t$, then $w \approx_{t'} w'$,
5. a function $N$ from $W \times T$ into $\mathcal{P}(W)$ subject to the following conditions:
   (i) for any $w, t$, $N_{w,t}$ is a non-empty subset of $\{ w' : w \approx_t w' \}$,
   (ii) if $t < t'$, $w' \in N_{w,t}$, and $w \approx_{t'} w'$, then $w' \in N_{w,t'}$, and
   (iii) if $t < t'$, $w \in N_{w,t}$, and $w' \in N_{w,t'}$, then $w' \in N_{w,t}$,
6. a function $R$ from $T$ into $\mathcal{P}(W \times W)$ meeting the following condition:
   
   for all $t \in T$, $R(t)$ is a reflexive binary relation on $W$,
7. an interpretation function $I$ that assigns to each time nominal $i$ an element $I(i)$ of $T$, assigns to each atomic formula $p$ a function $I(p)$ from $W \times T$ into $\{0, 1\}$, and meets the following condition:

   if $w \approx_{t'} w'$ and $t \leq t'$, then $I(p)(w, t) = I(p)(w', t)$, for all atomic formulas $p$.

For the sake of readability, we typically write $i$ for $I(i)$.

For any model, world $w$ and time $t$ in that model, let:

$$R(w, t) = \{ w' \in W : wR(t)w' \}.$$ 

Since interaction between subjects plays no role in our discussion, subjects are not elements of the model. We can think of these models as being given relative to an arbitrary fixed subject $x$. Given our fixed subject $x$, $R(w, t)$ is intended to represent $R(w, t, x)$, the set of prima facie alternatives for $x$ at $t$ in $w$. 

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The difference between the epistemic theory and the modal theory is here represented as a
difference in the recursive semantics, but this is localized to the clause for the future operator.

**Definition 4.** Let \( \phi^M_{m,w,t} \) be the truth value, according to the modal view, of a formula \( \phi \) of \( L \) relative to a model \( M = \langle W,T,<,\approx,N,R,I \rangle \), a time \( t \in T \), and a world \( w \in W \). We define this notion as follows:

(i) \( \lbrack p \rbrack_M^{M,w,t} = 1 \) iff \( I(p)(w,t) = 1 \), where \( p \) is atomic

(ii) \( \lbrack \neg \phi \rbrack_M^{M,w,t} = 1 \) iff \( \lbrack \phi \rbrack_M^{M,w,t} = 0 \)

(iii) \( \lbrack (\phi \land \psi) \rbrack_M^{M,w,t} = 1 \) iff \( \lbrack \phi \rbrack_M^{M,w,t} = \lbrack \psi \rbrack_M^{M,w,t} = 1 \)

(iv) \( \lbrack \neg \phi \rbrack_M^{M,w,t} = 1 \) iff for all \( w' \in W \), if \( w' \in N_{w,t}, \lbrack \phi \rbrack_M^{M,w',t} = 1 \)

(v) \( \lbrack K \phi \rbrack_M^{M,t,w} = 1 \) iff for all \( w' \in W \), if \( w' \in R(w,t) \cap N^*(w,t), \lbrack \phi \rbrack_M^{M,w',t} = 1 \)

(vi) \( \lbrack A_i \phi \rbrack_M^{M,t,w} = 1 \) iff \( \lbrack \phi \rbrack_M^{M,i,w} = 1 \)

(vii) \( \lbrack P_i \phi \rbrack_M^{M,t,w} = 1 \) iff \( i < t \) and \( \lbrack \phi \rbrack_M^{M,i,w} = 1 \)

(viii) \( \lbrack F_i \phi \rbrack_M^{M,t,w} = 1 \) iff \( t < i \) and for all \( w' \in W \), if \( w' \in N_{w,t}, \lbrack \phi \rbrack_M^{M,i,w'} = 1 \)

**Definition 5.** Let \( \phi^e_M^{M,w,t} \) be the truth value, according to the epistemic theory (future normality version), of a formula \( \phi \) of \( L \) relative to a model \( M = \langle W,T,<,\approx,N,R,I \rangle \), a time \( t \in T \), and a world \( w \in W \). The first seven clauses of this definition are the same as those in the previous one, replacing the subscripted “\( m \)” on double-brackets with a subscripted “\( e \)” throughout; the only difference is the final clause, which goes as follows:

(viii) \( \lbrack F_i \phi \rbrack_M^{M,t,w} = 1 \) iff \( t < i \) and \( \lbrack \phi \rbrack_M^{M,i,w} = 1 \)

The discussion of Section 6.4 relied on the following claim, which we called **equivalence**:

**Proposition 1.** For any formula \( \phi \), time nominal \( i \), and any model \( M = \langle W,T,<,\approx,N,R,I \rangle \), \( w \in W \) and \( t \in T \):

\[
\lbrack \neg \phi \rbrack_M^{M,w,t} = 1 \text{ iff } \lbrack \neg \phi \rbrack_M^{N,w,t} = 1.
\]

\(^{34}\)Recall that \( N^*(w,t) = \{ w' : w' \in N_{w,t} \} \cup \{ w \} \).
This can be proved by induction on the complexity of formulas; the proof is omitted for the sake of brevity. In that same section, we also appealed to knowing the future; that claim follows from the following more general proposition:

**Proposition 2.** For any model $M = (W, T, <, \approx, N, R, I)$, $w \in W$, and $t \in T$:

$$\text{if } [\phi]^M_{e,w,t} = 1, \text{ then if } [\mathcal{K}N\phi]^M_{e,w,t} = 1, [\mathcal{K}\phi]^M_{e,w,t} = 1.$$

**Proof.** Suppose $[\phi]^M_{e,w,t} = [\mathcal{K}N\phi]^M_{e,w,t} = 1$. Let $w'$ be any world in the model in $R(w,t) \cap N^*(w,t)$. It will suffice to show $[\phi]^M_{e,w',t} = 1$. Either $w' = w$ or $w' \neq w$. If $w' = w$, then we have $[\phi]^M_{e,w',t} = 1$, since we have $[\phi]^M_{e,w,t} = 1$. So suppose $w' \neq w$. Then since $w' \in N^*(w,t)$, $w' \in N_{w',t}$. And since $[\mathcal{K}N\phi]^M_{e,w,t} = 1$, $[\mathcal{N}\phi]^M_{e,w',t} = 1$. So for all $w'' \in N_{w',t}$, $[\phi]^M_{e,w'',t} = 1$. Since $w' \in N_{w',t}$, we have $[\phi]^M_{e,w',t} = 1$. 

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