

Back To The Open Future

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Abstract

Many of us are tempted by the thought that the future is open, whereas the past is not. The future might unfold one way, or it might unfold another; but the past, having occurred, is now settled. In previous work we presented an account of what openness consists in: roughly, that the openness of the future is a matter of it being metaphysically indeterminate how things will turn out to be. We were previously concerned merely with presenting the view and exploring its consequences; we did not attempt to argue for it over rival accounts. That is what we will aim to do in this paper.

In this paper, we defend the view that the open future is a kind of metaphysical indeterminacy. We begin (§1) by articulating two key desiderata which any account of the open future needs to accommodate. We then briefly outline our own view and show that it meets these desiderata (§2), before turning our attention to rival accounts of the open future, arguing that they either cannot accommodate the desiderata or incur highly objectionable costs in doing so (§3). Finally, we consider objections to our view (§4), in order to argue that our view does not incur similar costs. We conclude that our account of the open future is preferable to its rivals.

1. What Openness Requires

Central to the open future is the following thought:

Open Future: There are multiple possible ways our future might go.

Here are two desiderata we think must be captured by any theory of the open future.

Desideratum 1: The ‘might’ in Open Future cannot be merely epistemic. The open future theorist is not making the simple and uncontroversial point that for all we know such-and-such might happen in the future but that for all we know it might not. That’s almost certainly true (for many a ‘such-and-such’), but the open future theorist claims something more radical: that there’s genuine ontological openness in how things might turn out. So Desideratum (1) is that Open Future must be a metaphysical claim, making use of a metaphysical ‘might’. Our account of how the world is *in and of itself* should respect the fact that there are multiple possible futures.

Desideratum 2: The modal claim in Open Future, while not merely epistemic, is also not merely the claim that there are multiple metaphysically possible ways that the complete history of our world *could have been*; it is not even the claim that there are multiple metaphysically possible ways that the complete history of our world could have been *given* the actual history of our world so far. Again, at least given certain background assumptions (that the laws of our world are not deterministic, e.g.), this is pretty uncontroversial. But the open future theorist is claiming something more radical. It's not that there is a way our future actually *is* but that there are different ways it *could* have been (even given the same history up until now); it's that there actually are now multiple possible ways our future could turn out to be.

So to satisfy both desiderata, the open future theorist needs to make sense of the metaphysical (non-epistemic) possibility of there being multiple futures without it reducing to the mere metaphysical possibility of there being multiple ways the world could have been. The possibilities must be in reality, to satisfy the first desideratum, but to satisfy the second desideratum they must be possibilities for how a single reality might turn out to be rather than possibilities concerning alternative ways it could have been.

We grant that there are legitimate projects that do not aim to capture those two desiderata. One might be motivated to offer a deflationary account of the openness of the future: i.e. to account for ordinary talk about the future being open, but to explain this away as a merely epistemic phenomenon, or as merely making a claim about the space of metaphysically possible worlds – of ways things might have been. We're not going to argue against such projects here. Our concern is with what the best theory of genuine openness is. *If* you think there is a genuine phenomenon of the future being open – that there are multiple genuinely possible ways our history could go, and that this is not simply a matter of it being metaphysically possible that our history be different from how it actually is – then what is the best metaphysic to capture this claim?

2. Our View: The Open Future as Indeterminacy

2.1 The Basics

In Barnes and Cameron (2009) we advanced the thesis that the open future is a matter of it being *metaphysically indeterminate* what will happen: i.e. that at least some future contingents are metaphysically indeterminate in truth-value.¹ Here's a way of picturing this. If the future is open in a world *w* at time *t*, then there is a set of complete histories for *w* representing how *w* could be atemporally, given what has happened up to *t*. These atemporal histories all agree on what happens up to *t*. They disagree on what happens after *t*. It's indeterminate which of these

¹ A somewhat kindred view is defended in Greenough (ms.).

histories is the complete atemporal description of w 's history, because it's indeterminate what will happen in w . But determinately, one and only one of them is the complete atemporal description of w . At the last moment of w 's existence, there will be a single history that 'gets it right'. But at time t , it's indeterminate which of the many atemporal world histories compatible with what has happened so far is the right one.

Importantly, this model allows us to uphold both excluded middle and bivalence.² Suppose it's indeterminate whether there will be a space battle next millennium. For us, this means that there's an atemporal history consistent with what's happened so far in which a space battle occurs, and one in which a space battle fails to occur.³ But though it's indeterminate which of these two atemporal histories is the actualized history of our world, it's determinate that our world has a unique history which is actualized. And all candidates for being the actualized history of the world either contain a space battle or they don't. So it's determinately the case that there either will be a space battle or there won't be, even though it's indeterminate which. Likewise for truth. According to every candidate history it's either true that there's a space battle or false that there's a space battle. So 'There will be a space battle' is determinately either true or false – it's just indeterminate which.

2.2 A Complication

An immediate clarification to the above is necessary. We don't want to claim that *any* case of a future contingent's lacking a determinate truth-value is a case of the future's being open. Perhaps the persistence conditions of persons are such that there can be times when it is metaphysically indeterminate whether some hunk of matter is Robbie. If so, the future contingent claim that Robbie will exist at that time (assuming there are no other candidates to be him around at that time) is, now, metaphysically indeterminate in truth-value. But this doesn't seem like a case of the future being open. It could be perfectly settled what is going to happen – it's just that it's unsettled whether what will definitely happen involves Robbie. There aren't multiple possible futures here – there's one settled future, but it's not settled whether Robbie will be around to enjoy it.

How can we delineate a future contingent's being metaphysically indeterminate as a result of the future's being open from these other cases? We suggest the following. Metaphysical indeterminacy of future contingents is a case of the future's being open just in case it is indeterminacy that will be resolved. It's indeterminate whether Robbie will exist at t – and come

² For further details on the theory of indeterminacy being used see Barnes (2010a) and Barnes and Williams (2011).

³ What are these 'histories'? We don't care very much. In our (2009) we specifically characterize them as ersatz possible worlds, and we think that's a helpful way of thinking about them. But you could just as easily think of them as sets of sentences, or ideas in the mind of an atemporal deity, or whatever. They're a useful tool that helps clarify points about excluded middle and bivalence, but they aren't any part of the story about what it is to be indeterminate or unsettled.

t, it will *still* be indeterminate whether Robbie exists. Whereas while it is now metaphysically indeterminate whether or not there will be a space battle next millennium, come the next millennium this indeterminacy will be resolved: depending on how the future unfolds, it will be determinate that there is a space battle or it will be determinate that there is not.

How to make this thought precise? A natural first shot is: the future is open with respect to some future contingent p iff it's now metaphysically indeterminate whether p but it will be determinate whether p. But care is needed; consider two plausible claims:

P: It's open whether or not there will be a space battle next millennium.

Q: It's open whether or not there will be a space battle occurring some time between the year 3001 and the year 4000.

The current proposal deals with Q well enough. Q is true now because it's (now) indeterminate whether or not there will be a space battle some time within the relevant time-period and because come the year 4000 it will then be determinate one way or another whether a space battle occurred during that period. But consider P, which is surely true if Q is. On the current proposal, P is true because it's *presently* indeterminate whether there will be a space battle next millennium, but it *will* be determinate one way or the other. But what is the 'it' that will be determinately true or false? The proposition expressed by 'There will be a space battle next millennium'? On an A-theoretic view of tense – which many a believer in the open future will be a fan of – that sentence expresses a tensed proposition that will *never* be determinately true or false. It won't be determinate either way come next millennium (the 4th), because that very proposition will then be about space battles in the 5th millennium. Just as, for the A-theorist, the proposition expressed by 'There is now a space battle' changes its truth-value because it is sensitive to what's happening at the ever changing present, so the proposition 'There will be a space battle' never gets a determinate truth-value because it is always sensitive to what's happening in the future that we never catch up to! As time progresses it doesn't get settled, it just predicts further and further away space battles; and so if the future is always open, this tensed proposition never gets a determinate truth value. And yet P is true; and so the current proposal requires modification, or at least clarification.

We suggest the following. As we've said, we hold that whilst future contingents have no determinate truth-value, they are, determinately, either true or false. Furthermore, we hold that the truth-value they have can be revealed as time progresses and events unfold. So suppose on Friday you make a prediction: 'Aliens will invade tomorrow'. Your utterance lacks a determinate truth-value. But come Saturday, when aliens are mercifully absent, you can look back and say that your prediction was false. If it had been true, aliens would now be invading. They are not, so it was not true. Bivalence holds, so if it was not true, it was false. So since it's

determinate that aliens are not now invading, you can say that: determinately, your prediction that they would invade was false. You cannot say that it was *determinately* false: it wasn't – it lacked a determinate truth-value, because the future was open with respect to whether things would be as predicted. It wasn't determinately false, but it determinately was false.

We think that this is the mark of indeterminacy that *will* be resolved: a future contingent is a case of openness when it is indeterminate but where we will be able to look back and say what truth-value it had, given how time as a matter of fact unfolded.⁴ For consider instead your prediction in 2011 that Robbie will be around in 50 years. Now suppose in 2061 you investigate and discover that the Robbie-matter is arranged exactly such as to make it indeterminate whether Robbie exists. Then as well as it being true in 2061 that your prediction *had* no determinate truth-value, it is also true in 2061 that it is not determinate what truth-value your prediction had, and that is because the indeterminacy has not been resolved. It is indeterminate in 2061 whether Robbie exists, so there is no determinately correct answer to whether the prediction that he would exist was true.

So our final proposal is this:

Openness as Indeterminacy: The future is open with respect to some future contingent sentence S at t if and only if (1) S at t expresses a proposition that is, at t, metaphysically indeterminate in truth-value and (2) either it will be the case that, determinately, S was true, or it will be the case that, determinately, S was false. The future is open simpliciter iff there is some future contingent S such that the future is open with respect to S.

We think that Openness as Indeterminacy satisfies the two desiderata above. In accepting that the indeterminacy in question is metaphysical, we thus eschew both semantic and epistemic accounts of that indeterminacy, and this is what lets us satisfy the first desideratum. It's a genuine feature of how reality is in and of itself that it is unsettled how things will be. Furthermore, this is indeterminacy in how our world will turn out to be, not indeterminacy in how it could have been: there are facts about our world that are now unsettled, but which will be

⁴ Whether every case that meets this condition is a case of the future being open is debatable. Consider Schrödinger's cat. Suppose I am going to open the cat's box in five minutes. Someone might be tempted by the view that 'The cat will be alive in five minutes' is now indeterminate, but that in five minutes when we look in the box 'The cat is alive' will be determinately true or determinately false and, hence, it will be determinate that the prediction was true or determinate that it was false. But even if all of that is so, one might be hesitant to take this to be a case of the future being open; for, the thought might go, the indeterminacy is not to be explained by the passage of time but by the weirdness of quantum mechanics. We don't wish to get sidetracked by this issue: at the end of the day, we're interested in providing an *analysis* of 'The future is open with respect to p'. We're interested in defending the claim that openness is a species of metaphysical indeterminacy: that can be true even if there is no non-trivial way to separate those cases of indeterminacy that are cases of openness from those that are not. As long as we can say something that gets it right for the paradigm cases we think that does enough to establish a pro tanto case for taking openness to be a matter of indeterminacy.

resolved by the passage of time – we are describing how our history *is*, rather than merely describing alternatives to it, thus satisfying the second desideratum.

The cost of our view, of course, is ideological: to describe these facts, we make use of a primitive notion of metaphysical indeterminacy. Now, in fact we think there is good reason to add such a notion to your primitive ideology *anyway*, independent of considerations concerning the open future. If we're right, there's no *additional* cost in using that notion to characterize openness. But of course, we are at an ideological disadvantage to those who both (i) offer an account of openness which does not invoke primitive indeterminacy, and (ii) appeal to the familiar linguistic or epistemic accounts of the indeterminacy that arises outwith the open future. What we'll do in the next section is argue against what we take to be the main rivals to our account of openness, arguing that they either fail to meet one of the above desiderata, or that they meet them but only at a cost greater than our own.

3. Against Rivals

We will look at two kinds of rival account. The first attempts to analyze openness using modal resources, the second attempts to analyze openness by postulating a branching reality. Each view eschews adding new ideology: the former using the familiar ideology of modality, the latter complicating ontology instead of ideology. As such, each has a *prima facie* ideological advantage over our view. But we will argue that these views either fail to satisfy the two desiderata above, or they satisfy them but at an unreasonable cost.

3.1 Openness as modality

The clearest example of the first kind of account is Lewis's counterfactual analysis. He says⁵:

I suggest that the mysterious asymmetry between open future and fixed past is nothing else than the asymmetry of counterfactual dependence. The forking paths into the future – the actual one and all the rest – are the many alternative futures that would come about under various counterfactual suppositions about the present. The one actual, fixed past is the one past that would remain actual under this same range of suppositions.

In essence, the future is open because were the present different the future would be different, whereas the past is fixed because were the present different the past would remain as it in fact is.

We don't have the space to give this view the attention it deserves, but here is the essence of our complaint. Lewis recognizes, as any good account of counterfactuals must, that the truth of counterfactuals is context sensitive. One can set things up to hear it as true that had the present

⁵ Lewis (1979, p462).

been different, the past would have been also. Emphasize the improbability of p and its reliance on the improbable past events that caused it to be true and one can easily hear the truth of ‘So had the present not been p, the past must have differed’. Whether or not an assertion of a counterfactual claim is true depends on what facts we’re holding fixed. Here then is a dilemma for Lewis’s view: either there’s something special about the facts being held fixed when the counterfactuals give the right results for openness, or there’s not. If there is, then you need extra ideological resources to say what’s special about them; if there’s not, then you don’t satisfy the two desiderata.

Let us elaborate. Importantly, it is no part of the concept of openness that the future is maximally open if open at all. It should not be ruled out by an account of the open future that the future is open in some respects but not in others: our metaphysics should allow it to be open whether or not there will be a space battle next millennium, but settled that Ross will have a beer tonight. And that’s not because the laws and present state of the universe determine the latter but leave open the former. Both claims might be undetermined by the laws and current state of things, and yet one be open and the other closed as a matter of fact. At least, that is perfectly consistent with the concept of openness, so we claim.

Suppose then that we’re in a context whereby counterfactual assertions track the facts about openness in the manner Lewis suggests. It can’t just be, given the above, that that is because facts about the past are being held fixed and facts about the future are not, for that will not capture the difference between the two future contingents, one of which is open and the other closed. The future where Ross drinks a beer and the future where he abstain are both ones that would come about under some counterfactual supposition about the present, if we are not holding it fixed that Ross will drink a beer. To get the right results, we need to hold it fixed that Ross will drink a beer but not hold it fixed either that there will be a space-battle or that there won’t be, when evaluating the truth of the counterfactual claims. But why should we hold the former fixed and not the latter? It might be because we know that Ross will be having a beer, but we don’t know whether there will be a space-battle: but that would make openness a merely epistemic phenomenon, in violation of desideratum 1. There might be no reason – it could be simply arbitrary what facts get fixed, with what is open in a context depending simply on what facts are fixed in that context: but then, we think, openness is not a matter of how our reality might genuinely turn out to be but merely a matter of how it could have been given certain facts (namely, those that the context has held fixed), in violation of desideratum 2. Or it could be that there’s something special about whether Ross will have a beer that is lacked by the space-battle occurring or not. But the specialness isn’t that one fact is held fixed and the other not when evaluating the counterfactuals, for the specialness is meant to *explain* that. So in what does this specialness consist? One has to say something like: one fact is fixed by *reality*, the other not – this context has fixed the facts *correctly*. Well that’s fine; we accept that if you do this, Lewis’s counterfactual account can yield the right results. But the counterfactual account is merely

extensionally adequate, it's not capturing the metaphysics of openness. It's not open whether there will be a space battle *because* there are futures either way that would obtain under different counterfactual suppositions about the present – it's open *because* of the facts that are fixed in reality. But of course, now one needs ideology to describe this, and so the view loses what advantage it promised to have over our own. We, of course, think the right ideology to describe that is that of indeterminacy: when the counterfactuals get the openness facts right, it's because we're holding fixed the facts that are objectively determinate. Thus supplemented, Lewis's account is not a rival to our own. Un-supplemented, it fails to satisfy the desiderata.

3.2. Openness as branching

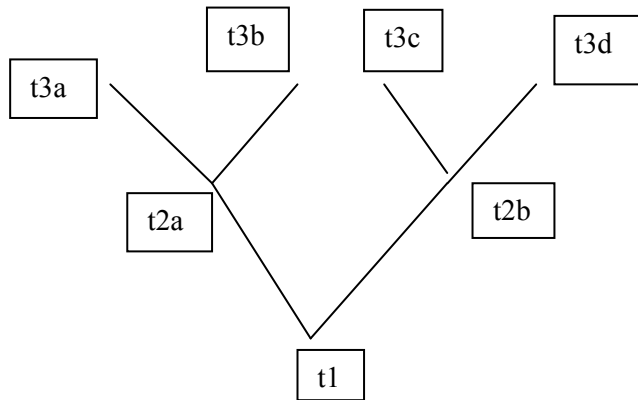
We think there is no way to satisfy the two desiderata whilst appealing only to modal resources. Let us look then at branching accounts.⁶ Branching time accounts do an admirable job of satisfying the two desiderata above. If there are literally multiple futures in existence, each bearing the relation *is later than* to our present time, then it's clear why variation across those futures is not merely an epistemic phenomenon but also not merely a matter of our world as a whole possibly having been different. And by analyzing openness in terms of variation across branches we have an account of the open future that need not invoke *recherché* ideology. However we think that branching time models are subject to serious objections which our view avoids.

There are different ways in which a branching time metaphysic can be developed; some objections we raise will apply to any branching time model, but others are specific to particular ways of developing the idea. We won't aim at exhaustiveness here, but we think we're covering the most plausible versions of branching in what follows.

Branching time need not require a tensed reality. One can have a B-theoretic branching time metaphysic, according to which time has a tree-like structure that never changes. What branches there (atemporally) are is the same from one moment to the next; furthermore, what node on the tree is *present* is not a matter of how the world objectively is, but is simply a matter of our perspective on the world. If I claim that a particular node on the tree, N, is present, then the truth-conditions of my utterance are simply that the event of my uttering that is located at N. This view is very much like standard B-theoretic eternalism; the only difference is that *being temporally distant from* is not an equivalence relation – events e1 and e2 might both be after the present, in virtue of being further up the tree, but e1 is not before, after, or simultaneous with, e2, in virtue of being located on diverging branches.

So suppose reality looks like this

⁶ These are accounts which take at face value the picture of reality suggested in, *inter alia*, Thomason (1970), McCall (1994), Belnap *et al* (2001) and MacFarlane (2003).



And suppose that space battles are located at t3a and t3b but not at t3c and t3d. Then an utterance of ‘There will be a space battle’ located at t1 is open, since space battles occur at nodes on some branches (some histories) that have t1 as a part but not on all. But an utterance of that sentence located at t2a or t2b is closed: it’s closed at t2a because it’s settled at t2a that there will be a space battle, since every branch that has t2a as a part includes a node with a space battle; and it’s closed at t2b because it’s settled at t2b that there will not be a space battle, since no branch that has t2b as a part includes a node with a space battle.

But while it is not open at t2a or t2b whether there will be a space battle, we can see that it *was* open whether there will be a space battle, since we can look to t1 which is in our past and see from there futures where space battles are occurring and futures where they are lacking. The alternative branches that, it is now settled, will never be our history still exist for us to look back on.

B-theoretic branching salvages *talk* of the open future, but we deny that there is any genuine openness on this metaphysic. This seems like a metaphysic on which it’s perfectly settled how things will be, you just don’t know whereabouts you’ll be within reality. All those future possibilities are just there, and that never changes. If this is the correct metaphysics, then it’s simply always settled that there are space battles in reality; indeed, at t1 it’s perfectly settled that there are space battles temporally beyond us. It only comes out as unsettled whether or not there *will* be a space battle because it’s unsettled which of the branches that are temporally beyond us *will* happen. But that’s not because reality is yet to determine which branch is the one that time is going to flow down, it’s only because in talking about ‘our history’ and ‘our future’ we are choosing to only talk about a small corner of reality – the branch we happen to find ourselves upon. But there’s nothing special about that branch, on this metaphysic – it’s just that it’s *our* branch. Genuine openness requires that *reality* be unsettled; openness shouldn’t arise just as a result of our parochialism. So we charge this view with violating Desideratum (1): openness is

merely an epistemic phenomenon on this view – a matter of where you find yourself on the tree, and nothing to do with reality itself.

This objection to B-theoretic branching is similar to one kind of modal irrelevance objection to Lewis's modal realism.⁷ Here is a statement of the objection from Michael Jubien⁸:

Suppose it's necessary that all A's are B's. This is supposed to mean that in every possible world, all A's are B's. So the necessity arises from what goes on in all the worlds taken together. There's nothing about any world individually, even in all its maximal glory, that forces all of *its* A's to be B's. It's as if it just *happens* in each world that all of its A's are B's, that from the strictly internal point of view of any world, it's *contingent*, a mere coincidence. . . what passes for 'necessity' is in effect just a bunch of parallel 'contingencies'.

The objection, as we see it, is this: genuine necessity and possibility can't arise out of a bunch of things just happening to be the case. Variation across different portions of reality (the 'worlds') just means that reality is interestingly non-uniform (it's just "a bunch of parallel contingencies"): it doesn't amount to the genuine possibility of things being different. You can call these things 'possible worlds' all you want, but part of the issue is why they deserve to be called so: what does variation across these portions of reality have to do with the possibility of things having been otherwise?

Similarly, it's hard to see how simply having lots more stuff temporally after the present can result in genuine openness as to what will happen. Call the branches 'futures' if you want, but part of the issue is why they should be so called: what does variation across them have to do with openness in how things will be? Lewis's reality doesn't look modal – it just looks like actuality is a lot more complicated than we thought. And the B-theorist brancher's future doesn't look open – how things will be just looks a lot more complicated than we thought.

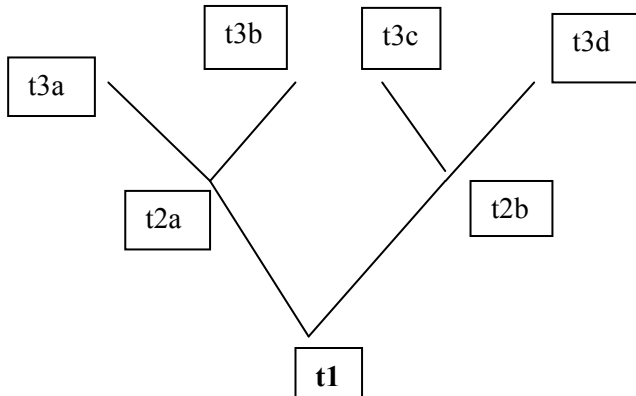
Think of these objections as merely trying to pin down intuitions. We don't expect the Lewisian modal realist to be convinced by the modal irrelevance objection; rather, what value these objections have is in pinning down a source of dissatisfaction you might be having when you have your blank stare. If you're like us, you feel some of the dissatisfaction in both cases, but more so in the branching time case. Here's why we think the thought is especially compelling in the temporal case. Central to our intuitions about openness is that there is a deep asymmetry between past and future. It's no coincidence that it's the *future* that's open and not the past: that is a consequence of the asymmetry in the very nature of time. But look at each of the branches – none of them capture that asymmetry. Each branch considered on its own looks just like a non-branching B-theoretic eternalist world, with the past and future being metaphysically on a par. But how can just having lots of things like that suddenly lead to this deep metaphysical

⁷ Lewis (1986).

⁸ Jubien (2007, p104-105).

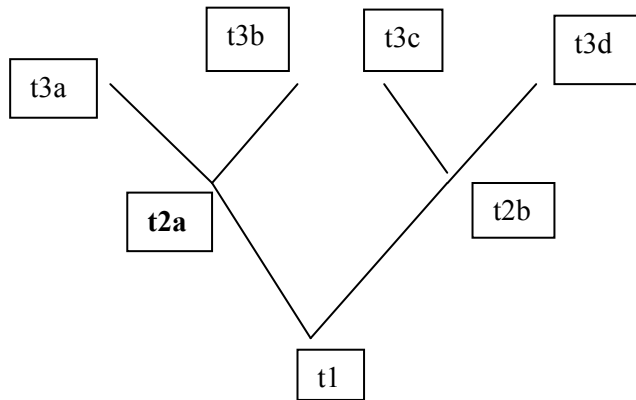
asymmetry? It can't, we say. There is no deep asymmetry⁹ between past and future if reality is like this – there is no genuine openness.

So for there to be genuine openness in reality, we think, there has to be something dynamic in the world: the B-theory will not cut it! So suppose we simply add a moving spotlight to the above view. At t1, reality looks like this



Where the bold print in the diagram signifies not merely what node we happen to be observing reality from but rather what node is objectively present. ‘There will be a space battle’ is open simpliciter (not merely relative to a node), if reality is as above. And as time progresses, the spotlight moves up the tree, determining one branch amongst many as the unique history of the world as it progresses. So suppose time moves to t2a over t2b; reality now looks thus

⁹ There is some asymmetry, to be sure. Two events, F1 and F2, can be temporally beyond me but bear no temporal relation to one another, but if two events, P1 and P2, are temporally behind me they must bear some temporal relation to each other. Our point is just that this does not capture the deep asymmetry required by genuine openness. It's not unsettled how things are temporally beyond me: it's perfectly settled that both F1 and F2 are temporally beyond me. Any unsettledness as to which event is future arises not out of an unsettledness in reality itself, but merely out of choice to only pay attention to a small portion of reality when using terms like ‘history’, ‘the future’, etc.



And now it is settled, simpliciter, that there will be a space battle; although still true that it *was* unsettled whether or not there will be a space battle.

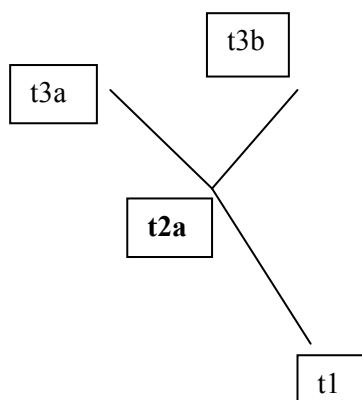
We grant that there is genuine openness on this view. It is genuinely open which of the future branches the spotlight will move to. And there is a *metaphysical* reason for restricting your attention to one branch over all the others (namely, the one that the spotlight lights up) when making judgments about what *will* happen, and so since it is open *which* branch that is, it is open what *will* happen, as a result of how reality is as opposed to merely our parochial perspective on it. This view – indeed, all the versions of dynamic branching views we will look at – satisfies the two desiderata we started with. Nonetheless, we think these views each have problems; problems enough to reject them.

Perhaps unsurprisingly, the current view inherits problems that plague the simple non-branching moving spotlight view. On the traditional moving spotlight view, it's very hard to see how you could ever be justified in thinking that you are present.¹⁰ Some time has this special metaphysical property; but how could you possibly know that it is *this* time (the one containing your reading of this sentence) that has it? Likewise, on the branching moving spotlight view, how could you possibly know which node the spotlight falls upon? And things are even worse on the branching version, for not only must we apparently remain ignorant as to whether this is the present, we seemingly cannot know if it's even a part of history. For what is to rule out reality being as in the second diagram above, and your being located at t2b? With the spotlight at t2a, it is now settled that t2b never did occur nor never will occur: history is the branch the spotlight moves down, and t2b is a node that will, it is now settled, remain forever untouched by the spotlight. So unless we can rule out our being at t2b, we are left with a very uncomfortable scepticism as to whether we are even a part of history.

¹⁰ See Braddon-Mitchell (2004).

There is another big problem that faces both views which have a static ontology, whether it be the B-theoretic branching model or the moving spotlight model, and that is that it makes it hard to see why we should care about history unfolding one way rather than another. If all the ways that history could unfold are out there, and will always be out there, then of course I have *selfish* reasons to prefer to end up on a good one, but why would I have a *moral* reason to *bring about* a good history? It's open that there will be a space battle, and you might not want there to be because it will lead to massive casualties. But while you have selfish reason to want to be on a space battle free branch, that's just like wanting to get out of the country when there's a war on. The war is still happening elsewhere, and the space battle is still happening in reality: it's just not in your country/not on your branch. Good for you, but that doesn't matter morally!

For that reason, it seems to us that the best version of the branching view has the tree change as time progresses: not just in terms of which node is present, but in terms of what branches of the tree exist. The most natural option is that as time progresses, the branches which are ruled out as being a part of history cease to exist.¹¹ So, on this view, at time t1 things look as in the first diagram above. But assuming time then progresses to t2a rather than t2b, at time t2 things will look like this:



t2a's becoming present settles that t2b, t3c and t3d never were and never will be present: they are ruled out as being parts of history, and as a result the branches containing them cease to be.

It's clear why, if this is the correct metaphysics of reality, I would have non-selfish reasons to want time to progress down one branch rather than another, for that makes a difference to how reality as a whole is. If the space-battle leads to nothing but destruction, then I should want time to progress down a space-battle free branch, since reality as a whole will then not contain such destruction. That's a major advantage over the previous views. On the other hand, this view threatens to make our decisions have *too much* moral import, for now if we do something that

¹¹ As in McCall (1994).

results in time progressing down one branch, we condemn all those people on the rival branches to non-existence. That seems hard to swallow!

What of the epistemic issues? If this is how reality is, then I at least know that it's not settled that I am not a part of history, for at all times everything that exists is either such that it's settled to be a part of history or not yet settled whether or not it will be a part of history. So no one who believes themselves to be a part of history is determinately wrong, whereas *many* people who believe that are determinately wrong on the two branching views considered previously. That is some advantage, at least. It's still not obvious how I could know that I am *present*, given that non-present nodes exist. But perhaps this view has an advantage over the moving spotlight view on this issue as well. The present, on this view, is the first node after which there is branching: *perhaps* a satisfying story could be told whereby we know we're at that point by knowing that we currently have the power of changing things.

But even if a satisfying story can be told there, the issue highlights another big problem with this version of branching. Since the present is indeed the first node after which there is branching, this view on the face of it entails that time has been closed up until now, but from now on it's open. That's bizarre: of course it should be an open possibility that this is the first moment at which the future has been open, but it shouldn't be guaranteed by the metaphysics that this is the case. To avoid such a conclusion, the believer in this view has to hold that what was the case can't simply be read off from how the tree is before the present node; she needs to invoke a *sui generis* tense operator that lets her speak of how the tree used to be, so she can say using this tense operator that there used to be multiple branches from past nodes, and hence that in the past there were multiple ways history could have gone but didn't.

Such an ideological addition is a major disadvantage to the theory; but more importantly, this threatens to undermine the advantage promised by a branching metaphysic. If reality was open prior to now, despite reality not branching before the present node, then what's to rule out reality now being closed, despite reality branching after the present node? If there are tensed facts about how the branching reality *was* that are not given by how it *is* prior to the present, then what is to rule out there being tensed facts about how the branching reality *will be* that are not given by how it is beyond the present? And perhaps one of these tensed facts concerns what branch *will be* the actual future. As soon as the believer in branching admits a *sui generis* tense operator that gives us the resources to say how the branching reality as a whole was or will be in a way that is not determined by how it *is* before or after the present node, she has to allow that it's an open epistemic possibility that there are (now) facts about which branch *will be* our history; and that is to allow that it's an open possibility that the future is not now open after all, despite the existence of these multiple branches after the present node. Now, of course, one can simply deny that there *are* such facts. But then the reason for the future's being open is not simply that there are these multiple branches; it's that together with there being no fact of the matter as to

which one will happen. But now openness is no longer being reduced to variation across the extant branches. The future's being open now involves these primitive tensed facts. And so the branching view loses the ideological benefit it was thought to have over our own. What is so much worse about there being brute facts about unsettledness – that it is metaphysically indeterminate what truth-value is had by various future contingent claims – than there being brute facts concerning which out of many branches *will* occur – that it is brutally true that no one of them is presently such that it will occur?

Let us unpack that last thought. Let's use 'WILL, p' to express the claim that p will occur in the sui generis sense of 'will' that is not to be understood in terms of how the tree is beyond the present. So now consider a particular branch, call it A. What should the branching theorist say about the claim that A WILL occur? They surely don't want to say that it is true. To single out a unique branch as the one that WILL occur is in effect to add a thin red line to the tree, and we agree with others that this is just to give up on the openness of the future.¹² Is it false, then? If so, then 'x WILL occur' should be false for all branches, x. But that's like taking all future contingents to be false: that doesn't look like it results in the future being open, it looks like it results in it being settled that nothing will happen. So maybe it's neither true nor false? But then the future being open isn't a matter of variation across branches, it's a matter of future contingents lacking a truth-value: that's Aristotelianism, and we argue against it below. So maybe it's unsettled whether 'A WILL occur' is true? But then the future being open isn't a matter of variation across branches, it's a matter of future contingents being unsettled. If unsettledness is indeterminacy, that's just our view: and if that's the view, there is no need to invoke a branching ontology. There's no need to have there literally be multiple branches such that it's not determinate which WILL occur; we should just cut out the middle-man and attribute the indeterminacy directly to the future-contingents.

We've offered objections against each of three ways of developing a branching metaphysic: objections which are specific to the particular way of developing the view. We will end this section by offering an objection to any branching view. The objection is that our view can make sense of a possibility that branching views cannot.

It seems possible that the future is open not simply in terms of *what* will happen, but whether *anything* will happen. That is, as well as it being open what will happen tomorrow, it also may be open whether or not reality will continue beyond tonight. So we should be able to make sense of there being multiple ways the future might unfold but also that it might not unfold any way because it is open – in exactly the same sense that each of those multiple futures is open – that this is the last time.¹³

¹² The thin red line view is discussed by Belnap and Green (1994), and dismissed for the same reason. See also MacFarlane (2002, p325).

¹³ Incidentally, we think this lets us add another reason to those offered in Barnes and Cameron (2009) for why the open future is compatible with determinism concerning the laws of nature. For surely the most we can get from

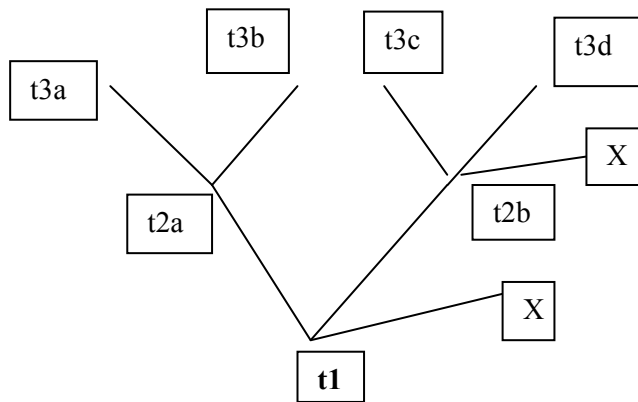
We can make sense of that. Just as it's metaphysically indeterminate whether or not there will be a space battle next millennium, so is it metaphysically indeterminate whether or not there will be a next millennium, and so metaphysically indeterminate whether *anything* will be true a millennium from now.¹⁴

But how is the branching theorist to make sense of this? The problem is that the absence of further branches from a node doesn't represent the further open possibility that nothing will happen beyond that node, it simply represents the absence of further open possibilities. (Of course, one could stipulate the reverse as part of one's theory: but then one would make the metaphysics guarantee that every time might be last time. But what we want is to be able to allow both for it being open that some time is the last time and for it being settled that it is not.) So look back to the first diagram above. Four branches diverge from t1, thus signifying that there are four ways the future might unfold from t1. What is signified by the absence of a fifth branch? That there are *only* four ways the future might unfold from t1, *not* that it might not unfold *any* way from t1 because t1 might be the last moment of history.

Now, of course you could have an extra branch on which nothing happens – a branch on which there are no space-battles, no people, no suns going supernova; but that's not the possibility of time ceasing, that's the possibility of time continuing but nothing happening. That might well be an extra way in which time might progress, but it's not the possibility we're trying to capture. Also, you can of course add to your branching diagram something which is *stipulated* to represent the possibility in question. So suppose we have:

determinism is that the laws and current state tell us how things will be at a future time if that time is reached; but the laws of nature are never going to settle that it will be reached. And so determinism will allow for at least two open possibilities: that time continues and things will be as the laws dictate, and that time stops.

¹⁴ A slight complication. We said that the future's being open is a case of metaphysical indeterminacy that will be resolved. But if it's indeterminate whether time will continue beyond today and time as a matter of fact ends tonight, that indeterminacy won't be resolved precisely because the point of resolution won't be reached. So we need to slightly amend the definition: the future's being open is a case of metaphysical indeterminacy that won't remain unresolved.



And we stipulate that a node with an X represents that the node leading to it could have been the last time. Then if things are as represented above, at t1 it was open that time wouldn't continue past that point, and likewise at t2b, but at t2a that is not open: it's only open from t2a *how* time will progress, not *whether* it will.

Well, this is fine if the point of these diagrams is just to represent how things are without aiming to give a perspicuous picture of the underlying *metaphysics*; and that's fine if, for example, all we want them for is for doing the semantics of future contingents. But our concern is with the metaphysics, and as such the above is entirely unsatisfying. What *are* the branches ending in Xs? They can't actually be additional branches like the others, because that would be for time to continue in some form, not for it to have ended. So what in reality is actually represented by this addition to the representation? We can't see a satisfying answer available to the branching theorist.

We've looked at what we take to be the most serious contenders to our view – a modal analysis of openness and branching reality account of openness – and we've argued that either they fail to meet one of the two desiderata, or they meet them at an unreasonable cost. We think our view meets both the desiderata, and that it does so without incurring objectionable costs. To argue for this, we'll now turn our attention to staving off some objections to our view.

4. Objections and replies

4.1 Primitive indeterminacy, metaphysical indeterminacy

On our view, as we've said, the open future is a type of indeterminacy – indeterminacy concerning what will happen. Indeterminacy, of course, can crop up in many other places.

Borderline cases in a Sorites series, the problem of the many, Schrödinger's cat, the continuum hypothesis: these are just a few familiar examples of indeterminacy (or at least, examples of cases which may plausibly be construed as involving indeterminacy). It's indeterminate whether the particular color patch is red, it's indeterminate whether this particular collection of atoms is identical to the table, it's indeterminate whether Schrödinger's cat is dead or alive, it's indeterminate whether the continuum hypothesis is true or false. We say that the open future is an instance of the very same basic phenomenon. If it's open whether there will be a space battle, then it's indeterminate whether there will be a space battle.

As we said above, in order for us to maintain that openness is a matter of indeterminacy while satisfying the two desiderata we started with, the indeterminacy in question needs to be metaphysical: it must be a matter of how the world is in itself that this indeterminacy obtains, and not merely a matter of imprecision in our representations of the world or ignorance in our knowledge of it. This paves the way for a potential objection. If, as some think, it is simply part of the very notion of indeterminacy that it is a semantic or epistemic phenomenon, then our view is simply a non-starter.

But we find it highly implausible that it is part of the very *concept* of indeterminacy that it is a semantic or epistemic phenomenon. *Perhaps* all indeterminacy *in fact* results from semantic indecision, e.g.; but even if that is so, that doesn't mean semantic indecision is built into our very *concept* of indeterminacy. It would be a substantive thesis about the source of indeterminacy, not a conceptual truth, that indeterminacy results from semantic indecision. The basic idea of indeterminacy – that things are 'unsettled', that they're not quite this way, but not quite that way either – is something we grasp before doing any philosophy. Whether the best account of the *source* of indeterminacy invokes semantic indecision, or a certain kind of ignorance, etc, is something you have to do a lot of philosophy to decide.

We find it plausible that there's a basic (pre-theoretic) concept of indeterminacy that doesn't admit of reduction.¹⁵ It is, then, an open question as to what the source of indeterminacy is: whether it be our linguistic practices, our epistemic limitation, or reality itself. To reject out of hand that the source of indeterminacy is (sometimes) worldly is just a dogmatic prejudice.¹⁶ To be sure, you can take it to be a *cost* to hold that the source is worldly; we agree – we conceded that in conceding that there is an ideological cost to our view. We just think it's a cost worth paying.

Resistance to metaphysical indeterminacy might well be a good reason to reject the open future thesis entirely – we won't speak to that here. But it's not a good reason for someone who *already* thinks the future is open to claim that this commitment shouldn't be characterized as indeterminacy. If you think the future is genuinely open, you're already committed to the idea that some facts about the world are genuinely unsettled, and furthermore that this unsettledness is not (solely) due to what we know or how we use our words. A commitment of this kind is unacceptable to many, and seems to be a large part of what is often found objectionable about metaphysical indeterminacy. But if – as any defender of the open future is – you're already

¹⁵ See Barnes and Williams (2011) for further discussion.

¹⁶ To be fair, while many dismiss metaphysical indeterminacy out of hand, some do actually try and argue against it. But see Barnes (2010b) as to why we are not convinced.

committed to there being some worldly unsettledness, it's unclear why this commitment is made worse by characterizing it as a kind of indeterminacy. At the very least, the onus is on the objector to explain what it is about metaphysical *indeterminacy* that's problematic in a way metaphysical *openness* (whatever that is) isn't.

4.2 Openness as indeterminacy

Suspensions of metaphysical indeterminacy aside, there are those who simply find our characterization of openness as indeterminacy implausible. Here, for example, is Matti Eklund¹⁷:

Insofar as I conceive of the future as unsettled, I conceive of it as not being the case that p and not being the case that not-p but that it will be the case that p or it will be the case that not-p, for some proposition p about the future. But if this is how to think of unsettledness here, the unsettledness is not a matter of indeterminacy.

He then adds in a clarificatory footnote¹⁸:

What I fundamentally object to is the conjunction of two claims: (a) the unsettledness of the future . . . is a matter of indeterminacy; (b) indeterminacy is to be understood as Barnes . . . understands it.

Eklund is not objecting to taking openness to be a matter of indeterminacy, per se. Rather, he thinks that to take it to be so is in tension with our preferred account of indeterminacy (that defended by Barnes, and by Barnes and Williams). On that account of indeterminacy, bivalence is upheld. When it is indeterminate whether p, either p is true or p is false, but it is unsettled which. This in contrast to accounts of indeterminacy where both the truth and falsity of p is excluded, and hence p is taken to have a third truth-value, or to simply lack a truth-value. Eklund's claim is that if the future is open, we *should* have such exclusion – a prediction about the future should not be the case, but nor should its negation. And so insofar as our preferred account of indeterminacy is correct, our account of openness in terms of indeterminacy is wrong.

Before we tackle this, we should note an oddity in Eklund's description of his own view. What kind of proposition is p in the first quotation? A future contingent like 'There will be a space battle'? If so, we understand why one might think that it's not the case that p and not the case that not-p. But what about Eklund's further claim that it *will* be the case that p or it will be the case that not-p? It *will* be the case that there will be a space battle, or it will be the case that there won't be a space battle? Surely if the openness of the future rules out that there will/won't be a space battle, it also rules out that it will be the case that there will/won't be a space battle. Why would one of the iterated future-tensed claims be true when neither simple future-tensed claim is? Perhaps instead p is meant to be a tenseless claim, like 'There is a sea battle during period t', where t is some period that happens to be in the future. But it surely isn't constitutive of the open future that neither that claim nor its negation holds. Presentists will hold that its negation

¹⁷ (2011, p. 160).

¹⁸ (2011, p. 160, fn.20).

holds in virtue of the fact that *t* does not exist; but surely presentism is compatible with the open future!

We're not just nit-picking here. We think the difficulty in making sense of Eklund's view as described points to something deeper. It's highly intuitive that there's something that will happen: that there's a history that will come to be. We can say that. There *is* a history that will come to be, it's just indeterminate what it is. But it's precisely because, on our account, indeterminacy does not exclude truth or falsity that we can say this: that there *is* some true account of how history will unfold, but that it is presently unsettled *which* out of many rival accounts is the true one. If you think that every account of how history will go is *ruled out*, on the other hand, it's hard to see – as evidenced by the above difficulty in making sense of Eklund's claim – how one can coherently hold that there's something that *will* happen – that there's some way that history *will* unfold.

The idea that both the truth and falsity of future contingents is ruled out by openness faces further difficulties. Call the view that the openness rules out the truth of both future contingents and their negations *Aristotelianism*, as this is the orthodox interpretation of Aristotle's view on the open future. A major problem for the Aristotelian view is that it doesn't seem to cohere with how we reason about future contingents. Consider the following argument from Robbie Williams¹⁹:

For a specific proposition *p*, we can measure the difference between our degree of belief in *p*, and its truth value. The truth norm for graded belief will then tell us that we should minimize this difference. For example, let $t(p) = 1$ iff *p* is true, and $t(p) = 0$ otherwise. Then define an 'alethic inaccuracy score' as $|t(p) - b(p)|$ – the absolute difference between a measure of the truth value of *p* and the degree of belief. A normative constraint on partial belief can be put as follows: one should minimize the alethic inaccuracy score of one's degree of belief in *p*. Suppose now *p* is neither true nor false, so that $t(p) = 0$ and $t(\neg p) = 0$. To minimize the inaccuracy score – i.e. to match one's beliefs as closely as possible to truth value measures – then we'd ideally like to have $b(p) = 0$ and $b(\neg p) = 0$. So if the normative scoring constraint is correct, both *p*, and $\neg p$, should be utterly rejected when *p* is indeterminate in the Aristotelian way.

But this doesn't fit at all with our reasoning about the future. If we completely reject 'We will finish the paper in time', why are we trying to? And if we have no credence in the claim that we don't finish the paper, it doesn't seem rational to worry that we won't finish the paper. For our present course of action – trying to finish the paper on time – to be rational, it seems we can't place credence zero on the claim that it will be finished on time. And if we were to reject both 'We will finish the paper' and 'It's not the case that we will finish the paper', it's not clear *what* our attitude to the future should be.

The defender of Aristotelianism could of course respond simply by denying that truth norms belief. But if they do so, they owe us an alternative explanation of what *does* norm belief.²⁰ The

¹⁹ Williams (ms.).

²⁰ And see Williams (ms.) for discussion of problems with alternative explanations available to them.

simpler thing to do is to reject Aristotelian openness, given that there are other characterizations of the open future available. One such characterization – the one we like – maintains that future contingents are a lot more like borderline cases than Eklund (and perhaps Aristotle) claim.

4.3 The Cognitive Role of Indeterminacy and Openness

The above arguments turn on the cognitive role of indeterminacy: what attitude we should have to p when we know that p is indeterminate. We're arguing against Aristotelianism on the grounds that if we have credence 1 that a future contingent is neither true nor false then we should place zero credence in both it and its negation; but it seems that we *shouldn't* place zero credence in a future contingent no matter how confident we are that the future is open in that respect. However, one might use considerations about the cognitive role of indeterminacy to argue that openness is, as Eklund maintains, not a matter of indeterminacy. In a nutshell the argument would be this: when we consider cases of indeterminacy, we always wind up in a *quandary*, but even if the future is open we are not in a *quandary* with respect to future contingents in the way that would be mandated were future contingents indeterminate. Even if indeterminacy with respect to p doesn't rule out the truth or falsity of p , so the thought goes, it rules out our having warrant for believing p , and it likewise rules out the rationality of making plans on the assumption that p . But even if the future is open, I can be warranted in believing certain predictions concerning the future, and rational in making plans based on those predictions. Thus, the ideal attitude to future contingents isn't compatible with the ideal attitude to cases of indeterminacy, and hence openness can't be a matter of indeterminacy.

So suppose the future is open with respect to whether we will eat steak for dinner tonight. On our account, it's thereby indeterminate whether we will eat steak for dinner tonight. Nevertheless, it's very *unlikely* that we will eat steak for dinner tonight, given that we're both strict vegetarians. There's a chance that we will suddenly buckle under the weight of our carnivorous instincts, sure – but it's a very small small one. So we both believe that we won't eat steak for dinner tonight. And we're both arguably *justified* in believing that we won't eat steak for dinner tonight (given that we've managed to refrain for many previous nights, and neither of us presently has a desire to eat steak tonight). And we're rational in planning on this assumption (we shouldn't go out and buy steak knives, e.g.). Contrast this to a standard case of indeterminacy – a borderline color patch, say. If it's indeterminate whether the patch is red, then it's unlikely we'd form strong beliefs that the patch is red. And if we did form such beliefs, it's hard to see how they'd be justified; not does it look rational to make plans that are only rational if the patch is red.

This objection assumes that indeterminacy is always associated with a characteristic cognitive role of uncertainty or quandary.²¹ But we are skeptical of the claim that there is such a unique

²¹ The details of how this role is characterized vary – e.g. Wright (2001, 2003a) maintains that it is a hesitance to take a view coupled with tolerance of polar views adopted by others, whereas Schiffer (2000) characterizes it as a kind of partial belief. But what is often maintained, and what we're denying, is that there is a single thing which is *the* cognitive role of indeterminacy.

cognitive role for indeterminacy. There may well be a characteristic cognitive role for borderline cases in a Sorites series. But other familiar cases of indeterminacy seem to engender different responses. Perhaps, as maintained by Wright²², a characteristic feature of our judgements about borderline cases is entitlement to either verdict. If a color patch is borderline red, and we're thus uncertain whether to say it's red or not red, we're nevertheless tolerant of polar verdicts in either direction; if someone else looks at the patch and says 'oh, that's red', they don't seem to have done anything obviously wrong, and we won't immediately correct them. But consider, in contrast, the problem of the many: we're certain there's a cat in the vicinity, and all but the metaphysicians are confident there's only one. But we're uncertain which of various different collections of molecules (all of which, if we consider them on their own merits, look perfectly cat-like) is the cat. So we've determinately got a cat, but it's indeterminate which of cat-candidate₁. . . cat-candidate_n is the cat. In this case, our judgements do *not* seem tolerant. If someone came along and said 'It's cat-candidate₄₃₁ – cat-candidate₄₃₁ and no other is the cat!' we'd be inclined to start from the top and explain the puzzle to them again, since they seem to be clearly confused.

Both borderline cases and the problem of the many, however, do look to put us in a similar type of quandary. We are undecided between polar verdicts (is red, is not red, is a cat, is not a cat) and *we have no higher credence in one verdict than we do in the other*. If this was characteristic of our response to indeterminacy, it might pose problems for the idea that the open future is a type of indeterminacy. We can easily have a high credence that we won't have steak for dinner, even though it's open (and so, on our view, indeterminate) whether we'll have steak for dinner. But we're not worried by this, because it's not the case that for all putative examples of present-directed indeterminacy we have equal credence in both polar verdicts. Or, more modestly, in some cases of present-directed indeterminacy one verdict can at least be rationally more action-guiding than the other.

Suppose that the Dark Lord Sauron has worked his malevolent enchantments on a clump of earth and left it to fester. But the process wasn't completed, and so it's indeterminate whether this clump of earth has become a troll or a goblin. Note that it's presently indeterminate whether the clump of earth is *now* a goblin or a troll, not simply indeterminate whether it *will be* a goblin or a troll. But the Dark Lord has done this many times before. Sometimes, the enchanted earth has evolved into a troll, but the vast majority of times it's become a goblin. There are many more goblins around than trolls. Aragorn is confronted with this case of indeterminacy. What should he think? It's perhaps too strong (though certainly not crazy) to say that Aragorn should think it's more likely that the enchanted lump is a goblin, or that he should have a higher credence in it's being a goblin. But here's what seems obviously right. If Aragorn is offered a choice between a weapon enchanted against goblins and a weapon enchanted against trolls, he should take the weapon enchanted against goblins; he should plan on the assumption that it is a goblin.

Contrast this with another case. Hal Jordan, The Green Lantern, is massively powerful if he's wearing his Green Lantern ring. But the ring also makes him extremely vulnerable to yellow (yes, really). Now suppose that Hal finds out that his enemies, while trying to obtain yellow weapons, have just been taken down a forced-march Sorites series between yellow and orange by the local arms dealer. Hal now realizes that he will be fighting nefarious villains equipped with

²² See e.g. Wright (2003, p94) and (forthcoming).

borderline yellow weapons. He has a choice between taking his Green Lantern ring, or taking a gun. There's no point taking both, because the ring won't let him shoot a gun (again, really); if he thinks he's going to need to use it, he should leave the ring at home. If his enemies have yellow weapons, he should take the gun, as his ring will be useless and he'd be otherwise defenceless. But if his enemies don't have yellow weapons, then he should take the ring, as he is far more powerful with the ring than with a gun, unless confronted with yellow. But since it's indeterminate whether his enemies have yellow weapons, what should Hal do? Intuitively, we think, Hal should be in a quandary in a way Aragorn is not. He should simply not know what to do, and there is no assumption such that rationality demands he plan on that assumption.

Our situation with respect to our steak-involving future is similar to Aragorn's (though perhaps less dramatic). It's open whether we'll have steak for dinner tonight, and so on our account it's indeterminate whether we'll have steak for dinner; but if someone offers to bet us \$50 that we will have steak for dinner, we should take that bet (just as Aragorn should take the goblin enchantment). Hal Jordan finds himself in a quandary, but Aragorn doesn't and neither do we.²³

The point is a simply this: the cognitive role of future-directed indeterminacy isn't radically different than the cognitive role of present-directed indeterminacy. It may well differ from our characteristic attitudes and responses to *some types* of present-directed indeterminacy, such as borderline cases in a Sorites series. But there are other cases of present-directed indeterminacy which elicit attitudes and responses similar to those familiar from the open future. As a result, we don't see an objection to our view here.

4.4 Knowledge of Future Contingents

What about *knowledge* of the future? If indeterminacy always excludes knowledge, then if it's indeterminate whether we'll have steak for dinner then we don't know that we won't. Now, that doesn't look like a radical thing for a defender of the open future to accept. Perhaps even though I can have good warrant for believing some future contingent, I can never *know* it precisely because the future is open. If our view has this consequence, we won't object.

But it's worth pointing out that such limitations on our knowledge isn't mandated. On our view of indeterminacy, its being indeterminate that p is consistent with p 's being true. We believe the proposition expressed by the sentence 'We won't have steak for dinner tonight'. Does that belief count as knowledge? The object of belief is indeterminate; whether we know the proposition

²³ For the purposes here, all we need to establish is that there's a difference between how Hal Jordan-style cases of indeterminacy should influence our credences/plans/actions and how Aragorn-style cases of indeterminacy should influence our credences/plans/actions. A further – much more complicated – question which we can't fully address here is what *explains* this difference. But here's a starting thought (one which seems particularly apt in the open future case). Our credences/plans/actions with respect to p should be constrained by the chance that p . The presence of indeterminacy may entail some things about the chance that p – e.g. if it's indeterminate that p we probably shouldn't say that the chance that p determinately = 1. But p 's indeterminacy may well leave plenty of other things open with respect to the chance that p (its being indeterminate that p needn't automatically entail that, e.g., the chance that p = .5). If its being indeterminate whether p is compatible with lots of different chance profiles for p , and chance should constrain our credences/plans/actions, then there are lots of different credences/plans/actions that could be rational when p is indeterminate – it simply depends on what the chances are. And so far, we've said nothing about how chance and indeterminacy interact (and as far as we can tell, no specific story about how chance and indeterminacy interact is forced on the defender of metaphysical indeterminacy).

could arguably be likewise indeterminate. Our belief is certainly justified; assume it is counterfactually stable, etc. Whether it counts as knowledge could then simply depend on whether the proposition is true. Well, it's indeterminate whether the proposition is true so perhaps it's just indeterminate whether we know it.

As we said above, on our account of the open future, we can look back at a prediction about the future – e.g., the present prediction that we will eat steak for dinner tonight – and say ‘that was wrong’ or ‘that was false’ once (fingers crossed) we end up having something other than steak for dinner. The proposition expressed by our utterance of ‘We will have steak for dinner tonight’ is presently indeterminate. But once the future unfolds in a non-steak-eating way, we see that the way the world is now is incompatible with the proposition having been true. That is, once we’re enjoying our tofu stir-fry at dinner, we can rule out that our utterance of ‘We will have steak for dinner tonight’ was true. Our presently eating a non-steak for dinner is incompatible with ‘We will have steak for dinner tonight’ having been true. If it had been true, we would’ve wound up eating steak. But we didn’t, so it was false. So at time t1, when we haven’t yet had dinner, it’s indeterminate whether we will have steak, and likewise indeterminate whether the proposition expressed by ‘We will have steak for dinner tonight’ is true or false. But that proposition is determinately either true or false – those are the only options. So at time t2, once we’ve had something other than steak for dinner, we can look back at the assertion of ‘We will have steak for dinner’ and say that it was false.

In exactly the same way, we could look back and say ‘Aha! We *knew* we wouldn’t have steak for dinner!’ If all that was required for the belief to be knowledge was that it was true – well, now we know it *was* true, so we know we *did* have knowledge. At no time will we determinately have knowledge of how the future will be; but we may be able to look back and correctly attribute knowledge to our past selves.

4.5 Truth and Fatalism

A final objection targets not our treating openness as indeterminacy but rather our claim that all of this is compatible with bivalence. The objection is that this undermines one of the benefits of believing in the open future: namely, that it offers a response to the logical argument for fatalism. In the traditional argument for fatalism, the thought is simply that if some future contingent p is true now, then the future is fated to be a p way. If p is presently true, and p is a claim about the future, then what p says will be the case will be the case as a result of how the world is presently. So no matter how the future unfolds, it will be that p.

That argument didn’t appeal to p’s being *determinately* true or false just now, just that it has a truth-value. And we *grant* that p now has a truth-value. So how can we resist the argument? How does denying that it has a *determinate* truth-value help, when the fatalist’s argument didn’t claim that it did?

On our view, it’s either true or false that there will be a space battle next millennium. But this isn’t enough to get you the fatalistic conclusion. The fatalist needs to say that there is some way the future is fated to be. The most that we can be charged with is that on our view the future is

fated to be some way or other. That is, there is determinately some way the future is going to be. But there's no way for the future to be such that the future is determinately going to be that way.

We aren't committed to the fatalist conclusion in the same way that supervaluationists aren't committed to 'sharp cut-offs' in the Sorites series. In a Sorites series for, say, baldness, the supervaluationist says it's (determinately) true that there's a bald man standing next to a non-bald man. But they argue that the truth of this isn't sufficient for there being a sharp cut-off in the series, because there's no adjacent pair such that determinately that pair is a bald man and a non-bald man. There's determinately a cut-off, but there's nowhere such that the cut-off is determinately there. You're only committed to an objectionable sharp cut-off if you're committed to there being somewhere such that the cut-off determinately occurs there. And the supervaluationist claims that our reluctance to say that there is a cut-off is due to our confusing this claim with the objectionable claim that there is some place such that, determinately, *it* is the cut-off.²⁴

In the same way, we say you're only committed to fatalism if you're committed to there being some way for the future to be such that the future will determinately be that way. For there determinately to be some way the future will be is unproblematic. We think that those who take 'Determinately, there is some way the future will be' to lead to fatalism are confusing this claim with 'There is some way the future will determinately be'. The latter is indeed fatalistic, but we reject it.

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²⁴ See, e.g., Keefe (2000, p185).

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