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The Problem of Change Restored

Martin Pickup

Oriel College, Oxford

Many philosophers have found change puzzling.¹ How can it be that something changes in its properties and yet remains the same thing? How can one and the same thing have these different properties? Questions of this sort, about the *persistence* of things through change, have been an ongoing feature of philosophical discussion since the beginning of the discipline.² I think that there is something puzzling here, and that investigating change can be a fruitful way of trying to understand a nest of connected issues concerning identity, time, tense, objects, properties, and instantiation. But not all agree. In some fairly recent papers, for instance, it has been argued that change is *not* problematic: there is nothing to be worried about.³ The phenomenon of change, it is suggested, is not one of particular philosophical interest, and we shouldn't expect it to illuminate our wider discussion.

As I have said, I think that change *is* problematic. I think it *is* initially mysterious how things can change. I believe working through the problem can tell us things about what the world is like, and thus that it is worthwhile doing so. In this paper I'll defend the problem from the attempted dissolutions of it. In brief, my argument will be that what we are offered is not a real dissolution of the problem but rather an existing solution to the problem, namely adverbialism. This solution is not universally or even generally accepted. Pointing to a contested solution to a problem is doesn't successfully dissolve that problem, so the problem of change is not successfully dissolved.

Why does this matter? One answer is that it's worth knowing which phenomena give rise to philosophical problems and which simply give rise to philosophical questions. The former, but not the latter, leave us with tensions in our conceptual scheme. The former, but not the latter, should have us worried. Whether or not change gives us a problem is important. But this answer is not enough to completely dispel the concern that we're engaging in a primarily terminological dispute: are we just disagreeing whether some phenomenon falls under the term 'problem'? Here a methodological motivation can provide us with a second answer to the question of why this matters. Those who think that change is unproblematic draw the moral that change should not be a starting-point for discussion

¹ As an indication of this widespread puzzlement, see the entry in the Stanford Encyclopedia of Philosophy on 'Change and Inconsistency' (Mortensen (2015)), its references and bibliography.

² As an example, Parmenides in the 5th Century B.C. seems to have denied that change occurs (the Eleatics in general seemed to have been concerned with the issue). More recently, McTaggart at the beginning of the last century famously argued that time is unreal on the basis that time requires real change, and real change leads to a contradiction (McTaggart 1908). (Real change is here understood as change in the A-relations of events). More recently still, David Lewis developed a modern version of the argument in his (1986) p202-205, calling it the argument from temporary intrinsics.

³ See in particular Hansson (2007), Hofweber (2009) and Rychter (2009): these are the papers I'll be discussing.

about connected philosophical topics.⁴ Those, like me, who think change *is* problematic also tend to think it is a good way to approach these other areas. Of course, whether or not change is problematic is strictly independent of whether or not it is methodologically fruitful to investigate change as a nexus of metaphysical issues. Nevertheless, I believe it is plausible to think that demonstrating that change gives rise to a philosophical problem underwrites its place in metaphysical discussions more generally.

When is something a problem?⁵ I will assume the following: if there is a collection of thoughts, intuitions or concepts that do not appear to fit well together, then we have a problem. Solving the problem seems to require either explaining why these do fit well despite appearances, or adapting some or all of them to make them cohere comfortably. Paradoxes, and possibly puzzles, count as problems in this sense. So, to show that there is a problem with change I need to show that some features of change cases require further work to show how the collection of thoughts, intuitions or concepts involved can, in fact, cohere well together. In particular, I take it as a sufficient condition for some phenomenon to count as a philosophical problem that the phenomenon, in conjunction with reasonable premises, appears to generate a contradiction.⁶ That change is such a phenomenon is something that the detractors of the problem concretely disagree with.

I will argue for the restoration of the problem of change. To do so, I begin in Sect. 1 by offering two versions of the problem of change. Sect. 2 describes the recent attempts at dissolution and Sect. 3 my reply. I conclude in Sect. 4.

Before we set out, though, a few preliminaries. Firstly, I will only be considering change as it applies to material objects, following typical presentations of the issues. Parallel problems will arise for any entities whose identity conditions permit variation in qualities (I have in mind particularly processes and events with duration), but these will not be considered here. Secondly, the sorts of change I'm interested in are changes in properties of objects that continue to exist. There may be other sorts of change (for instance the alleged changes of the coming to be of an entity or its ceasing to exist). I set these sorts of change aside. Thirdly, I will remain neutral on the connected debates concerning identity, time, tense, objects, properties and instantiation, though I will mention them when they are relevant. Finally, some of the recent literature that seeks to undermine the problem of change addresses the question of what sort of problem is supposed to be raised by change: the so-called 'meta-problem of change.'⁷ This is not my concern here. I am concerned to show that there is a problem, not with the type of problem that it is.

⁴ Hofweber and Hansson clearly do so: e.g. "The prominent role that the problem of change has in the philosophy of time is a mistake, or so I have argued. The problem of change is not a goal for the philosophy of time to solve, it is a distraction from the real questions in the philosophy of time. We should thus give up trying to solve the problem of change, there is no such problem, and focus on the central questions in the philosophy of time instead." (Hofweber *op. cit.*, p312)

Rychter's attitude is somewhat less explicit. He is at pains to emphasise that his 'dissolution' of the problem does not undermine interest in metaphysical questions about persistence, though it presumably does undermine approaching such theories by way of change.

⁵ Somewhat surprisingly, Hofweber and Hansson, who deny that change is problematic, say little about what it is for something to be a problem. Rychter *op. cit.* p9-10 talks about what it takes to be a *puzzle*, and he investigates whether there is a *puzzle* of change. I suspect that puzzles are species of problems, and this seems in keeping with Rychter's approach.

⁶ This is one way to define a paradox: "an apparently unacceptable conclusion derived by apparently acceptable reasoning from apparently acceptable premises." (Sainsbury 1995 p1) Paradoxes are surely problems.

⁷ These are questions looked at in Michael Raven's defence of the problem of change in his (2011). But Raven only spends a couple of paragraphs on whether or not there *is* an issue, and his argument here seems

1. *Problems of change*

An object changes when and only when one and the same thing has incompatible properties. It must be one and the same thing, or else nothing has persisted through a change; the properties must be incompatible or else nothing has changed. This can be seen by considering examples. A poker which is first hot and then cold has changed: it is one and the same thing and hot and cold are incompatible properties. A poker first being hot and later a pair of tongs being cold is not an instance of change because it is not the very same thing which is subject to the properties. A poker first being hot and then being black is not an instance of change either, because hot and black are not incompatible properties.

Thus, in other words, in cases of change an object must have numerical identity and qualitative distinctness.⁸ There are a variety of ways to develop a problem of change given this, and I will focus on two. The first uses the law of non-contradiction and the second uses the indiscernibility of identicals (also known as Leibniz's Law).

2.1 *The Problems*

The law of non-contradiction is non-negotiable.⁹ It tells us that no proposition and its negation are both true.¹⁰ The worry that change gives rise to in this context is that when something changes it seems like a proposition and its negation *will* both be true, as what is the case changes from the way described by the proposition to the way described by its negation. This is because the properties the object has before and after the change are incompatible, and so having one of these properties implies not having the other. This concern can be constructed into an argument using the example of some arbitrary material object O changing from being F to being G.

- (i) O changes from being F to being G (premise)
- (ii) No proposition and its negation are both true (non-contradiction)
- (iii) The proposition 'O is F' is true (from (i))
- (iv) The proposition 'O is G' is true (from (i))

unconvincing. His claim is that there are tensed and tenseless readings of some key statements, and that the metaphysical problem is to decide which readings are appropriate. Einheuser (2012) argues against Raven and defends the no-changers (though she thinks there *is* a *meta*-problem of change).

⁸ A simple argument that change is problematic because it requires both sameness and different is therefore misguided. Hofweber recognises this: see Hofweber *op. cit.* p294. Also see Wasserman (2006) for a helpful presentation of the issues.

⁹ Note that some, such as Graham Priest, do actually deny the law of non-contradiction, and this has interesting consequences for their discussion of change (see Priest (2006) for details). With the overwhelming majority, however, I'm simply going to assume non-contradiction.

¹⁰ As a matter of interest, the most popular way of formulating the problem of change in the literature is by recourse to the law of non-contradiction in the context of properties. In fact, it is usually presented by directly employing a concept of *incompatibility* between properties. For instance, Haslanger (2003) p316 states it thus: "*Law of non-contradiction*. Nothing can have incompatible properties, i.e. nothing can be both P and not-P." Kurtz (2006) p2 explains it in this way: "CONSISTENCY: Nothing can have incompatible properties. (CONSISTENCY follows from the law of non-contradiction: Necessarily not, for any object x, x has the property F and x lacks property F.)"

- (v) F and G are incompatible (from definition of change)
- (vi) 'O is F' entails \neg 'O is G' (incompatibility)
- (vii) \neg 'O is G' (from (iii), (vi))
- (viii) 'O is G' and \neg 'O is G' (from (iv), (vii))

Thus it seems like any instance of change leads to a violation of non-contradiction.

The second argument uses the principle of the indiscernibility of identicals. The indiscernibility of identicals states that for any thing x and any thing y, if x is identical to y then any property x has, y will have too.¹¹ Or, as it is sometimes expressed, anything true of one of the things is true of the other. Labelling the entity before a change O_1 and the entity after the change O_2 we can construct the following argument:

- (ix) O changes from being F to being G (premise)
- (x) O_1 is F (from (ix))
- (xi) O_2 is G (from (ix))
- (xii) Being F entails not being G (incompatibility)
- (xiii) $\neg O_1$ is G (from (x), (xii))
- (xiv) $O_1 = O_2$ (from (ix))
- (xv) If $x = y$ then y is A iff x is A (indiscernibility of identicals)
- (xvi) O_1 is G (from (xi), (xvi), (xv))

So O_1 both is and is not G: a contradiction.

These two arguments have been quickly presented. I do not think these problems are without solution: in fact, there are a number of different solutions to them which each require us to adjust or refine the concepts involved in setting up the problem. I don't doubt that the reader will be thinking of their preferred solution already, and thereby finding some flaw with the arguments. This is fine, and does not undermine my point. For what I want to say is that these problems require solving. My opponents, by contrast, think there is no problem here in the first place. That is, they do not try to show that the arguments are merely flawed or unsound but further that *they do not even present us with a problem*. This view will be explained in the next section.

2. The 'no-problem' challenge

Although denying that change gives rise to a problem is a reasonably popular contemporary view, I will focus on three concrete attempts to show this to be the case. The papers by Hansson, Hofweber and Rychter are my specific target. They each consider several different ways change is supposed to give rise to a problem. Hofweber has a reply to a version of the first problem I have

¹¹ The principle is almost universally accepted. Any qualification or restriction of the principle can be seen as significant philosophical revision. For the indiscernibility of identical to be violated, there must be some x and y such that $x = y$ but x satisfied some predicate that y didn't. To suggest that one and the same thing both has and does not have a property violates non-contradiction. So if non-contradiction holds then there cannot be a violation of the indiscernibility of identicals.

The principle of non-contradiction therefore entails the indiscernibility of identicals. But they are not equivalent, for the indiscernibility of identicals doesn't entail the principle of non-contradiction. There is no inconsistency in the following: suppose that the indiscernibility of identicals is true. Suppose also that some sentence, for example the Liar sentence 'this sentence is false', is in fact both true and false. In such a case, the indiscernibility of identicals is true but the law of non-contradiction isn't.

described. Hansson replies to a version of the second problem. Rychter tackles both. So I'll consider their responses to the versions in turn.

Although almost everyone accepts the law of non-contradiction, Hofweber and Rychter both claim that this is not what is being employed in the problem. They consider arguments which use non-contradiction at the level of properties, in particular those which rely on the claim 'nothing can have incompatible properties', more formally 'if x is F and y is not F then $x \neq y$ '. For Hofweber and Rychter such a statement of the law is ambiguous between two readings, and neither of the readings provides us with a decent argument. The readings are:

(a) If x is F and y is not F *at one time* then $x \neq y$

And

(b) If x is F and y is not F *even at different times* then $x \neq y$

The task Hofweber and Rychter set for the proponent of the problem is to choose one of these readings and show how it creates the problem. (5a) is uncontroversial but will not do the required work in the argument: O does not have and lack the property F at one time. Rather, it has F at one time and lacks it at another.

(5b), by contrast, does do the required work. But it is implausible. As Rychter points out, Aristotle's formulation of the law of non-contradiction is (5a), not (5b).¹² It is therefore not reasonable to stipulate that an object cannot at any time have a property that is incompatible with properties it has at any other time: this seems a straightforward denial of the possibility of change and shouldn't be built into the law of non-contradiction. (5b) therefore appears unpalatable.¹³

It's not immediately clear how to translate this to apply to the version of the argument I first give, as that concerns non-contradiction at the level of propositions rather than properties. Using a propositional version complicates matters slightly, as it is controversial whether propositions can change in their truth-value over time. Supposing propositions *can* change in truth-value, Hofweber/Rychter can identify an ambiguity in the statement of non-contradiction (ii):

(iia) No proposition and its negation are both true *at one time*

(iib) No proposition and its negation are both true *even at different times*

Presumably their point would be the same here, namely that (iia) is plausible but doesn't generate a problem, whereas (iib) would create a problem but is implausible.

If we take an eternalist view on propositions, however, so that they are unable to vary in truth-value over time, the Hofweber/Rychter 'dissolution' of the problem will have to say something different. This is because a proposition true at any time will be true at all times, and so (iia) would entail (iib). Given (iia) is plausible and (iib) does the required work, this would still leave a problem.

This might encourage us to think that the first version of the problem I present is resistant to their objection if we are eternalists. But, to be charitable, I imagine they would offer a different sort of

¹² One example of this can be found in the *Metaphysics* IV 6: 1011b13–20. Despite this, Kurtz claims Aristotle as an authority to support her atemporal formulation, and even quotes a passage where Aristotle clearly mentions the qualifications of time and respect (Kurtz *op. cit.* p25)

¹³ Notice, too, that accepting (5b) would make all properties permanent, as being F at some time would imply being F at all times. But this is counterintuitive: there is a natural distinction between classes of permanent and temporary properties.

criticism of an eternalist reading of the argument. In particular, my suspicion is that they would claim a different eternalist proposition is expressed by an utterance of 'O is F' at different times. If this is so, the argument I presented will be suspect. Why? Well, the conclusion (viii), which was that 'O is G' and \neg 'O is G', will not constitute a contradiction if 'O is G' doesn't pick out the same proposition in both of its uses in the conclusion. If it is not one and the same proposition being asserted and denied then we don't have a contradiction. In a sense, 'O is G' is then itself ambiguous between different eternalist propositions, depending on which time it is being uttered. Again, Hofweber and Rychter can point to an ambiguity and allege that this is what is driving the appearance of a problem.

Now I'll turn to the analogue reply to the second version of the problem, which is presented by Hansson in his (2007).¹⁴ His crucial move is similar to the one made above by Hofweber and Rychter in the case of non-contradiction.

Hansson considers the problem as a challenge for a B-theory endurantist. He argues that there is no appearance of a problem because the way that the incompatibility of properties has been deployed is obviously mistaken. Hansson suggests that O_1 and O_2 do indeed share all properties, as required by the indiscernibility of identicals, and so that O_1 is F and is G. But according to Hansson we can't thereby generate a contradiction because being F *doesn't* entail not being G. On his view, premise (xii) is not only false but implausible.

Why is this? Well, Hansson's interprets 'O is F' as stating that 'O is, at at least one time, F'. Given this, it will not rule out 'O is G', namely the claim that 'O is, at at least one time, G'.¹⁵ On this understanding of the copula, it is an extremely weak claim. And by saying that being F does not entail not being G, Hansson means that being F at one time does not entail not being G at any other time. So Hansson's position is that, understood in this way, F and G are not exclusive *simpliciter*, so O_1 can indeed be both. To put it another way, much as the reply to the first problem takes there to be two distinct temporal readings of non-contradiction, the Hansson-style reply to the second problem might suggest two distinct readings of incompatibility. On the first, incompatible properties cannot be both had *at the same time*. On the second, incompatible properties cannot be both had *even at different times*. The first reading is insufficient to do the work, the second is implausible.

Thus understood, the attempted dissolutions of both problems proceed in very similar ways. Both of them distinguish between certain things holding *at one time* and *at any time*: the criticism of the first problem pulls apart two readings of non-contradiction on this basis, and the criticism of the second problem pulls apart two notions of incompatibility. They therefore each hope to show that there is an illegitimate step in the respective arguments.

But notice that this is not all they claim. It is not just that the two arguments presented as problems from change are not successful in establishing their conclusion because of this illegitimacy. That sort of move is what a *solution* to the problem looks like. Rather, Hofweber, Rychter and Hansson all think that their criticism shows that there is no such problem in the first place. That is, not only is the use of non-contradiction or incompatibility illegitimate, it is so clearly illegitimate and unsupportable that it conclusively undermines the claims of the arguments to even present a problem.

In the next section I will be arguing against this view. I will not try to establish that the criticisms are unsustainable, but rather that they are insufficient to show that there is no problem here. That is

¹⁴ Rychter endorses Hansson's approach, Rychter *op. cit.* p11.

¹⁵ See Hansson (2007) p267. I don't think that these are the best interpretations of the claims that are made in the second version of the problem. Saying that O is F is saying more than just that O is, at at least one time, F. But I'll set this issue aside and concentrate, in the next section, on a different criticism.

because these criticisms themselves implicitly make controversial assumptions that will not be widely accepted. So the criticisms are not so obvious to render the problems dissolved.

3. *The restoration of the problem*

Let's start with something that is generally agreed. Time is what makes change possible without contradiction. It is time that somehow makes it possible for one and the same thing to have incompatible properties without landing in contradiction. But the issue is that it isn't obvious *how*. This explains why there are a number of distinct candidate solutions: if the role of time in change was clear then there wouldn't be disagreement over how to solve the problem.

So if the dissolution claim is simply that the natural way to address change is to temporally relativise then it should be granted. But this claim, I take it, is not sufficient to justify the assertion that there is no *problem* of change. To take a parallel: the problem of evil suggests a tension between the concept of a divine being as omnipotent, omniscient, and perfectly good and the existence of certain sorts of evil or suffering. To attempt to dissolve this problem by suggesting just that God has some unspecified reason for permitting such evil or suffering is woefully inadequate.¹⁶ There is a legitimate demand for some indication of what such a reason could be: this is the whole challenge of the problem. Similarly, Hofweber, Rychter and Hansson must be doing more than simply suggesting that time (somehow) 'dissolves' the problem, or else we have a legitimate query of how it does so. The whole problem is how to explain time's role in making change possible. For if there isn't an intuitive and plausible account for this, then the problem certainly hasn't been dissolved.

To put this a different way, it is clear that the statements we make about objects and their properties are typically tensed. The poker *is* cold but *was* hot, for instance. So we might be tempted to think that simply paying attention to tense in the two arguments formulated above will show them mistaken. But the recognition of tense in statements of change is not enough to show that the arguments are misguided. For we don't know what metaphysical role tense is playing in these statements. For a start, many philosophers believe tensed statements are reducible to tenseless ones. Secondly, even if tense is irreducible it isn't clear how exactly it undermines the premises or blocks the inferences of the two arguments. The claim to have dissolved the problem is not warranted simply by pointing to tense.

But I think it would be unfair to the 'no-problemers' to suggest that they are simply pointing to time (or tense) and taking it to fix the issue. I think they are making a more substantial claim than that. Hofweber and Rychter take it that there is ambiguity in the law of non-contradiction, and that it must be interpreted in a way sensitive to temporal predication. This is a material assertion.¹⁷ Hansson believes that incompatibility is to be understood as temporally sensitive, and furthermore that statements of the form 'O is F' should be construed as 'O is, at at least one time, F'. This, too, is a

¹⁶ There is, in fact, a reply to the problem of evil that does leave deliberately unspecified the reason God would have for permitting evil: this is known as sceptical theism (see Dougherty 2016 for an overview). But it does so on the basis of a sophisticated argument about the conditions under which we can move from something seeming to be the case on the basis of our evidence to the conclusion that things are in fact that way.

¹⁷ In fact, one might be tempted to think that any such interpretation of non-contradiction as temporal is itself sufficiently revisionary to count as a *solution* to rather than *dissolution* of the problem of change. I won't pursue this line of attack here, however.

substantive claim. But the difficulty for all three of them is that these claims beg the question. I'll explain why.

In order for the no-problem criticism to get off the ground, we need to be able to distinguish between an atemporal reading of predication and various different temporal readings of it. It isn't clear how to do so. Take a statement like 'O is F'. The problems rely on taking this at face value as making the same assertion when uttered at different times. Specifically, what is said of O and F by 'O is F' is the same as what is said of O and G by 'O is G' when these are uttered at different times. Various different solutions to the problem of change reject this for different reasons. The A-theory view, for instance, which says that there is something metaphysically special about the present time, will argue that *when* these statements are uttered matters because the past, present and future are metaphysically different (one way to cash this out involves irreducible tense). The B-theory, tenseless view, which holds that all times are metaphysically on a par, has other alternatives. One can take objects to be sums of temporal parts, so that 'O is F' is actually predicating F of a temporal part of O. One can take properties to be relational, so that 'O is F' is actually predicating some relational property F-at-t of O (or predicating the F-at relation to hold between O and t). Or one can take instantiation itself to be temporally modified, so that 'O is F' is actually t-ly predicating F of O (where this is to be distinguished from t'-ly predicating F of O).¹⁸

These competing solutions are much debated, and their various pros and cons are documented.¹⁹ One's general metaphysical commitments will play a role in which of these solutions is most palatable. But each of them seems to come with some cost, judging from their contested status. The no-problemers appear to offer us a free lunch here: no cost to pay because there isn't really a problem here in the first place. But how exactly do Hofweber, Rychter and Hansson distinguish between the atemporal and various temporal readings of predication?

Hofweber and Rychter's target version of non-contradiction, which operates on properties, tells us that if x is F and y is not F then $x \neq y$ (for otherwise something would be both F and not F). What Hofweber and Rychter offer us are two ways to understand 'is' in this claim. In the first case, (a), we could understand it as 'is at one time'. In the second, (b), it is understood as 'is at any time'. The ambiguity that is crucial to their case is found in the ascription of properties to objects. In other words, the ambiguity is found in the having of properties, or the ways in which objects instantiate properties. Specifically, the ambiguity is between two ways to temporally index the having of properties in the law of non-contradiction. They contend that an object being F and not being F at the same time is impossible, but that an object being F and not being F at different times isn't. But why this difference? Why is one impossible and the other possible?

Hofweber and Rychter must draw a metaphysical distinction between having a property at one time and having it at another. According to them, there must be a difference between an object being F at t and the same object being F at t': if there were no difference between them then either both or neither should violate the law of non-contradiction in conjunction with a further claim that the object is G at t'. Hofweber and Rychter say that the latter violates this law and the former doesn't, so must take them to differ.

As noted above, the version of the problem from non-contradiction I have presented uses a propositional application of the law. This altered slightly the no-problem challenge to this version of

¹⁸ A similar view is that instantiation is in fact a three-placed relation with time as the third relata so that 'O is F' is actually predicating a three-placed instantiation relation to hold between O, F and t. Whether or not this view is fundamentally distinct from that in the text is an interesting question, but not one I will focus on here.

¹⁹ See Wasserman (2006) and Mortensen (2015) for overviews, and the references therein for further material.

the argument, giving two alternatives depending on our view of propositions' truth-values. Temporalism about propositions, and the corresponding ambiguity in propositional non-contradiction, gives rise to a very similar situation. My response will therefore parallel the above: to identify this ambiguity assumes a difference between something being true at one time and true at another. Given what Hofweber and Rychter say about the property variant of non-contradiction, this assumption would presumably be grounded in an assumption about the having of properties being different at different times. So the position would remain the same.

The propositional eternalist, who locates the ambiguity in which proposition is expressed by 'O is G' at different times, will face an alternative issue. According to this view, there are different propositions expressed by 'O is G' uttered at different times. This means that what we are saying of the object O and property G at one time is different from what we are saying of them at another time by uttering the same sentence. 'O is G' itself is ambiguous. Again, though, this identifying this ambiguity requires us to distinguish between the different propositions expressed by utterances of 'O is G' at different times. For these propositions to differ, they must make different claims, and presumably (for Hofweber and Rychter) the claims they make are different because the having of G by O is different at the different times. This renders each way to interpret the argument parallel, with each requiring a distinction between the having of properties at different times.

We can now consider the no-problem challenge to the second argument. As noted, Hansson (and Rychter following him) argues that incompatibility is temporally relative. The properties F and G are incompatible if had at the same time, but not if had at different times.²⁰ In other words, O being F at t is compossible with O being G at t', but not compossible with O being G at t. Thus O being G at t and O being G at t' are importantly different. So, we have a distinction between an object having a property at one time and the very same object having the very same property at another. This resembles the metaphysical underpinnings of the argument against the first problem.

For all three of the no-problemers, there must be a difference between the having of a property at one time and the having of that property by the same thing at another time. In what does this metaphysical difference consist? It is not nearly universally accepted that there is such a distinction: the perdurantist, relational properties theorist and A-theorist can happily deny it.²¹ Our *prima facie* view seems to be that the connection between objects and their properties is the same at different times. To see this, consider what would be the case if the having of properties by objects were time-dependent in a relevant sense. The *having* of properties would then be different from time

²⁰ Hansson's view of incompatibility and mine are slightly different. He says that the B-theory endurantist "will insist that [the properties] are incompatible only under certain circumstances – namely when they are instantiated by one and the same object *at a single moment in time*." (Hansson 2007 p269: the italics are his). So, in fact, Hansson thinks the properties are *not* incompatible (when had at different times). I prefer to think of incompatibility as a property of properties, so that it doesn't depend on the time of instantiation of some property F whether it is incompatible with G. Thus the properties *are* incompatible, on my view, but whether or not there is a contradiction might depend on the time of instantiation. I don't take this difference to be more than terminological, however.

²¹ Rychter considers a criticism that bears a resemblance to mine in a different context, when considering atemporal instantiation as a way to underwrite an interpretation of the Lewisian problem of temporary intrinsics that he offers. There, he asserts: "[an atemporal instantiation principle] does not seem to follow from an ordinary conception of what it is for an object to instantiate a property, since we ordinarily think of objects as having their properties *at times*." (p19) But the dialectic is misrepresented by this. It's not that the proposer of a problem is committed to an unwarranted and unintuitive account of instantiation. Rather, to say that there is not a problem for the reasons given above requires a temporal notion of instantiation that is equivalent to adverbialism, and is contentious.

to time.²² An object having a property at one time would be different from the same object having the same property at another. But this difference is one that leaves untouched the object and its properties, which would produce strange results. For imagine we have an object O being F and another object, Q, being F. If we metaphysically compare O being F and Q being F, the only distinction between them appears to be the objects involved. But if time is to play a role in predication, there will be a further possible difference between them, depending on whether O's being F and Q's being F obtain at the same time. For, if their having of the property is not at the same time, there is some *additional* difference, beyond merely the objects, between the two cases. If what it takes to have and lack a property is not invariant across times, then there is a distinction between Q's being F at the same time as O's being F and Q's being F at a different time to O's being F. But no such difference is forthcoming: we can't notice such a difference.²³ It can be difficult to make sense of what this extra difference is supposed to be, especially given that we can't notice it. This warrants the idea that when we say an object has a property, the *prima facie* interpretation is that we say the same thing regardless of the time at which we say it.

So I take it that the connection between an object and a property it instantiates is plausibly time-invariant. But this is an issue for the no-problem approach. Consider the attempted dissolutions of the two problems in turn. As mentioned already, to address the first version of the problem, in whatever form, Hofweber and Rychter need to explain what the difference is between an object having a property at one time and the very same object having the very same property at another time. There *is* a way to do this, and I think it might be behind the claims that they both make. It is to say that all instances of having of properties are temporally loaded: the relationship of instantiation between objects and properties includes a temporal element. In other words, deny the time-invariance of instantiation. This is a perfectly permissible move, but it's a *solution* to the problem, called adverbialism. It isn't a good way to show that there is no problem by proposing a solution. But I contend that Hofweber and Rychter need adverbialism or something akin to it to be able to distinguish between their types of 'being F' in their disambiguation of the law of non-contradiction into the two readings (5a) and (5b) given above, and to distinguish the readings (iia) and (iib) of a temporalist propositional non-contradiction, and to distinguish the eternalist propositions expressed by 'O is G' when uttered at different times.²⁴

The attempt to dissolve the second problem, by making incompatibility time-sensitive, falls foul of the same issue. In fact, Hansson's argument more explicitly reliant on adverbialism. He himself notes its role: towards the end of the paper, he refers to a picture presented by Johnston, Lowe and

²² This might seem to be an advantage in accounting for an object having the same property over time: it first has the property in a t way, and later in a t' way. But note that each of the alternative solutions can account for this distinction. The perdurantist can say that the object's temporal part at t has the property and its temporal part at t' has the property. The relational properties theorist can say that the object has the t-property and the t'-property. The A-theorist can say that the object *had* and *has* the property. So we don't need temporally varied having of properties to capture an object's continuing to have a property.

²³ Of course, it could be that there is a difference, but that it is inaccessible to us. This would be epistemologically worrying, but is at least consistent. Perhaps an omniscient observer would observe this difference in time between O's having F and Q's having F at a different time. But to be committed to this seems a cost.

²⁴ It would be possible to frame my criticism of Hofweber and Rychter in terms of the popular metaphysical notion of *grounding*: what *grounds* the difference between the two temporal readings of non-contradiction? Or, more generally, what *grounds* the difference between an object having a property at one time and an object having the same property at another? But I'm holding back from this way of speaking because grounding is a controversial notion, and some won't accept it.

Haslanger according to which times are the locations of the instantiation of intrinsic properties.²⁵ As he presents the dissolution of the problem, then, it is a version of adverbialism. Adverbialism provides an understanding of the having of properties that permits Hansson to distinguish between O being F at one time and being F at another. Hansson's paper takes an endurantist, eternalist view, and he explicitly holds the properties fixed across time.²⁶ Adverbialism is therefore the mechanism behind his position.

But, of course, appealing to an existing solution to the problem of change is not a good way to show that there is no such problem. Adverbialism requires us to revise our intuitive understanding of instantiation.²⁷ Hofweber, Rychter and Hansson all make the same mistake: they take a solution to the problem to show that there is no problem.

I should consider a possible riposte, however. Perhaps they will say that while they do indeed rely on adverbialism, adverbialism itself is so clearly the right solution that calling it a solution is overdramatic: it is so clearly right that there isn't a problem to start with. I disagree. Adverbialism is revisionary. When an object has a property at one time and the same object has the same property at another time, it seems the self-same relation holds between the property and the object at the two different times. The identity of the object, of the property and of their connection at the two times is our starting point in theorising. It is this starting point that brings about the problems, because a contradiction is then threatened when the object changes between the two times. A natural move therefore is to revise our starting point and claim that one of the identities does not hold: the object, property or connection is distinct at the different times. But this is a *revision* of our conceptual scheme, and as such no good as an attempt to dissolve the problem.

Adverbialism is not only revisionary, but it isn't clearly the right solution either. Adverbialism has criticisms.²⁸ At the very least, it isn't broadly accepted. It tinkers with instantiation in a way that cuts against typical understandings of the relationship between objects and properties. This tinkering raises issues: if the instantiation relation is in fact a series of distinct temporally relativised relations then we lose a straightforward understanding of what it is for an object to exemplify a property. For example (as raised by Lewis), the adverbialist faces Bradley's Regress: O is-tly F. F is related to O by the 'is-tly' relation. But what relates O and 'is-tly'? What relates F and 'is-tly'? Presumably some other relation. But then we can ask what relates O (and 'is-tly' and F) to this second order relation. An infinite regress is threatened. Furthermore, even if a vicious infinite regress can be avoided we have added a

²⁵ Hansson *op. cit.* p271. I have not mentioned the intrinsic/extrinsic property distinction in my argument so far: I wish the problem of change to be neutral with regard to this. In part, this is because the exact distinction between intrinsic and extrinsic properties is a knotty issue. But it is also because I am not sure the distinction is fundamental and I am also not sure that the problem of change is any easier for extrinsic properties. If change leads to contradiction, this is a problem regardless of the nature of the properties involved. This is also the reason I do not explicitly rule out a problem of change for 'mere' Cambridge change.

²⁶ E.g. p271: "I do not think that expressions such as 'is straight at *t*' need to correspond to peculiar time-indexed properties, such as *being-straight-at-t*."

²⁷ Hansson, on p271, claims that his view doesn't require a three-placed instantiation relation. Perhaps not, but it does require instantiation to be temporally indexed. I suspect he would consider any objection to adverbialism as question begging, but at this stage of the dialectic not much is to be gained from fighting over this point. Suffice it to say that the problem is, of course, question begging to any well worked out solution. But this doesn't show it isn't a problem, if the solution requires a revision of our concepts.

²⁸ For instance, in Lewis (2002) and Giberman (2017).

large number of instantiation relations to our ontology (one for each time). This is a cost that needs to be evaluated.²⁹

Just to be clear, the point of this paper is not to establish that adverbialism is not a viable solution to the problem of change. I even, in fact, have some sympathy for it. But the point of the paper is to show that the supposed dissolution of the problem of change is in fact a disguised and contested existing solution to the problem. The no-change proponents should be arguing for adverbialism against its critics, not arguing that there is no problem in the first place. The onus is on them to demonstrate that adverbialism is so obvious as to warrant calling it a dissolution of, rather than solution to, the problem(s). I don't believe this can be done. Hence I have argued that the attempted dissolutions to the problems of change are in fact disguised versions of a solution to the problems: adverbialism. As what we are offered is a solution, rather than a dissolution, I hope to have shown that change is problematic after all.

4. Conclusion

The problem of change is, I contend, alive and well. In attempting to dissolve the problem, Hofweber, Rychter and Hansson implicitly rely on a pre-existing solution to the problem. In order to distinguish between the different versions of non-contradiction and incompatibility that they deploy to diffuse the problem, we need to commit to a controversial account of instantiation as temporally relativised.

The fact that the problem of change is a genuine problem is, I think, unsurprising. Change has been the locus of much metaphysical speculation over the centuries. Making sense of change forces us to consider and reconsider how we think time, identity, properties and instantiation are related. This is fruitful work, which has given us a number of distinct solutions with their distinctive metaphysical commitments. I conclude that the problem of change is not dissolved, but it can be solved. Which of the solutions to favour is, of course, a question for another day.³⁰

²⁹ A further reason to think that there has been no dissolution to the problem of change comes from the following example (I'll apply it to Hofweber and Rychter's analysis, but it applies to Hansson's too). Consider the following hypothetical case: An object changes between t and t' by having the property F at t and later having some incompatible property G at t' . However, imagine that, at t' , the object travels back in time to t , and in so doing doesn't change with respect to G . Thus, at t we have an object which both has the property F and the property G , with which it is incompatible.

In such a case, if it is conceptually possible, we have a scenario in which the no-change argument is not applicable. For even a version of the law of non-contradiction akin to (5a) would be violated. This shows that the distinction between readings (5a) and (5b) doesn't conclusively undermine the problem of change. If (5a) is supposed to be inviolable, we need an explanation of what's going on in the time-travel case. It seems plausible that what's going on in the time-travel case is a special case of what occurs in a normal change case. We should therefore expect the explanation of the time-travel case to also have something to say about how the normal cases of change do not violate non-contradiction. Such an explanation will not appeal to some distinction between a temporal and atemporal reading of non-contradiction. Perhaps the no-changers should then relativise non-contradiction further, to include space as well as time. This works, but puts additional strain on the view. For it is far more controversial that non-contradiction is relative to space than that it is relative to time. At any rate, it'll still require an explanation of the means by which the absolute and relative versions of non-contradiction can be distinguished.

This demonstrates that temporally indexing the having of properties will not be sufficient to rule the problem of change a non-problem: if it doesn't get rid of the problem in all cases, it doesn't get rid of the problem.

³⁰ [*acknowledgements]

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