



# Dispositional essentialism and the necessity of laws: a deflationary account

Alan Sidelle<sup>1</sup>

Accepted: 20 April 2023

© The Author(s), under exclusive licence to Springer Nature B.V. 2023

## Abstract

Two related claims have lately garnered currency: dispositional essentialism—the view that some or all properties, or some or all fundamental properties, are essentially dispositional; and the claim that laws of nature (or again, many or the fundamental ones) are metaphysically necessary. I have argued elsewhere (On the metaphysical contingency of laws of nature, Oxford University Press, Oxford, 2002) that the laws of nature do not have a mind-independent metaphysical necessity, but recent developments on dispositions have given these ideas a new vibrancy and made them the topic of more focused discussion. So I would like to revisit this, arguing that the new work, as interesting and important as it is to our understanding of fundamental properties, powers and dispositions, should not change our minds about metaphysical necessity. One should still think necessity is conceptually or conventionally grounded. I do not argue that laws of nature are not necessary, nor that properties do not have dispositional essences, but only that if these are the case, then, like other *de re* or empirical necessities, they have no metaphysical weight and are based in our rules or decisions about how to talk about the world. We may have excellent reasons to talk and think in this way—but these reasons do not include, require or provide evidence of mind-independent metaphysical necessity or essences.

**Keywords** Dispositional essentialism · Laws of nature · Anti-essentialism · Metaphysical necessity · Alexander Bird

---

✉ Alan Sidelle  
asidelle@wisc.edu

<sup>1</sup> Department of Philosophy, University of Wisconsin-Madison, Madison, WI 53706, USA

## 1 Introduction

There has been a resurgence of interest in the idea of powers, dispositions, which are not derivative from some other sort of property, familiarly called ‘categorical’.<sup>1</sup> This has entered into the realm of so-called metaphysical necessity with two related sorts of claims that have garnered interest and currency: the first is dispositional essentialism, the idea that some or all properties, or some or all fundamental properties, are essentially dispositional; the second is the claim that laws of nature, or again, at least many of them, or the fundamental ones, are metaphysically necessary. I have argued elsewhere (2002) that the laws of nature do not have a mind-independent metaphysical necessity, but recent developments on dispositions, much thanks due to Bird (2001, 2002, 2007a, 2007b) and Ellis (2001), have given these ideas a new vibrancy and made them the topic of more focused discussion. So I would like to revisit this, arguing that the new work, as interesting and important as it is to our understanding of fundamental properties, powers and dispositions, should not change our minds about metaphysical necessity. One should still think that necessity and essence are conceptually or conventionally grounded. In keeping with my earlier work, I will not be arguing that laws of nature are *not* necessary, nor that properties do not have dispositional essences. I will only argue that these necessities, like other *de re* or empirical necessities, have no metaphysical weight and are based in our rules or decisions about how to talk about and conceptualize the world. And as before, I do not deny that we have excellent *reasons* to talk and think in this way—only that these reasons do not include, require or provide evidence of mind-independent metaphysical necessity or essences.<sup>2,3</sup>

## 2 The prima facie case, and a rehearsal of the conventionalist analysis of the necessary a posteriori

The prima facie case against the necessity of the laws of nature—fundamental or otherwise—is familiar and straightforward. There are countless ways to imagine and conceive the laws being other than they are, both directly—focusing on the laws

<sup>1</sup> Much of the contemporary literature traces back to Martin (1994). More explicitly, see McKittrick (2003), Mumford (2006). See also Choi and Fara (2021).

<sup>2</sup> Anti-conventionalists frequently suggest that acknowledging that there are good reasons for carving the world as we do—for having terms governed by certain sorts of criteria (e.g. interesting causal joints)—completely undermines the conventionalist position. This is a mistake. The combining of conventionalism with this sort of ‘concession’ is at least as old as Locke (e.g. 1689, Book III, chapter 6 Section 39). There would be a problem only if the reasons required, or implicitly committed one to, mind-independent essences or *de re* necessities, which they palpably do not. (See the next section if this is not sufficiently obvious.)

<sup>3</sup> My ‘conventionalism’ has always been about mind-dependence, rather than requiring conventions in the more full-blown sense. So when I say something is conventional, or that we make a ‘decision’, I am speaking loosely for ease of exposition. It is perfectly compatible with my view that we are predisposed to carve up the world in certain ways and so do not really ‘choose’ the modal application conditions for (many of) our terms. But I emphasize the absence of any *metaphysical* mistake were one to, say, apply ‘water’ to XYZ, even in the face of all the actual facts.

themselves and imagining the details of the mathematical relationships, or the constants involved, to be different, or indirectly—focusing on the particular events and imagining their unfolding in different patterns: billiard balls reacting to collision by changing color, for instance. And there is keeping the historical pattern the same, but imagining it to be explained by quite different laws which simply overlap—after all, the underdetermination of theory by evidence reminds us that there are countless possible mathematical formulae that could generate the same set of results.<sup>4</sup> (Similar remarks apply to dispositional truths like ‘things with negative charge repel each other,’ ‘salt dissolves in water’ and ‘sour things make humans’ lips pucker’. But it is a little more complex so we will return to it later.)

Of course, since the work of Kripke (1980) and Putnam (1975), it is commonplace to point out that what can be imagined need not be possible—indeed, one often hears the claim that imagination is no evidence of possibility whatsoever. At any rate, when we are dealing with a posteriori claims, such as hypotheses of laws of nature (whether true or not), it will always be possible to conceive their falsity, despite the fact that some are necessary. So this *prima facie* case against the necessity of the laws is often dismissed or completely ignored. Indeed, it is more common for philosophers to espouse claims of necessity for empirical claims, citing Kripke and Putnam, than it is for such claims to be resisted by such traditional appeals. And worse, those who would press such objections are often accused of confusing epistemic and metaphysical possibility.

In my view, this is a serious mistake.<sup>5</sup> Indeed, it is a number of related mistakes. The first mistake is overlooking, what has been pointed out not infrequently and rarely challenged, the fact that Kripke and Putnam’s arguments in support of their a posteriori necessities themselves depend fundamentally on imagination and conceivability, or more generally, thought experiments and modal and linguistic intuitions—all the a priori apparatus.<sup>6</sup> Putnam’s Twin Earth argument, when Twin Earth is considered as a possible world rather than another distant planet, amounts to the intuition that XYZ—or any other non-H<sub>2</sub>O substance—would not count as water, no matter how otherwise similar it was to water. (In fact, Putnam does not so much ask whether this is so, as just assert it. But it is clear that insofar as there is evidence here, it comes from our considering such water-y non-H<sub>2</sub>O and judging it not to be water.) Similarly for Kripke’s argument (or again, assertion) that gold is essentially an element, and more particularly, essentially has atomic #79. Or the arguments/suggestions that humans are essentially humans, or cats essentially animals. Now of course, it remains true that the fact that we take these essentialist proposals seriously suggests that we cannot defeat them by *simply* imagining a robot cat, or Socrates being a surprisingly intelligent pig. But reminding ourselves of how Kripke

<sup>4</sup> Of course, if a Humean account is correct, there cannot be worlds that agree in all their facts, but not their laws. Whether or not this is a strike against such views (see Carroll, 1994), contingency is easy for the Humeans just by altering the facts in the right ways. I am not aware of any Humeans who believe the laws are necessary.

<sup>5</sup> What follows is a very compressed version of the argument in my (1989, chapters 2–4). See also my (1992b).

<sup>6</sup> For a somewhat dissenting voice, see Biggs (2011) and Biggs and Wilson (2019)—though even on their account, it is hard to see how our methods could give us knowledge of mind-independent modal facts.

and Putnam support their claims should at least throw some caution into the cavalier fashion with which appeals to imaginings are dismissed. In each case, we *do* make imaginative appeals. But rather than ‘can you imagine that p is false?’ the structure is: “Suppose P is actually true. Now, look for the scenario which most plausibly would be one where P is false.<sup>7</sup> If, in such a case, P remains true, then (probably) there is no case where P is false, and so, P is necessary.” In these cases, P’s actual truth is taken for granted, and so, insofar as the thought experiments are taken as probative, they support ‘If P, then necessarily P’ (or if P\*, then necessarily P—see note 7). *This* is quite independent of the actual truth of P, and so is a priori (though see note 8). Similarly, if competent judges do *not* accept this, we have evidence *against* the necessity of P. That is why it seems that while Socrates is essentially human (given that he is actually human), he is only accidentally (even though actually) a philosopher, or the teacher of Plato. So yes—when we are evaluating a posteriori claims for proposed necessity, we should not simply ask ‘Can you conceive that not-p?’ We should rather ask: ‘Can you conceive that not-p, while supposing that p is actually true?’<sup>8</sup> And it is noteworthy that for the vast majority of a posteriori claims, the answer remains ‘yes’—and so, we take what we initially imagined as indeed possible.<sup>9</sup>

Why is this important? First, obviously, it shows that while direct appeals to imagination may not be probative for possibility in a posteriori statements, it is misleading to just leave the matter there. To do so suggests there is some other epistemology of modality, something which perhaps provides deeper insight into ‘real’ modality, something other than the meanings of words and logical or conceptual connections. But if the arguments in fact rely on traditional modal epistemology—just with the focus being not on ‘can you imagine that not-p?’ but ‘assuming p, can you imagine that not-p?’—then we cannot *dismiss* opposing imaginings, but rather need to look at the *right ones*. And in the case of laws of nature, it seems perfectly obvious that in all the conceivings we mentioned, or alluded to above, our imaginings *did* take for granted that the laws, *in fact*, are what they appear to be. Nonetheless, it *still* seems they could have been different in these ways. Put another way, the imaginings are not ‘undermined’ by, or retracted in the face of empirical discoveries, as are the ‘pre-scientific’ conceivings of non-H<sub>2</sub>O water or non-elemental gold. So the *prima facie* case against the necessity of laws of nature remains.

<sup>7</sup> Sometimes we will need a P\*, different from P. For instance, for the necessity of original matter, what is necessary is plausibly ‘o (if it exists) originates mostly in m’, while the empirical premise is that o originates (*entirely*) in m. I ignore this in what follows.

<sup>8</sup> Additionally, the antecedent may include more than just ‘p’. For instance, in our judgments about water and gold, we take for granted that microstructure plays a particular explanatory role in the behavior of these things. But as Chalmers has emphasized (2012), insofar as our judgments here are not entirely a priori, but have further empirical assumptions, we can build them into the antecedent and generate an a priori conditional which is being judged—that is, rather than ‘if p then necessarily p,’ it is ‘if p and q and r... then necessarily p’.

<sup>9</sup> Even if such ‘empirically neutral’ imagining (as opposed to explicitly hypothesizing the actual truth of p) is not the best way to establish this. It is fine, though, when the claim is purportedly a priori, as traditional proposed philosophical accounts have been.

Of course, the case is only *prima facie*, just as the more familiar claims of possibility based on conceivability are. After all, we may have overlooked something, missed some conceptual connection or relevant point. But the friend of the necessity hypothesis needs to show us where.

So—point one: Kripke and Putnam have given us no reason to doubt the epistemic probity of appeals to conceivability for a posteriori claims, when such appeals take for granted the *actual* truth of the proposition in question.<sup>10</sup> And point two: the non-obtaining of our actual laws of nature seems perfectly so conceivable.

Further, as I and others have argued (Chalmers, 1996, 2002; Jackson, 1998; Sidelle, 1989), insofar as the epistemology here is fundamentally a priori, and fundamentally no different than we thought it was when it was widely believed that all necessities were a priori, we should think that there is nothing more *metaphysical* to the necessity of water's being H<sub>2</sub>O than there is to that of something needing three sides to be a triangle, or to be unmarried to be a bachelor. There is no 'new' insight into the 'real' modal structure of the world revealed in the arguments of Kripke and Putnam. If scientific discoveries are sometimes of truths that are necessary, the *argument* for the necessity still comes from investigating our modal intuitions and conceptual judgments. And so, as with the old epistemology, there is no reason to think there is any new metaphysics, either. We can *call* it 'metaphysical' necessity, if we want to distinguish these truths from logical and a priori conceptual necessities (as well as from epistemic possibilities, which is how Kripke introduced the notion), but there is nothing 'metaphysical' about it (at least, if that implies it to be mind-independent).

In his review of Nathan Salmon's *Reference and Essence*, Coppock (1984) nicely illustrated this with his example of 'Socratoon'. 'Socratoon' is introduced with the following rule: Something in any possible situation is Socratoon just in case its color is Socrates' actual favorite color. We can 'imagine' that some Socratoon things are yellow, but that will not establish that something could be Socratoon and yellow. But on any hypothesis of color C being Socrates' favorite color, we *cannot* conceive of Socratoon being some non-C color. If Socrates' favorite color is maroon, then it is necessary a posteriori that whatever is socratoon is maroon.<sup>11</sup> I hope it is clear that no one would treat this as an interesting metaphysical matter about the essence of socratoon. My view [and Coppock's as well, and Chalmers (for example, 2002)] is that whenever there is a necessary a posteriori truth, it is based on concepts that have basically the same sort of semantic structure as 'socratoon,' with the exception that the relevant terms are not explicitly stipulated to have these rules but rather, the rules are products of our practice and intentions, and are revealed—often, only with a lot of philosophical probing—in our counterfactual judgments. The necessity and

<sup>10</sup> Indeed, as highlighted in his arguments against mind-body identities, Kripke *insists* upon it (though here, what we can 'assume', about actuality, is not that pain=C-fiber firing (that would beg the question), but any facts *relevant* to that, e.g. their law-like co-extension and seemingly identical causal roles).

<sup>11</sup> Notice that this has the P\* structure above, from note 6.

essences that emerge, then, are the same as those of socratoon.<sup>12</sup> And pointing out that the necessary truth in question resulted from scientific investigation and is not analytic simply does not show that the necessity is not a conceptual, conventional or semantic matter, in the sense I have outlined.

Point 3: Kripke and Putnam's arguments have not appealed to, nor given any evidence of, faculties of modal insight beyond those we might have believed in prior to their work.

Point 4: Nor have they provided any evidence of necessity which is beyond the logical and conceptual.

Finally, this is connected to another important point about the error of just dismissing appeals to the imaginability of not-p. For while we may, upon the hypothesis of some p's actual truth, deny that our imagined case shows not-p to be possible, it is—at least, in all the familiar cases—still the case that our imagining reflects *some genuine possibility*. Hesperus may not be possibly not Phosphorus, but it is possible for it to fail generally to be the last star visible in the morning.<sup>13</sup> Water may not possibly be XYZ, but there can be XYZ that is watery, or as it is sometimes put, which is 'thwater'.<sup>14</sup> And in all of these cases, there could be language speakers very much like ourselves, who introduced the terms in identical circumstances, who make contrary judgments about these cases, letting their term 'water' apply to XYZ and 'gold' to some non-element. Such speakers do not make any metaphysical mistake.<sup>15</sup> If these scenarios do not undermine our necessity claims, but do undermine those of these hypothetical other speakers, it is simply because of how they are described while using the terms in question, speaking those languages. So once again, a posteriori necessities do not, I believe, reflect mind-independent necessities

<sup>12</sup> Again, for further argument for this, see my 1989 chapter 3, as well as Chalmers (1996, 2002). The rule for 'water' might be: 'something counts as water (in any scenario) just in case it has the same deep explanatory structure as the substance (enough/most of the samples) to which we apply 'water' *actually* has'.

<sup>13</sup> As Dennis Stampe pointed out to me, the meaning of 'the Morning Star' is trickier than the usual 'the last star (sic) visible in the morning'; sometimes Mars has that honor, but it is not, on those days, 'the morning star'.

<sup>14</sup> Indeed, Kripke emphasizes the need to account for these, and famously offers his own account, which then plays a crucial role in his argument against materialism. Yablo (2000) calls this 'textbook Kripkeanism,' and challenges it, as have others. To my mind, David Chalmers has responded quite adequately to all such challengers. See, for instance, his (2001), and more recently (2014).

<sup>15</sup> Not to get ahead of myself, Bird (2007b) argues that *chemists* who treat fool's gold as gold, or XYZ as water, *are* making a mistake. But in his view, the mistake comes from the fact that chemistry is the science of substances, and our alternative speakers would not be referring to substances with their terms. I won't quibble about the term 'substance' here (which to my mind obviously just pushes the bump in the rug), but I note simply that the referential work is then being done precisely by the intention to refer to, or to govern counterfactual uses of chemical terms by, the 'substantial' properties of the instances to which the term is applied. One makes no metaphysical mistake by not doing chemistry, nor has one made a mistake about what is mind-independently essential—any more than one would be making a *metaphysical* mistake if one insisted on using the deep structure in contexts where functional role is 'stipulated' as guiding modal application (as, perhaps, with a term like 'poisonous'). The 'discoveries of essence' are simply the non-modal findings that in fact, these samples have this sort of structure. See note 2.

and essences, but our concepts, which sometimes have a form less like ‘something is F just in case it is G’ but ‘something is F just in case it has the same microstructure as most of the samples we call ‘gold’ or ‘something is Socratoon just in case it shares Socrates’ actual favorite color’.

So, point 5: When there is a necessary a posteriori truth, there is a semantic rule telling us how to apply a term in modal contexts based upon what the actual world—nonmodally—happens to be like. Metaphysically, no erstwhile possibility is really ruled out.

To put it simply, when there is a necessary a posteriori truth, the predicate acts as a semantic constraint—not a metaphysical constraint—on the subject term, just as in analytic truths. It is just that the relevant trait is picked out in terms of the satisfaction of some empirical condition, as in ‘Socratoon,’ and somewhat more complexly with ‘water’ and ‘gold’.<sup>16</sup>

So, insofar as the *prima facie* case against the necessity of laws of nature can be met, and we can be convinced that they *are* necessary, despite these scenarios that *are* possible, and which *look* like cases in which the laws fail, we should think the necessity of the laws is not a matter of mind-independent necessity, but of our concepts involved in the laws.

All of this goes, *mutatis mutandis*, for claims about the dispositional essences of properties. Science can reveal that the having of property F bestows on an object the disposition D, but not that it does so with metaphysical necessity. As with laws, my claim is disjunctive: either the properties are not essentially dispositional, or if they are, it is matter of our conceptual scheme, in the way that the ‘essence’ of Socratoon is to be maroon. Either way, we don’t have a mind-independent essence.<sup>17</sup>

### 3 Is there anything in recent work on dispositions, and associated claims about the laws of nature, to challenge this?

Most (though not all<sup>18</sup>) of the recent championing of the necessity of laws of nature comes from those who support *dispositional essentialism*.<sup>19</sup> Many, or all, or fundamental properties, on this view, are claimed to confer dispositions essentially upon their bearers. For instance, it is proposed that it is essential to its having negative charge that a thing is disposed to attract things with positive charge, and to repel

<sup>16</sup> Of course, it can also be the case that it follows a priori from some other necessary truths, as with theorems. But then we have to account for the necessity of that from which it is derived. This is more the pattern we find in some of Bird’s examples, discussed below.

<sup>17</sup> While I put ‘essentially’ in quotes, to emphasize the contrast with the supposed mind-independent nature of the essentiality of dispositions, I am happy enough in first order metaphysics to use ‘essence’ and indeed, to agree with Fine that not everything necessary is essential. For instance, while it is necessary that what is Socratoon is such that  $2+2=4$ , it is not essential to it. Fine proposes that what is essential is what is in something’s definition. I am happy to agree—but the definitions, on my view, are conceptual/conventional rather than real.

<sup>18</sup> For a different approach, see Fales (1990) and Swyer (1982).

<sup>19</sup> See especially Ellis (2001) and Bird (2007a). The idea is often traced back to Shoemaker (1979, 1980).

other things with negative charge. And perhaps it is essential to salt—or at least, a necessary consequence of its essence—that it is disposed to dissolve in water, and to mass that it disposes objects to attract others with a force proportional to its own magnitude. Further, insofar as dispositions are closely related to producing certain effects in certain conditions, it is suggested that the laws governing<sup>20</sup> these properties merely flow from the essences of the properties, expressing precisely the effects of these properties in the relevant situations. And since these dispositions are essential to the properties, it will be impossible for the properties to be instantiated without these dispositions, and consequently, without behaving in accordance with the laws. The laws, then, are metaphysically necessary.

Even without the claim that the laws are necessary, dispositional essentialism itself is proposed as representing substantive metaphysical necessity, and so something which conflicts with my position as outlined above. We need, then, to look at this position.

Salt dissolves when put in water. Non-stick pans clean with little effort. Paper catches on fire and leaves ashes when brought quite close to a flame. We suppose that before these objects were in these circumstances, it was already true that they *would* so behave if they *were*, and further, that other objects relevantly similar are also so disposed. Traditionally, it has been thought that when an object has a disposition, this results from two things—some ‘categorical’, non-dispositional property of the object: its chemical composition, or structure, say, and contingent laws of nature, which assign particular dispositions to particular categorical properties. The basic laws assign dispositions to fundamental properties, and dispositions given by non-basic properties supervene on, or are grounded in, the dispositions of these basic properties, as the non-stick disposition of my pan is explained by the dispositions given by the atoms on the surface and their arrangement, with deeper explanations to follow. (For an example, see Quine, 1960, sec. 46.)

Recent work on dispositions has challenged a number of traditional ideas. Dispositions cannot be analyzed, some argue, in terms of counterfactuals as to how an object would behave in given circumstances (this is the moral of finks, masks and mimics; see, for the beginnings, Johnston, 1992; Martin, 1994; for more, see Choi & Fara, 2021; Yates, 2013). We should rather think that objects have ‘active powers’ to certain behaviors/manifestations in circumstances. And these are not contingently given by ‘neutral’ bases, but bases that are themselves dispositional. Some propose that laws do not ‘govern’ properties (or events), but are themselves just generalizations reflecting the dispositions conferred by the properties (Bird, 2007a, 2007c; see also note 20). Finally, some have argued that the fundamental properties of physics are dispositions that do not have any further bases—mass, spin and charge, for example (Chakravartty, 2007; Ellis, 2001; Molnar 1999, 2003; Mumford, 2006; Vetter, 2015; Williams, 2019; for an overview of current discussion, see Meincke

<sup>20</sup> Throughout this paper, I mean to be neutral about whether laws actually ‘govern’ events in any meaningful sense. While most dispositional essentialist necessitarians think laws do *not* govern, there is disagreement, and my discussion does not depend on one understanding or another. For not governing, see Mumford (2004), Ellis (2006), Bird (2007c) and Demarest (2017). For a governing option, see Tugby (2016), Dumsday (2013).



forthcoming). There have been other important developments, but these will suffice for us here.

Now, my particular concern is what may be called ‘real’ essentialism: mind-independent metaphysical necessity, not to be understood in terms of logical and conceptual necessity. So here, these would take the form of truths like: Necessarily, if something has F, it has D. These express the dispositional essences (D) of the given properties (F). (The distinction between essential and necessary properties does not matter for our discussion here; all that matters is the uncontroversial direction: if G is essential to F, then it is necessary that what is F is G.)

Is there any reason to think that these sorts of necessities reflect a mind-independent necessity if (as we have argued) the Kripke–Putnam a posteriori necessities do not? It seems to me that generally, dispositional essentialists have simply taken the fact that the necessary truths they are espousing are a posteriori and synthetic to establish the sort of mind-independent necessity in question. They after all are doing first order metaphysics, arguing that certain facts are necessary, rather than arguing for a particular interpretation of that claim. But like Kripke and Putnam themselves, as well as many who have been influenced by them, one may adopt a second-order, realist way of talking that makes it clear one is taking for granted this interpretation. This is reflected, for instance, in their emphasis on these truths not being analytic, and resulting from science, and in the way in which intuitions and imagination are dismissively treated (“necessity is a metaphysical issue, imagination is a conceptual or psychological one”). So it is not surprising if we haven’t been presented with new arguments for such a realist take on these truths. Nonetheless, perhaps something about dispositions, or these truths, may give us reason to think these are truly metaphysical and mind-independent.

Let’s start with a familiar illustration. Consider the traditional secondary quality view of colors, on which an object’s being green is its being disposed to cause humans to have a certain sort of qualitative visual experience. This view is *not* that being green is really a categorical property of this leaf, which necessarily confers this *further* disposition upon the leaf. Rather, having the disposition is *what it is* (or part of what it is) for the leaf to be green.

Now, consider just the disposition—put aside whether it is what greenness is. It is trivially necessary that if something is disposed to cause humans to have a certain sort of qualitative visual experience, then it is its disposed to cause humans to have this sort of qualitative visual experience. It would be extremely misleading—a sort of metaphysical exaggeration—to say that it is *essential* to having this disposition that something is so disposed. It is hardly a metaphysical necessity. But it is no *more* metaphysically necessary if we use the word ‘green’ to refer to the disposition (in the subject place). It may *appear* to, because we perhaps are still thinking of greenness as a *separate* property which *confers* the disposition. But it is not. Finally, it *still* is no more metaphysically necessary if ‘F’ functions like ‘Socratoon’, to pick out a disposition (or to have its application constrained by a disposition) that needs to be determined empirically, like ‘is disposed to attract bodies with whatever force actual things attract other bodies’. So, speaking generally, if ‘F’ in ‘Necessarily, what has F has disposition D’ just refers to disposition D, or to a broader disposition from which D follows, then that necessary truth has the same sort of logical or

conceptual necessity as ‘What is Socratoon is maroon’, and nothing of more metaphysical import.

That being said, we can turn to cases of supposed dispositional essentialism. In the case of fundamental properties, which is the central case, especially in connection with laws of nature, it seems plain that what is being claimed is that the fundamental properties are themselves dispositions, with no further distinct base. So the ‘essential’ dispositionality is just the necessity of having a disposition if you have that disposition. However, one may object, ‘what has mass is disposed to attract other objects with mass’ or certainly, ‘what has  $n$  grams of mass is disposed to attract other objects according to  $F = Gnm_2/d^2$ ’ is certainly not trivial. So it may seem to present a more substantial necessity. It is certainly a substantive scientific discovery, and indeed, the mere fact that we can *argue* about the necessity seems to show it is more substantive than ‘what is disposed to attract other objects...is disposed to attract other objects...’.

But let us remember the cases of ‘water’ and ‘Socratoon’. It is not trivial that what is Socratoon is maroon, yet metaphysically, it amounts to no more than (a) what is in fact Socrates’ favorite color is maroon, and (b) necessarily, what is maroon is maroon. Water’s being necessarily  $H_2O$  is also not trivial. But—on my account at least—it is a product of our intention to constrain application of ‘water’ by whatever in fact is the explanatorily deepest feature of (enough of) the samples to which we apply ‘water’. Finding what is explanatorily deepest is, of course, a substantive scientific undertaking. But the necessity is conceptual and logical. And there can be an argument about it because in the absence of full probing, we may not be clear what principles or intentions are governing our use of a term (and of course, some may *not* so use it). For instance, one may be moved by cases like Putnam’s noting the superficial similarity of molybdenum and aluminum (1975), to see that we *do* defer to deeper structure over superficial features, and so are more committed to using ‘water’ as we do ‘aluminum,’ than to counting XYZ as water.

To bring this around to mass and its dispositions. It is clearly trivially necessary that what is disposed to attract objects according to  $F = Gm_1m_2/d^2$  is so disposed ( $G$  is the gravitational constant). For that matter, it is equally necessary that whatever is disposed to attract objects according to  $F = G^*m_1m_2/d^2$  is so disposed (where  $G^* \neq G$ ), or that whatever is disposed to attract objects according to  $F = Gm_1m_2/d^3$  is so disposed—it is simply the case that nothing in fact has either of these dispositions. This is not interestingly altered if we introduce a different term—‘mass’, say—to stand for the having of this disposition. Nor—to take it one more step—is it altered if we introduce ‘mass’ to stand for *whatever* disposition it is that bodies actually have to attract each other. The resulting necessity of ‘what has mass is disposed to attract...’ is the same as that of ‘What is Socratoon is maroon’. Finally—to take a step towards somewhat greater (even if still shoddy) historical accuracy—suppose instead that ‘mass’ is used for a theoretical magnitude which plays a postulated causal role in the motion of bodies. Here, as far as the introduction of the term goes, it *could* turn out that there is a categorical property which contingently confers the disposition in question. In that case, scientists would have to decide whether ‘mass’ applied to whatever had that categorical property (in which case ‘what has mass is disposed to attract other bodies according to ...’ would presumably be contingent),

or to anything with the disposition. And notice that it is left for science to discover just what the disposition in particular is. But suppose—as we are supposing—that it is determined that there *is* no distinct base for this disposition. We might have then determined that there is no such thing as mass—but we didn't. Rather, we continue to use 'mass' to talk about the disposition.

Does this, then, mean that 'mass' (and its determinates) rigidly designates this disposition, as 'Socratoon' does maroon? Not necessarily. Since we have the term 'mass', and not merely the term 'is disposed to attract objects according to  $Gm_1m_2/d^2$ ', we might apply it to objects in other possible situations if they had dispositions that we—or the scientists most of us defer to—deemed to be sufficiently similar. After all, for all of the discovery that there is no separate base for this disposition, it remains that there are endlessly many sets of dispositions that are quite similar in one way or another, differing in the value of  $G$ , or exactly how distance figures, or how the 'masses' interact—or by simply having an exception here or there for certain values, or in certain locations.<sup>21</sup> Do—or can—objects with these dispositions have mass, or be of 250 kg? This seems not a metaphysical question about the 'essence' of mass, but a decision about how to use 'mass'—though, of course, it could well be a principled one that makes a scientific difference. But what makes one use, rather than another, scientifically better will not be that it actually captures the real metaphysical essence of mass. Obviously, it *need* not be any such thing. All there is, is the actual disposition, the possible dispositions (and their consequences—e.g. what a world where objects have these dispositions would be like) and our use of the term 'mass' (which includes its conceptual connections with other scientific terms, either directly, or through more 'Socratoon' like connections which need to be discovered empirically). Different people, including different scientists, may have different tendencies as to how to describe these cases—and so there can be 'disagreement' about what is necessary (given what is actual), just as there can be disagreement about whether it is necessary that water be  $H_2O$ . But as with the case of water, insofar as it *is* counted as necessary, this necessity results from the concept, not a mind-independent essence.

The situation is basically the same for non-fundamental dispositions and their bases. The simple point—that it is necessary that if you have a disposition, then you have that disposition—is plainly independent of whether the disposition is fundamental or not. When a disposition does have a base—like crystalline structure for fragility, or the bonding in salt molecules for solubility—there will at least be conceivable cases that *look* like ones in which something has the base but lacks the disposition. It seems again a matter of linguistic selection whether these count as the same crystalline structure, or as salt or ionic bonding. Here, in at least some cases, there may be extra holistic pressure not to count the base as the same, as these will often be quite theoretical concepts conceptually tied to other concepts (perhaps analytically, or perhaps through the more complex sort of rules that defer to what is explanatorily important), so counting it as the same may have ramifications for our other descriptions which would complicate our scheme. This is partly because higher-level dispositions result from the lower-level dispositions conferred by their

<sup>21</sup> For a characteristically creative sense of the range of possible dispositions, see Unger (2005).

more basic components and their arrangements, so if we have linguistically tied the concepts for the more basic parts to their dispositions, this ‘trickles up’ if we have also conceptually tied the higher-order properties to their microstructures, as we often do. Seeing such connections can then be a source of surprising, scientifically based necessary truths, of a sort suggested by Alexander Bird in his ‘down and up’ cases, to be taken up in the next section. But in all these cases, we have no reason to think that the necessary truths reflect mind-independent essences or necessary connections, and indeed, we have all the same reasons adduced above for thinking that they don’t. In every case, the proposed necessity is argued for by inferences from actual facts to necessities that rest on intuitions we have no reason to treat as reflective of mind-independent necessity or essence, and every reason to treat as stemming from selections about how to talk in modal contexts. And again, all these necessities co-exist with the possibilities which could equally well be treated as contrary to the necessity. That something with crystalline structure must dispose something to break in this way is compatible with things having internal structure that looks *very much like* crystalline structure. If these are not cases of non-fragile, or differently fragile crystalline structures, it is because our rules of application require us not to count them as such. Those who speak differently would not be making a metaphysical mistake.

Finally, two brief other elements of recent work that might be thought to represent a more robust metaphysical necessity.

1. Brian Ellis’ version of dispositional essentialism includes the claim that individuals essentially belong to the natural kinds to which they in fact belong. Combine that with dispositional essences for these kinds, and we get *de re* truths asserting that given individuals necessarily possess certain dispositions—a somewhat different sort of dispositional essentialism.

I hope it is clear that this simply combines two sorts of necessary a posteriori claims, and that for each of these we have provided reasons to think of their necessity as conventionally generated: the claims of individual essence, which are versions of Kripke’s proposal that what is actually human is necessarily human, and the claims of dispositional essences for kinds, which are a special case of what we have been discussing above.<sup>22</sup> So whatever appearance truths of this sort may provide—if such truths there be—they actually provide no extra support for, or examples of, metaphysically real necessity or essence.

2. As Barbara Vetter (2009) points out, there are two modal aspects to dispositional essentialism that are not always clearly distinguished. One concerns the idea that dispositions, or powers, are themselves modal. Someone may have the power to lift 300 pounds, but never do so, and this power may not be reducible to a categorical property plus a law-based connection between that property and lifting 300 pounds if one tries. The other is the claim that (at least some) properties

<sup>22</sup> Some may think the mere fact that these truths are *de re* establishes their concept-independent necessity. I explain why this is not so in 1989, Chapter 3, and 1992a.

confer such powers essentially. While laws of nature may be grounded in the powers that things have, and while it may be crucial to their ability to do so that they have this first modal aspect, this does not entail that the properties have, or bestow, the powers essentially. It is the *powers*—not their status *as* essential or accidental—that support the laws. On the other hand, even if these properties were *not* powers, whatever features they have essentially will generate, or go with necessary truths expressing this connection—necessarily, whatever is rectangular has four sides. So the fact, if it is one, that dispositions are modal—that they ‘go beyond’ what is actually the case—is not relevant to the claim that properties which confer these dispositions have them essentially (nor then to the claim that the laws in question are necessary). (See also Jaag, 2014.)<sup>23</sup>

From the start, there was no glaring reason why the arguments in favor of a conventionalist or conceptualist interpretation of Kripke and Putnam’s necessities should not carry over straightforwardly to the proposed dispositional essentialist truths. Why should the fact that the properties in question are dispositional—‘is disposed to dissolve in water’ or ‘repels items with negative charge’—make things different from ‘is partly composed of oxygen’ or ‘is human’? I hope to have made it plausible that this *prima facie* skepticism is correct.

#### 4 Back to laws

Given this discussion of dispositional essentialism, it seems unlikely that it can support metaphysically necessary laws of nature. Still, perhaps we should look directly at the laws.

The way dispositional essentialism is supposed to support the necessity of laws is basically this. Suppose that having *F* (mass) essentially confers some disposition—manifesting *M* in *C* (attracting other objects in this way: with a force equal to  $Gm_1m_2/d^2$ ). And suppose the laws are of the form: whatever is *F* is *G*. Finally, suppose that to have the disposition to *M* in *C* is being such that if *x* were in *C*, it would *M*. Then, it would be necessary that what is *F* manifests *M* in *C*—which is a value of *G*, and so is what the law says. The law, then, is necessary.

There have been objections to this derivation, but they need not concern us here.<sup>24</sup> We ask: how does this conception of why the (fundamental) laws of nature are necessary address the *prima facie* case laid out earlier in the paper, that the laws

<sup>23</sup> One more related argument, which I will not pursue here, is that we cannot understand the ‘weaker’ sort of necessity and counterfactual support supposedly represented in causation and natural law, and so if we think they have modal force, it must be full blown metaphysical necessity. I address this argument in 2002; roughly, the postulation is too strong for the phenomena it is supposed to explain, and is not really compatible with all the modal data, like the real possibilities left open even after the postulation of the metaphysical necessity of the laws.

<sup>24</sup> For example, Hendry and Rowbottom (2009) and Vetter (2012).

are only contingent? That is, the large range of ways we can seem to conceive of the laws failing to obtain, even when we take for granted what the laws actually are?

We want to distinguish the claim that the laws—that is, the  $p$ , where it is a law that  $p$ —are necessary, from the claim that the laws are necessarily laws. It may be that law necessitarians generally hold the latter, stronger claim, but I am committed to denying even the weaker claim, again, understood as a claim about mind-independent metaphysical necessity. After all, in the examples I have been presenting, it seems that  $p$  is false, not merely that  $p$  is not a law. Nonetheless, it is useful to first consider what may come to mind when hearing the proposal that the laws of nature are necessary.<sup>25</sup>

I have in mind the idea that any possible world has to be basically like ours. Of course, things can be very different, but there will be the same sorts of things governed by the same laws. This may seem an implausibly narrow view of what is possible. However, it is not required of the law necessitarian. She can allow that there could be (in a sense to be clarified in a moment) very different laws which explain what is going on in other worlds. But this will require that things in these worlds have different *properties*. So things *could* be very, very different, and scientists could find very different laws. (Let us suppose, for simplicity, that nothing in those worlds have any properties that figure in our laws.) Not only is this compatible with law necessitarianism, but the arguments for the necessity of laws cast no doubt upon this possibility. Why is it compatible with law necessitarianism? Because it is still true—vacuously true—that everything with mass attracts everything else with mass with the actual force. Some may not be happy with this vacuous truth; if so, perhaps they will be satisfied with it at least not being false, as ‘Hesperus = Phosphorus’ is not false in worlds where Venus does not exist. The important thing is that these are *not* worlds the law necessitarian is committed to, or has reasons for, denying. Instead, they are simply worlds in which nothing has the relevant properties, so the truths which are laws in our world are at least not false.<sup>26</sup> (Indeed, perhaps they are even *laws*—but they are ‘inactive’, as no events fall under them.) The events in those worlds are explained by other laws, and maybe some worlds lack laws altogether.

I have turned attention to this sort of possibility because not only are *these* possibilities not denied, but we can now appreciate that the sorts of possibilities we first considered, as examples in which the laws fail to obtain in a world that looks something like our own, are also, in a way, not ruled out. For all the arguments show, something could be quite water-y, yet not be disposed to boil at 100 °C. Or quite mass-like, but not disposed to attract other items according to the law of gravitation. The claim instead is that in these scenarios, what is water-y is not water, and what is mass-like is not mass. Consequently, these too are not worlds in which the laws fail to obtain, but are to be handled like the more alien worlds: the law statements are at least not *false* there, because the objects in the seeming counterexamples don’t truly have our properties. *That* is how the counter examples are addressed.

<sup>25</sup> It would, however, be very surprising if it were possible for  $p$  not to be a law, but *also* impossible for  $p$  to be false. After all, if there are worlds where it is not a law (and not just because there are no  $F$ ’s—see below), it would seem to be up for grabs, in those worlds, whether all  $F$ ’s turned out to be  $G$  or not.

<sup>26</sup> Roberts (forthcoming) makes use of this when wondering whether Bird should be understood as committed to nomological possibility being the broadest sort of possibility (p. 18).

I leave it to the scientifically better informed to determine how plausible these claims about the (non)existence of mass and water are. But they are of a piece with our earlier findings about the property essences themselves. The acknowledgement of these possibilities undermines any real metaphysical force the claim of necessity might be supposed to have, especially when we see that it commits us to thinking that the terms for the properties have the features in the laws, or the underlying dispositions, as semantic constraints, rendering the necessity fundamentally conceptual. Put another way, insofar as property essences are conventional, so is any necessity they generate for the laws.

Before leaving this, we should look at a rather different sort of argument. We have been looking at claims that laws are necessary based upon the supposed dispositional essentialism. But Alexander Bird has offered a very interesting and creative alternative argument as well, one which (he claims) does not depend on dispositional essentialism (at least, not in the same way<sup>27</sup>). Bird describes it as employing a ‘down and up’ argument. He employs it to argue that it is a necessary law that salt dissolves in water.<sup>28</sup> (This can, of course, be equally used just to claim that it is necessary that salt dissolves in water.)

The basic idea is that if Coulomb’s law obtains, salt must be disposed to dissolve in water, due to the electrostatic attraction between charged particles, whereby the ions in the water pull at the sodium ions with more force than that of the rest of the salt molecules of which they are parts. But Coulomb’s law, or something quite like it, is necessary for salt to exist, for it is needed for the ionic structure of salt, that is, of sodium chloride. So, roughly: Necessarily, If salt exists, Coulomb’s law obtains (this is the ‘down’ part—taking us to the lower-level facts (essential structure and laws) necessary for the property or kind to be instantiated), and Necessarily, if Coulomb’s law obtains, then salt dissolves in water (this is the ‘up’ part, moving from the lower-level, more basic properties and laws, to the dispositions they entail). So necessarily, if salt exists, it dissolves in water.

I put aside any challenges to the basic argument, because my focus is on the various claims about what is necessary in the background.<sup>29</sup> We are to suppose, first, that water is necessarily H<sub>2</sub>O and salt is necessarily NaCl. Further, that NaCl cannot exist without ionic bonding. And we are also to suppose that ionic bonding must be governed by Coulomb’s law (or something quite like it—sufficiently so as to get salt to dissolve in water). (This last one Bird says is true ‘by definition’, so I will not quibble—though he later sees need to argue for it, appealing to ‘what is needed for recognizably electrostatic forces’—so he is apparently appealing to some either

<sup>27</sup> As we will see, it still depends on the claim that certain properties would not exist if certain laws failed to obtain, so presumably, it is essential to them that the laws do obtain, and therefore, that they have the dispositions the correspond to the laws. See Bird (2001, p. 267) (and elsewhere in Bird’s various discussions of these arguments) for his claim that this argument is independent of dispositional essentialism. I take it that by ‘dispositional essentialism’ in these claims, he means something stronger than these necessities on which the argument relies.

<sup>28</sup> The choice of salt dissolving in water is just meant to be illustrative. But our response will apply equally to any argument of this sort.

<sup>29</sup> For some other replies, see Beebe (2002), Psillos (2002). Bird replies in (2002). See also Drewery (2005), among others.

modal or semantic intuitions, rather than straight definition.) Bird, not surprisingly, appeals to Kripkean essentialism:

Kripke's and Putnam's arguments show that the fact that water is composed of hydrogen and oxygen and the fact that salt is composed of sodium and chlorine are necessary .... Furthermore, not even the numbers of atoms in a molecule are sufficient for identity of substance. Isomers are substances that possess the same formulae but are different substances nonetheless. That is because the constituent elements, although the same for both substances, are arranged differently in their molecules... What makes a water molecule a molecule is not merely that there is an oxygen atom neighbored by two hydrogen atoms, but that these neighbouring atoms are chemically bonded to one another in a certain way. So the chemical bonding found water is an essential feature of it, and any world in which there is water is a world in which there exists that kind of bonding. (270)

I suspect that the sorts of considerations which lead people to think water must be  $H_2O$  *do* support these further sorts of constraints Bird proposes.<sup>30</sup> But as we have seen, we have no reason to treat that as expressing metaphysical, mind-independent necessity, rather than decisions about how to constrain the application of terms like 'water' and 'salt' in modal (as well as actual) contexts. So we are left with the genuine possibility of salt-y stuff and water-y stuff existing where Coulomb's law does not obtain, and so the former not dissolving in the latter. Or even salt itself not dissolving in watery stuff, or water itself not dissolving salty stuff. But perhaps Bird can sidestep questions about the everyday terms 'water' and 'salt' and simply focus on the law that NaCl dissolves in  $H_2O$ . If this is necessary, it cannot be traced to our rules for using 'water' and 'salt'. But similar considerations apply. Indeed, Bird himself is helpful here. In another context, he (2007b, 299ff) points out that even in the development of chemistry itself, terms are not introduced trivially with what he calls 'essence specifying' names. When various elements were discovered, it was unclear what their essences were, or indeed, just *what* was essential to elements, which we now treat as atomic weight, or to chemical compounds. But this provides us with just the sort of epistemic possibility for NaCl not having ionic bonding, or indeed, bonding that acts in accord with something in the vicinity of Coulomb's law. So again, we have a semantic decision, though again, one which may well be quite principled. It is just that the principle and reasonableness of the decisions does not involve any *modal* claims stronger than counterfactuals. Of course if, on the other hand, there is *not* this conceptual space, then it is again trivial that NaCl is so governed (though again, perhaps not trivial that its bonding obeys the specifics of Coulomb's law—just that given any other pattern of disposition, the bonding does not count as ionic and so the non-dissolving substance would not be NaCl.)

Again, I do not say Bird may not be right, nor do I deny that it is a quite interesting argument and conclusion. I only say that *if* he is right, what he has done is

<sup>30</sup> Though I am much more skeptical about his quite different assertion that the Mona Lisa would not exist with significantly different molecules of oil and pigment. That relies on quite a different sort of intuition.



extract interesting consequences from a combination of science and our conventions governing a class of terms, and that the modal force all comes from the latter. At some point, the arguments all appeal to Kripkean-style intuitions about what descriptions are appropriate given certain empirical findings, which we have seen have no claim to represent mind-independent modal facts or essences, and the conclusions never rule out the possibilities that such claims of necessity would *seem* to have to rule out if they were ‘real necessities’. That is to say, salty stuff can still fail to dissolve in water, or water-y stuff, and even ‘NaCl-y’ stuff can fail to dissolve in H<sub>2</sub>O-y stuff—and if at some point we don’t even have such an appearance, it is because we are using the terms so that the necessity follows trivially, as in ‘necessarily, stuff which is X and is disposed to dissolve in stuff that is Y, is disposed to dissolve in stuff that is Y’.

## 5 Empirical content?

There may be a lingering concern. I have been suggesting that if the theoretical terms used in laws have a certain sort of semantics, then the laws may ultimately say something like ‘every pair of objects that are disposed to attract each other according to:  $F = Gm_1m_2/d^2$ , attract each other according to the formula  $F = Gm_1m_2/d^2$ . In my enthusiasm to make their necessity non-substantive, I have rendered the laws *themselves* non-substantive. But the laws of nature—especially the fundamental ones—represent not merely empirical discoveries, but monumental ones. We can hardly base the actual behavior of all objects on a set of tautologies, even if they are ‘disguised’ with reference-fixing descriptions that keep the sentence from being analytic or a priori. And of course, the laws make empirical predictions, so they can be tested. So, how can my account allow the laws to represent the remarkable empirical achievements they are—or at least, allow them to be substantive—as well as to play the substantive role they do in prediction and explanation?

There are a number of ways to approach this. I will mention a couple, though for reasons of space, they can only be sketched.

Probably the most familiar is to appeal to something like a two-dimensional semantics (Chalmers, 2006). The empirical—and contingent—content would come from the ‘primary’ intension of law statements, and the (often theoretical) terms involved. The necessary law would be the secondary intension, extending the contingent empirical input into application for modal statements and descriptions of other worlds. This would not necessarily require the specific two-dimensional framework Chalmers has developed, though it is a much more sophisticated and detailed model than the more piecemeal, though similar, semantic suggestions I have made.

What I would like to finish with, though, comes at it from a slightly different angle. We start from the tautological ‘laws’. Consider that on the view in question, the laws are drawn from ‘essential dispositions’ of (basic) properties. Having mass gives a body the disposition to attract other bodies according the formula  $F = Gm_1m_2/d^2$ . And the law says that objects attract each other in just such a way. Similarly for charge and other basic properties. Now, on the view I have presented, the terms here—‘mass,’ ‘charge’—have these dispositions as their semantic criteria

of application. (Again, this is determined partly empirically, as with ‘water’ and  $H_2O$ , but with the boundary of application fundamentally set by our linguistic intentions, not by mind-independent essences. Keep the Socratoon example in mind.) Consequently, satisfying ‘has  $n$  grams of mass’ is a matter of being disposed to satisfy the formula for that value of  $m_1$ , which makes it necessary, but also, seemingly, gives us a formula that is ultimately metaphysically trivial, like ‘water is  $H_2O$ ’. Epistemically, we can explain, in terms of the semantic intention, how it is that this is a posteriori. But *metaphysically*, we may still worry that the ‘worldly’ content is too trivial to predict and explain in the way laws of nature are supposed to.

Remember, though, that on this view, the necessity of laws of nature does not rule out worlds we might otherwise describe as worlds with different laws of nature, or at least, where our laws do not obtain. There are at least two sorts of such worlds: worlds that are ‘wildly different’, with extra properties we don’t have here, and worlds that are ‘familiar’, but where objects that seem to have the same, or very similar properties, act differently. The necessitarian says, of these worlds, that they do not contradict his claim. As above, the view will be that in these worlds either (a) the actual laws of nature obtain (or are at least true), but they are moot as nothing has the properties covered by these laws (and there may be laws governing other properties which nothing has in our world) or (b) the laws do not obtain, but only because nothing has the properties. (I will proceed using (a), but it is easily be translated for (b).)<sup>31</sup>

Once we see that on this view, while our laws are necessary, they may still fail to have any application in many worlds, we can also appreciate that there are laws that obtain in these other worlds which are equally ‘innocuously’ true in our world. That is, our world, with respect to those worlds, is just like those worlds, with respect to our world and laws. In effect, while we might have thought that necessitarianism was the view that all worlds have all and only our laws, in fact, all the arguments in support of the necessity of our laws equally supports the necessity of *all possible* laws. Worlds do not differ in their laws, but in what properties are instantiated, and thus, which laws, as we might say, are ‘active.’ And this, precisely, *can* be a matter of scientific discovery, and whether a law has application is contingent. On the view of properties considered here, discovering ‘the laws’ and which properties are instantiated go hand in hand. We don’t *really* have a handle on the properties—which are individuated by their dispositions—until we know what the laws—that is, the dispositions—are. Of course, we can have enough of a handle to *refer* to them, just as we can refer to individuals without knowing their essences. But ‘F’ is going to have its extension—actual and possible—governed by ‘the disposition had/conferred by things to which we apply ‘F’ (or however we are guiding our ‘F’ judgments), and there are ever so many possible dispositions that might be had by things so identified. There are many dispositions, and corresponding laws, which might be had by things that ‘look’ like this. Given how the terms are being used (by hypothesis), whatever the disposition/law *is*, it is going to be individuated *by* that disposition/

<sup>31</sup> The view, and my discussion of it, may be usefully compared to what the world of individuals, and our discovery and understanding of it is like, when employing Leibniz’s notion of complete individual concepts.

law, and so there is a law/essential disposition that will be expressed there (necessarily, what has F has D), and one which is, as I have urged, trivial. But it is not trivial that it is *active*—that the properties are instantiated. So scientists can find out that there *are* things with these dispositions, and so that this law has application. Both are contingent. Of course, if one is not engaged in the sort of philosophical enterprise we are, there will be no reason to be *thinking* ‘which of these tautologies has application?’ as opposed to ‘what are the laws?’. Indeed, given what the laws are, on this view, one can idly spin out, a priori, endlessly many ‘laws.’ But what one would need to do is to find out which are *our* laws, that is, which ones apply. (One can also be finding out that things that have *these* dispositions also have *those* dispositions. They can also find out that some dispositions are, or are not, basic. Again, all potential fodder for laws, but all contingent—though of course, all can be ‘turned into’ something necessary by intending or deciding to constrain counterfactual application by these empirically discovered features.) My proposal is that all the scientific work of prediction and explanation can be done with the contingent claims that objects *do* have these dispositions/properties, and that things with these properties/dispositions also have those. And while it may be important that what is cited needs to be capable of supporting counterfactuals, it need not hold in *all* worlds (and it won’t, unless our semantics generates it.)

This overall account here is fundamentally neutral on whether the laws *are* necessary. Of course, if the laws are not necessary, then it is not true that all the laws hold in all worlds, and we should not see scientific work as ‘selecting’ which ‘trivial’ laws have application and which precise properties and dispositions are instantiated. But I was never proposing that this is how scientists see themselves working. It is a ‘rational reconstruction’ from within the framework drawn out from dispositional essentialism/law necessitarianism. In practice, unless one is a philosopher (and one of a particular sort, at that), one will not describe oneself as ‘selecting’ rather than ‘finding out how these properties behave’—nor is there any need to. There is nothing one really needs to *do*, to be doing one, rather than another. The difference only shows up in modal discourse, and how one semantically governs novel applications of the terms in question—particularly counterfactuals, both near and far. Using the terms in one way, the dispositions and laws are contingent, and there is no puzzle about empirical, non-trivial content. Use the terms another way, and the statements are necessary and triviality threatens—but we put the content in determining what is instantiated. The same empirical work is done in both cases—it is just redescribed, as needed, because there are slightly different vocabularies being employed.

## 6 Conclusion

For all this, it is very interesting to consider the suggestion that our uses of these terms may depend on—or rather, defer to—science in these unexpected ways. Indeed, this is what makes the results *seem* so empirical, and perhaps makes it easy to dismiss the suggestion that what is necessary here—and so, some of what is true here—can depend on our concepts or conventions. It allows Alice Drewery, for instance, to say that “the necessary truth that the existence of salt depends on

Coulomb's law, or something sufficiently like it, is a purely empirical matter" (2005, 388). So again, my claims here are entirely second-order and interpretive. Whether there are fundamental dispositions is an empirical question. Whether all fundamental properties are dispositional is also empirical.<sup>32</sup> Whether certain higher-order properties or substances essentially obey certain laws, or have certain dispositions—*partly* empirical, in ways that are hard to predict. I only insist that if something is found to be necessary, or essential, the modal force comes from our rules, and the necessity does not rule out any *real* possibilities, but only how we describe them. This, of course, is just to restate the familiar general conventionalist [or rationalist (Chalmers)] line on necessity in general, and a posteriori necessity in particular. But I hope we have seen that for all the philosophical interest there may be in dispositional essentialism, and its possible relation to the necessity of laws, none of the considerations do anything to make us rethink that general position, and indeed, they fit the mold perfectly, only illustrating that our rules may be even more opaque and open to details of empirical specification than the cases of 'water' and 'gold' might make us think. Put a bit differently: if the conventionalist/rationalist analysis of Kripke/Putnam a posteriori necessities is correct, then we have every reason to think the same of any a posteriori necessities in connection with dispositions and laws.<sup>33</sup>

## References

- Beebe, H. (2002). Contingent laws rule: Reply to bird. *Analysis*, 62, 252–255.
- Biggs, S. (2011). Abduction and modality. *Philosophy and Phenomenological Research*, 83(2), 283–326.
- Biggs, S., & Wilson, J. (2019). Abduction versus conceiving in modal epistemology. *Synthese*, 198(Suppl 8), 2045–2076.
- Bird, A. (2001). Necessarily, salt dissolves in water. *Analysis*, 61(4), 267–274.
- Bird, A. (2002). On whether some laws are necessary. *Analysis*, 62(3), 257–270.
- Bird, A. (2007a). *Nature's metaphysics: Laws and properties*. Oxford University Press.
- Bird, A. (2007b). A posteriori knowledge of natural kind essences: A defense. *Philosophical Topics*, 35(1/2), 293–312.
- Bird, A. (2007c). The regress of pure powers? *Philosophical Quarterly*, 57(229), 513–534.
- Carroll, J. (1994). *Laws of nature*. Cambridge University Press.
- Chakravartty, A. (2007). *A metaphysics for scientific realism*. Cambridge University Press.
- Chalmers, D. (1996). *The conscious mind*. Oxford University Press.
- Chalmers, D. (2002). Is conceivability a guide to possibility? In *Gendler and Hawthorne conceivability and possibility*.
- Chalmers, D. (2006). Two-dimensional semantics. In E. Lepore & B. Smith (Eds.), *The Oxford handbook to the philosophy of language*. Oxford University Press.
- Chalmers, D. (2012). *Constructing the world*. Oxford University Press.

<sup>32</sup> Well, maybe. There is the threat of a vicious regress if all (basic) properties are dispositional, though Bird (2007c) has argued, borrowing an idea from Dipert (1997), that the regress can be avoided if the world can be represented as an asymmetric graph. See Oderberg (2014) for a reply, and Hildebrand (2014) for a different reason for thinking some fundamental properties must be categorical.

<sup>33</sup> And, as concerns the more general theme of this volume, this will apply as well to any purported neo-Aristotelian essences. After all, whatever else essences are, they are had necessarily, and the epistemology of essence has to be adequate to justifying claims of metaphysical necessity, and dealing with apparent contrary possibilities. So versions of the problems and arguments presented here can easily be applied to any supposedly substantive proposals of such essence.

- Chalmers, D. (2014). Strong necessities and the mind-body problem: A reply. *Philosophical Studies*, 167(3), 785–800.
- Choi, S., & Fara, M. (2021). Dispositions. In *The Stanford encyclopedia of philosophy*. <https://plato.stanford.edu/archives/spr2021/entries/dispositions/>
- Coppock, P. (1984). Review of Nathan Salmon. *Reference and Essence*, *Journal of Philosophy*, 81(5), 261–270.
- Demarest, H. (2017). Powerful properties, powerless laws. In J. D. Jacobs (Ed.), *Causal powers* (pp. 38–53). Oxford University Press.
- Dipert, R. (1997). The mathematical structure of the world: The world as graph. *The Journal of Philosophy*, 93, 329–358.
- Drewery, A. (2005). Essentialism and the necessity of the laws of nature. *Synthese*, 144(3), 381–396.
- Dumsday, T. (2013). Laws of nature don't have ceteris paribus clauses, they are ceteris paribus clauses. *Ratio*, 26(2), 134–147.
- Ellis, B. (2001). *Scientific essentialism*. Cambridge University Press.
- Ellis, B. (2006). Looking for laws. *Metascience*, 15, 437–441.
- Fales, E. (1990). *Causation and universals*. Routledge.
- Hendry, R., & Rowbottom, D. (2009). Dispositional essentialism and the necessity of laws. *Analysis*, 69(4), 668–677.
- Hildebrand, T. (2014). Can bare dispositions explain categorical regularities? *Philosophical Studies*, 197(3), 569–584.
- Jaag, S. (2014). Dispositional essentialism and the grounding of natural modality. *Philosopher's Imprint*, 34, 1–21.
- Jackson, F. (1998). *From metaphysics to ethics: A defense of conceptual analysis*. Oxford University Press.
- Johnston, M. (1992). How to speak of the colors'. *Philosophical Studies*, 68(3), 221–263.
- Kripke, S. (1980). *Naming and necessity*. Harvard University Press.
- Locke, J. (1689). *Essay concerning human understanding*.
- Martin, C. B. (1994). Dispositions and conditionals. *Philosophical Quarterly*, 44(174), 1–8.
- McKittrick, J. (2003). The bare metaphysical possibility of bare dispositions. *Philosophy and Phenomenological Research*, 66, 349–369.
- Meincke, A. S. (Forthcoming). Dispositionalism: Between metaphysics and the philosophy of science. In Meincke (Ed.), *Dispositionalism. Perspectives from metaphysics and the philosophy of science*. Dordrecht, Netherlands.
- Molnar, G. (1999). Are dispositions reducible? *Philosophical Quarterly*, 49(194), 1–17.
- Molnar, G. (2003). *Powers: A study in metaphysics*. New York: Oxford University Press.
- Mumford, S. (2004). *Laws in nature*. Routledge.
- Mumford, S. (2006). The ungrounded argument. *Synthese*, 149, 471–489.
- Oderberg, D. (2014). The world is not an asymmetric graph. *Analysis*, 71(1), 3–10.
- Psillos, S. (2002). Salt does dissolve in water, but not necessarily. *Analysis*, 62(3), 255–257.
- Putnam, H. (1975). *The meaning of 'meaning' in mind, language and reality: Collected papers* (Vol. 2). Cambridge University Press.
- Quine, W. V. (1960). *Word and object*. MIT Press.
- Roberts, A. (Forthcoming). From physical to metaphysical necessity. *Mind*.
- Shoemaker, S. (1979). Identity, properties and causality. *Midwest Studies in Philosophy*, 4, 321–342.
- Shoemaker, S. (1980). Identity and cause. In P. van Inwagen (Ed.), *Time and cause* (pp. 109–135). D. Reidel.
- Sidelle, A. (1989). *Necessity, essence and individuation*. Cornell University Press.
- Sidelle, A. (1992a). Rigidity, ontology and semantic structure. *Journal of Philosophy*, 89(8), 410–430.
- Sidelle, A. (1992b). Identity and the identity-like. *Philosophical Topics*, 20(1), 269–292.
- Sidelle, A. (2002). *On the metaphysical contingency of laws of nature*. Oxford University Press.
- Swoyer, C. (1982). The nature of natural laws. *Australasian Journal of Philosophy*, 60, 203–223.
- Tugby, M. (2016). Universals, laws, and governance. *Philosophical Studies*, 173(5), 1147–1163.
- Unger, P. (2005). *All the power in the world*. Oxford University Press.
- Vetter, B. (2009). Review of bird (2007). *Logical Analysis and History of Philosophy*, 12, 320–328.
- Vetter, B. (2012). Dispositional essentialism and the laws of nature. In A. Bird, B. Ellis, & H. Sankey (Eds.), *Properties, powers, and structures: Issues in the metaphysics of realism*. Routledge.
- Vetter, B. (2015). *Potentiality*. Oxford University Press.
- Williams, N. E. (2019). *The powers metaphysic*. Oxford University.

- Yablo, S. (2000). Textbook kripkeanism and the open texture of concepts. *Pacific Philosophical Quarterly*, 81(1), 98–122.
- Yates, D. (2013). The essence of dispositional essentialism. *Philosophy and Phenomenological Research*, 87(1), 93–128.

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.