

Replies

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Abstract

This paper responds to the contributions by Alexander Bird, Nathan Wildman, David Yates, Jennifer McKittrick, Giacomo Giannini & Matthew Tugby, and Jennifer Wang. I react to their comments on my 2015 book *Potentiality: From Dispositions to Modality*, and in doing so expands on some of the arguments and ideas of the book.

Keywords: Dispositions; powers; potentiality; modality

I am very grateful to Lorenzo Azzano and Andrea Borghini, and to the seven contributors for this special issue, from whose papers I have learned a great deal. I am deeply honoured (and quite delighted) by the time and effort they invested in thinking about potentiality in general, and about *Potentiality* in particular. In what follows, I will not be able to address every point in as much detail as it deserves, and in some cases I will only indicate the direction in which I think further discussion should go. These are not rhetorical devices, but rather expressions of my hope that these discussions will continue.

1 Dispositions and conditionals: Response to Bird

Potentiality, like many metaphysical topics, can be approached from two directions. We can come to it from ‘the manifest image’, our everyday understanding of our own abilities and the dispositions of the objects in our environment. Or else, we can approach it from ‘the scientific image’, taking our best scientific theories, perhaps interpreting them and drawing whatever conclusions can be drawn from them.

There is no guarantee that the two images will converge; often, it is argued that they are in opposition to each other. One tenet of my book is that in the case of potentiality, the two images happily converge on a common picture – and in fact that they do so twice over. First, both images make it natural to take potentiality as a primitive, not to be reduced away as it would be in a Humean ontology. In this, I believe, Alexander Bird and I are in agreement. Second, both images suggest a conception of potentiality or – to use the more common term from which I start – of dispositions that is very different from the conception which philosophers have standardly accepted. It is here that Alexander Bird disagrees with me.

In chapters 2–3 of *Potentiality*, I rejected the orthodox conception which links dispositions, either reductively or non-reductively, to counterfactual conditionals, and developed instead a conception of dispositions that links them to graded possibility. To characterize ordinary dispositions such as fragility, instead of

(F-S) x is fragile iff were x subjected to a stress, x would break,

I proposed

(F-V') x is fragile iff x could break easily.

My initial argument for (F-V') included both semantic and metaphysical considerations, semantics being, I take it, one of our best guides to the 'manifest image'. I then turned to the scientific image to discuss 'nomological dispositions' (ch.2.6), i.e., dispositions that encode a genuine law of nature, and argued that for non-semantic reasons they, too, are not best captured by a conditional conception. (The argument is a generalization of my criticism of Bird 2007, as formulated in Vetter 2012.) Rather, I argued, nomological dispositions are best integrated into the picture that arose from the manifest image: potentiality, which is characterized only by a manifestation, comes in degrees; ordinary dispositions such as fragility are situated at the lower end of the degree spectrum, while nomological dispositions are to be found at its higher, maximal end.

I did not then and I do now take myself to be 'drawing conclusions about fundamental aspects of modality from evidence regarding our use of everyday expression' (Bird, p. 9). Semantic considerations about everyday expressions illuminate the manifest image, and the concepts we use even in understanding the scientific image. And being clear on our concepts is useful even when we go on to apply them to understand the scientific image. But it is considerations about nomological dispositions themselves, not about semantics, that justify my including them in the picture which is suggested by the semantics.

So much for methodology. Bird, however, has objections both to my claims about semantics (the manifest image) and about nomological

dispositions (the scientific image). I believe that I can dispel the first objection, but the second will require more extensive discussion than I can provide here (and now).

Let me take up the semantic objection first, then. With regard to (F-V), Bird asks: ‘How is the “easily” qualification supposed to be understood?’, and answers: ‘It is to be understood, as others have done, in terms of close possible worlds’ (p. 4), i.e. as x breaking in at least one (or a few) of the possible worlds that share our laws and have ‘exact matches in matters of particular fact’ (p. 4, fn. 2). He then goes on to provide a counterexample to (F-V) thus understood, where a fragile glass is from its creation so shielded that it does not break in any close world, i.e., its fragility is always masked. His diagnosis is that I have mistaken the force of ‘easily’, which he thinks qualifies the implicit stimulus and not the nature of the modality involved.¹

My response is different from the one that Bird envisages (on p. 5f.), however. For I do *not* appeal to closeness as understood here. Rather, I argue that the easy possibility involved in dispositions is best captured by a *proportional* model, if it is captured in possible-worlds terms at all: whether or not an object x is fragile is a matter of x ’s breaking in a *sufficient proportion* or relevant worlds (Vetter 2015, 72ff.). Those relevant worlds, in turn, are not supposed to be the close worlds of Lewisian semantics. Rather, they should ‘provide maximal variation in the external circumstances. The proportion of cases in which a vase breaks ... should not depend on factors that are external to the vase’ (Vetter 2015, 77; see also Vetter 2014).² Bird’s shielded glass, on this understanding, will break in as many of the relevant worlds (or cases) as one that is not so shielded, because its being shielded will not be held fixed across the relevant worlds. (For more on the proportional understanding of dispositions, see sections 2 and 3, and the contributions by Wildman and Yates to which they respond.) This, I believe, rebuts Bird’s first worry.

Bird’s second worry, however, is not so easily dispelled. So let us turn to that worry: the ‘problem of non-conditional possibilities’.

The problem arises from three assumptions (together with some observations on modal logic):

1. On a dispositionalist view all modality has to depend (or, Bird says, supervene) on dispositions at the fundamental level.

¹Note that Lowe (2011) and Aimar (2018) would both agree with Bird on the reading of ‘easily’ and still opt for a possibility account of dispositions. I will not take that route, but I think it is a live option.

²Note that this applies, as it stands, only to intrinsic dispositions. For extrinsic dispositions, those external factors on which the disposition depends should not be varied; see Vetter 2015, 75f., fn.10.

2. All dispositions that are fundamental are nomological dispositions (i.e. dispositions that encode a law of nature).
3. All nomological dispositions have an internal conditional structure.

The first assumption arises simply from the idea that everything is grounded in the fundamental level; I will not question it in what follows. The second assumption is natural given that we take fundamental physics to be our best guide to the fundamental level. The third assumption is one which I shared in Vetter 2015, chs. 2.5-2.6 and 3.5; what I argue there is that the conditional nature of nomological dispositions is better characterized by my view of dispositions, which takes the conditional nature to be embedded in the disposition's manifestation, rather than giving the disposition itself the structure of a (counterfactual) conditional. Given the three assumptions, however, the fundamental dispositions are all conditional: they give rise to possibilities (or indeed necessities) for certain conditionals to be true, but they do not yield any non-conditional possibilities.

The result is somewhat ironic since my view was precisely characterized by its focus on possibilities and *not* conditionals; accordingly, the problem starts out in Bird's paper as a problem for the standard conception of dispositions and an advantage for my view. Integrating the laws of nature into the picture, however, appears to force conditionals back onto us and thus makes the problem raise its head even within the alternative conception of dispositions. What this makes clear, however, is that the problem is not a specific problem for my (non-conditional) account of dispositions; it is rather a problem for dispositionalism about modality quite generally.

I do not have the space here to provide a full solution to this interesting problem, nor am I certain what a solution would look like. But an obvious place to look for a solution is in the assumptions that I have made explicit above.

Consider assumption 2: Are all fundamental dispositions nomological dispositions? This does not seem obvious to me. Even if physics supplies nothing but nomological dispositions, and (part of) physics is our best science of the fundamental, it does not follow that physics says *all there is to say* about the fundamental level. The fundamental may be thought to include some logical facts, but it does not follow that physics must incorporate the study of logic. More to our present point, if I am right about the logic of potentiality, then any way that things are fundamentally entails their having the potentiality to be that way, and I see no reason why that potentiality should not equally count as fundamental (see section 5 for more on this). If, further, some of the way things are are not themselves conditional (if, for instance, some fundamental properties are categorical), then we will have non-

conditional fundamental potentialities. This is not enough for present purposes since I have not yet argued for any potentialities that might ground non-actualized, non-conditional possibilities. Still, these considerations open up some space for rejecting assumption 2 and evading Bird's problem.

Alternatively, we might question assumption 3: Are all nomological dispositions conditional in form? In some other cases of apparently conditional dispositions, such as water-solubility, I have argued that the manifestation is really to be understood in *causal* terms (Vetter 2015, 96-98; Vetter 2014, 148-151). Thus water-solubility, on my view, is not the disposition to dissolve *if* put in water, but rather the disposition to dissolve-in-water, that is, to be *caused* by (immersion in) water to dissolve. Perhaps I was wrong to build conditionals into the manifestation of the nomological dispositions; perhaps something like this causal story would work better there too.³ A disposition to be caused by Φ ing to Ψ seems a better candidate for implying the possibility of both Φ ing and Ψ ing than a disposition to Ψ -if- Φ . But it remains to be seen, first, how this is best integrated with the quantitative nature of the nomological dispositions, and second, whether it is borne out by our best (philosophy of) physics.

There are, then, some directions in which one might go to solve Bird's problem of non-conditional possibilities. But I suspect that the problem will trouble dispositionalists for some time to come.

2 Degrees of potentiality and possible worlds: Response to Wildman

Nathan Wildman offers three objections to the account of potentiality and of possibility that I develop in Vetter 2015. I will here take up the first objection.⁴

Wildman's objection (in section 2 of his paper) is directed against the proportional understanding of the graded possibility involved in dispositions which I have set out in section 1 in response to Bird's

³For independent reasons, I do believe I was wrong to build a material conditional into the manifestation of nomological dispositions. For as Ralf Busse has pointed out, that threatens triviality: things might possess the disposition to Φ -if- Ψ simply by having the disposition to not- Ψ (see Busse 2015). Whatever solves this problem might solve the problem of non-conditional possibilities as well.

⁴I suspect that the second objection (appealing to the distinction between being destructible and being perishable) can be dealt with on the level of semantics, not metaphysics, by writing the relevant kind membership as an additional condition into the truth conditions; or perhaps even on the level of pragmatics. The third objection can be avoided, as Wildman points out, by adopting 'permanentism' or eternalism. For reasons sketched in Vetter 2015, ch.7.9, I believe that I am committed to that view anyway.

criticism. To have a disposition, on the view I defend, is simply to have a potentiality to a sufficient degree; and degrees are best captured in comparative terms. Wildman captures my view of such comparative degrees in the principle

PROPORTION x has [a] potentiality [to] P to a greater degree than y iff the proportion of worlds where x has its relevant intrinsic features and P s is greater than the proportion of worlds where y has its relevant intrinsic features and P s. (p.4)

That is, indeed, the gist of my conception of degrees, insofar as it is to be captured in terms of possible worlds – and insofar as it applies to intrinsic potentialities. With extrinsic potentialities, we would have to add the relevant extrinsic features along with the intrinsic ones.

Wildman then develops an ingenious counterexample to PROPORTION, which has the following structure. Let P be a process with a certain necessary precondition (in Wildman’s example, P is killing humans by venom, and the necessary precondition is the existence of humans). Now let y , but not x , be essentially tied to the obtaining of that precondition (in Wildman’s example, y is a cybernetic cobra that is essentially made by humans, x is an ordinary cobra with no such essential ties to humans). Then the relevant worlds for x will include a large class of worlds where x does not P simply because the precondition is not met. Since y is by its essence precluded from existing in such worlds, the relevant worlds for y will not include a corresponding class. As a result, the proportions are skewed: y (the cybernetic cobra) will have a much higher proportion of P -worlds among the relevant worlds than x even if x intuitively has the potentiality to P to a greater degree (i.e., has a higher proportion of P -worlds among those where the necessary condition is satisfied).

So we have a counterexample to PROPORTION: x has the potentiality to P to a greater degree than y , but its proportion of P -worlds among the relevant worlds is not higher, and may indeed be much lower, than y ’s. Wildman concludes that the ‘possibility of such cases strongly calls into question understanding talk of potentiality degrees in terms of talk of proportions of worlds’ (p.6).

I would like to consider three possible responses to this counterexample.

A first response is to point out that Wildman’s example is one of an *extrinsic*, not an intrinsic potentiality. Whether or not something is venomous to humans plausibly depends on humans, in two ways: it depends on the existence of humans, and on their physiology. But for extrinsic potentialities, PROPORTION cannot be upheld as it stands in any case: we will have to consider worlds where not only x has its relevant intrinsic features, but where the relevant external factors also

hold. Worlds in which humans have evolved to have a different physiology that makes them immune to the cobra's venome are not relevant; and neither are worlds where there are no humans. Writing the existence and physiology of humans into the conditions that circumscribe the relevant worlds clearly gets rid of Wildman's counterexample: we need not consider those worlds in which x , the ordinary cobra, exists unaccompanied by any humans. However, this response relies on a specific feature of Wildman's case: its extrinsicality. It may not apply to other similar cases; but perhaps it can be generalized.

A second strategy thus generalizes the first. The first response disposed of the troublesome worlds (those where x exists but the preconditions for P ing are not met) by requiring that certain extrinsic features of the objects are held fixed. But we could dispose of them more directly, by simply requiring that, in addition to keeping fixed the relevant intrinsic features of the object in question, at the relevant worlds all relevant preconditions for their P ing are met. (It is a difficult question what makes a precondition 'relevant'; but the same is true for the question what makes an intrinsic feature 'relevant', so I think we can justify postponing that question.) Since the existence of humans is a precondition for their being poisoned, we have again excluded the troublesome worlds in Wildman's example, and have done so in a way that generalizes beyond the extrinsic potentialities. It is obvious that such a response will need to spell out the notion of a 'precondition'. It might do so in conceptual or logical terms; but it might also do so in genuinely modal terms: C is a precondition for P ing iff, necessarily, if anything P s then C . Would it be circular for the potentiality theorist to appeal to modality at this stage, in understanding potentiality itself? No, since PROPORTION is at any rate not meant as a reductive account of degrees. It is merely a formal model, used to capture the formal structure of potentialities' degrees.

This brings me to a third, and indeed my preferred response, which may be combined with the previous one but can also stand on its own. It is that PROPORTION was never meant to be more than a formal model, capturing or at least approximating the formal structure of degrees of potentiality. Wildman considers a response along these lines and complains that it 'makes potentiality degrees even more mysterious' (p.7) and that 'for those of us who struggle to understand potentiality degrees, this [kind of response] is cold comfort' (p.7). I respond that Wildman does not seem to struggle to understand potentiality degrees: he has a very clear grip, in his own counterexample to PROPORTION, on the question of which cobra is more venomous than the other. That kind of grip, like our knowledge of what can and can't happen, is prior to any possible-worlds semantics; the semantics, after all, is modelled in such a way as to capture our intuitive judgements. Wildman's point, of course, is that he and others fail to have a more

theoretical, philosophical understanding of potentiality degrees except in terms of possible worlds. I agree that more needs to be said about potentiality degrees than I do in my book (I have tried to say a little more in Vetter 2018b; see also section 3). What needs to be done, I think, is to carefully reflect on our pretheoretic judgements of potentiality degrees (of this being more fragile than that, of one person being more able to run than another) and their inferential relationships, and to formulate general principles about them (such as a transitivity principle, or a complementarity principle for which I have argued: the more x is disposed to P , the less x is disposed to non- P , and vice versa), which can then be tested against further reflections of our pretheoretic judgement – and so on, until we have reached a kind of equilibrium. What more can we do? The theory I propose takes potentiality as its primitive. New primitives are often met with complaints of unintelligibility. The best that their proponents can do is work with them and show them to be fruitful.

3 Dispositionalist necessity and the role of causation: Response to Yates

In an earlier paper (Yates 2015), David Yates argued that dispositionalism in its most straightforward form (the form I defend) fails to be formally adequate since it does not provide the dispositions we need to distinguish between necessary truths (such as, $2+2=4$) and necessary falsehoods (such as, $2+2=5$). Responding to his paper gave me the opportunity to elaborate further on how I understand degrees of dispositions or potentiality (see Vetter 2018b):⁵

Degrees, I argued, are best understood so as to give rise to a principle of proportionality, such that the degree of any object x 's potentiality to Φ is always indirectly proportional to the degree of x 's potentiality not to Φ . This principle of proportionality, in turn, gives rise to what Yates (in this issue) calls universality: the claim that for all x and Φ , it is always true either that x is disposed to Φ or that x is disposed not to Φ (or, of course, both). Universality in turn implies that objects do have dispositions which are always necessarily manifesting, such as a disposition to be dancing-or-not-dancing, or indeed a disposition to be such that $2+2=4$. Yates had briefly considered but swiftly rejected this response in his 2015 paper under the title 'a plenitude of powers'.

⁵Since Yates prefers the term 'disposition' to my 'potentiality', and I did the same in my response (Vetter 2018b) to his earlier paper (Yates 2015), I will in this section use two terms interchangeably. See section 4 for a more precise explanation of how I intended to distinguish them in Vetter 2015.

The ultimate source of our disagreement, though, is not a matter of whether ontology ought to be plenitudinous or sparse. It is, as Yates makes very clear in his contribution to this issue, our different take on the relation between dispositionality and causation. Yates takes dispositions to be essentially linked with causation; even if we went beyond efficient causal powers (i.e., dispositions to cause events) in our theory of dispositions, we must still maintain some link between dispositions and causation. I, on the other hand, stress the modal aspect of dispositions: they concern what *can* be, and while that is often (and especially in the cases that interest us) linked with causation, it need not be so.

Yates's argument proceeds, not by tackling this disagreement head-on, but by arguing against my principles of proportionality and universality. He agrees that the former implies the latter, and provides counterexamples against both. The counterexamples initially rely on the standard model of dispositions as coming with a stimulus and a separate manifestation. The disposition to sing when it rains, for instance, does not appear to be indirectly proportional in its degree to the disposition not to sing when it rains; in fact, Yates argues, one might lack both because rain simply makes no difference to whether or not one sings.⁶

Now, I do not accept the standard model in which a disposition is characterized by a stimulus and a manifestation. Yates notes that 'it is not clear ... whether or not [I take] the argument from degrees to depend on [my alternative conception of dispositions]' (p. 12, fn. 17). That is because I had hoped that the argument did not so depend. But Yates's argument convinces me that it does. So let me outline how my manifestation-only conception of dispositions accommodates Yates's apparent counterexamples.

As Yates points out, my way of dealing with such apparently stimulus-involving dispositions as the disposition to sing when it rains is to pack it all into the manifestation: what Yates has in mind, on my view, is the potentiality to be-caused-by-rain-to-sing. Applying the principle of proportionality to this potentiality, Yates asks where we should apply the negation: if we give the negation narrow scope, then the potentiality to be-caused-by-rain-to-sing must be indirectly proportional to the potentiality to be-caused-by-rain-*not*-to-sing; if we give the negation wide scope, then our potentiality must be indirectly proportional to the potentiality *not*-to-be-caused-by-rain-to-sing. Yates favours the

⁶I might point out here that I accept dispositions, or rather potentialities, of very low degrees, so the probability of one's singing given rain would not have to be high to warrant the ascription of a potentiality to sing when it rains. This takes care of the final remark. But it does not make the proportionality principle any more appealing when applied to Yates's case.

narrow-scope view and argues, convincingly, that it does not yield proportionality.

However, it should be clear that this is not an instance of the principle of proportionality as I have stated it. On my view, a potentiality comes with a manifestation only. The proportionality principle applies to potentialities with contradictory manifestations: the potentiality to Φ , and the potentiality not to Φ . If we replace Φ with ‘be caused by rain to sing’, then the potentiality not to Φ is the potentiality not to be caused by rain to sing (i.e., it uses the wide-scope negation of Φ). Any temptation to go for a narrow-scope negation is driven by the idea that it is singing, and not the complex property of being-caused-by-rain-to-sing, which is somehow the ‘real’ manifestation of the potentiality in question. But my view leaves no room for a ‘real’ manifestation *within* the manifestation.

Given the wide-scope reading of the negation, Yates agrees that proportionality and hence universality succeeds. In fact, he claims that on this reading ‘universality would be a logical truth: either x is disposed to Φ , or not [x is disposed to Φ]’ (p. 14), because ‘the most natural way to render “ x is disposed not to be caused to sing by rain” in the stimulus-manifestation idiom is: not [x is disposed to sing when it rains]’ (p. 13). Now, what is or isn’t the most natural reading of a sentence in the stimulus-manifestation idiom is neither here nor there, since we are dealing with the alternative, manifestation-only, conception.⁷ But there is an independent objection in the remark that I have quoted: it says that the wide-scope reading collapses into a negated disposition ascription. That would make my principle trivial indeed, but it is not true. We can distinguish between something’s having a potentiality not to be caused by rain to sing, and its lacking the potentiality to be caused by rain to sing. The former, but not the latter, comes in degrees: one can be more or less disposed not to be caused by rain to sing, with the maximal degree amounting to a (relative) necessity of never being caused by rain to sing. Of course, the distinction is thin, given my own argument for proportionality, but it is nevertheless there.

I do, therefore, hold on to the principles of proportionality and universality, and continue to hold that there are potentialities which are necessarily always manifested, such as the potentiality to be such that $2+2=4$. Yates, however, has another objection. Even if proportionality and universality hold for values of Φ that are suitable as manifesta-

⁷Yates may have in mind here the idea that the stimulus-manifestation idiom is so much more natural that I must be able to translate my own idiom back into it. I tend to believe, and I have argued in Vetter 2014, that the stimulus-manifestation idiom has no pretheoretical force, and I would venture to claim that appearances to the contrary stem from contemporary philosophers being raised on a dogma that dates back to classical empiricism and its concern with verification.

tions of dispositions, the argument should not be carried over to such properties as *being such that $2+2=4$* , for that property is simply not embedded in the causal nexus. It is here that we return to our ultimate disagreement: how do dispositions relate to causation? In Vetter 2018b, I cite examples from Nolan 2015, as well as from physics to show that some dispositions have manifestations that are non-causal. However, Yates points out that Nolan’s dispositions can at least be taken to be grounded in more fundamental causal dispositions, and that it is controversial whether the examples from physics are really non-causal. Neither applies to the disposition or potentiality to be such that $2+2=4$, if there is one: it is uncontroversially and fundamentally uncausal.

We have come full circle to our initial and basic disagreement: are there dispositions that are entirely acausal, i.e., not embedded at all in the causal nexus? Yates insists that there aren’t, while I hold that there are. I do agree with Yates that our initial and paradigmatic examples of dispositions and hence of potentialities, both from ordinary life and from science, are causal in some sense. If they were not, then recognizing them would be less useful for our practical purposes of manipulating objects and predicting their behaviour. In philosophy, we inevitably generalize beyond the initial and paradigmatic examples. In doing so in the present case, we *can* hold on to the causal element and stop where it gives out; we may even reserve a term, be it “power” or even “disposition”, for the result of such a generalization. But note that this would be a decision, not an analysis of an already established usage: “disposition”, in the philosopher’s vernacular, is a theoretical term. And instead of stopping where causation gives out, we can also generalize further and notice that there is a modal element involved in our initial range of cases which can in principle be separated from the causal one. It is certainly not a conceptual confusion to say that some fundamental properties are dispositional (in the sense of “are like our initial examples of dispositions”) but acausal; Yates provides reasons against the truth of such a claim, but not against its conceptual coherence. (For more examples, see Vetter 2015, 98.) Thus it seems we *can* generalize beyond the confines of causal dispositions; and if we can, why shouldn’t we do so where it fits our theoretical purposes? One response to this question is that without integration into the causal network we have no reason to believe that such properties really exist. But I would beg to differ: causation is but one kind of explanation, and we might as well take integration into the *explanatory* order of the world as evidence of existence. (In fact, I am inclined to think that the big metaphysical questions are not questions about existence at all, but are rather questions about the explanatory order of the world; see also below, section 5.) And if that is so, then I believe that there

is plenty of space for such properties as maximal potentialities, which explain, for instance, why things have no potential for doing otherwise.

This does not, of course, settle the debate but merely serves to point to the more general and in some sense deeper issues that underly it: David Yates's and my different conceptions of dispositions are rooted, I suggest, in our different conceptions of metaphysics itself. But to discuss those directly is a task that I must leave for another time.

4 Degrees, dispositions, and the metaphysics of potentiality: Response to McKitrick

Potentiality is rather handwaving about the exact metaphysics of potentialities: are they universals, and if so, are they universals of the Aristotelian or of the Platonic variety? Or could they be fit into a nominalist metaphysics? My hope was that what I said in the book was compatible with a wide array of answers to these questions. Jennifer McKitrick challenges this hopeful attitude.

There is much that I agree with in McKitrick's paper. She is certainly right, for instance, that neither Class Nominalism nor Resemblance Nominalism are viable options for an account of potentialities along the lines that I envisage, despite my officially non-committed stance on the metaphysics of properties in *Potentiality*.

Rather than going through her many arguments one by one – which, desirable as it would be, is impossible in the limited space I have here – I would like to address one central premise that runs through several of her arguments, and which concerns the relation of a determinable potentiality to its determinates, the specific degrees of that potentiality. On my behalf, McKitrick reconstructs an argument that appears to show that the determinable potentiality is, on my view, more fundamental than the determinate, degreed, potentialities. She takes this claim not as in itself a *reductio ad absurdum* of my view, but rather as a view which a metaphysics of potentialities must, and which most candidate metaphysics fail to, accommodate.

I do not endorse the claim that a determinable potentiality is more fundamental than its determinate degrees, and I do not think that I am committed to the claim. To show why, let me begin by reproducing the crucial premises of the argument which McKitrick has constructed on my behalf (the premises are quoted from McKitrick, p.4; quotations and page numbers within the premises refer to Vetter 2015):

3. A disposition is a degree of a potentiality: “having a disposition such as fragility is a matter of having the right potentiality (in this case the potentiality to break or be broken) to a contextually sufficient degree” (22).

5. Potentialities ground dispositions: “The notion of a potentiality has been introduced as the metaphysical background to the context-dependent notion of a disposition” (96).

If these two premises are granted, it follows that determinable potentialities ground at least some of their determinates; and then it would be arbitrary not to claim that they ground *all* of their determinates.

I do not accept either premise 3 or premise 5 as stated in McKittrick’s words. Explaining why not gives me a welcome opportunity to further clarify the relation between dispositions and potentialities, or rather: between the notion of a disposition and that of a potentiality.

In Vetter 2015, 80-84, I claim that the relation between a given disposition term, say ‘fragile’, and the corresponding potentiality, i.e., the potentiality to break, is analogous to that between ‘tall’ and height. To clarify why I reject premises 3 and 5, I will again refer to this analogy.

Consider, first, premise 3, and its analogue with ‘fragile’ replaced by ‘tall’ and ‘potentiality’ by ‘height’:

- 3’. Tallness is a degree of height: “[being tall] is a matter of having [height] to a contextually sufficient degree” (22).

Clearly, 3’ is false: tallness is not itself a degree of height. To start with, there is no one property of tallness: ‘tall’ expresses different properties in different contexts. Given a particular context, of course, ‘tall’ does express a particular property. But that property is not identical with any particular (degree/determinate of) height. There are many determinate heights that can make an individual satisfy the predicate ‘is tall’, as interpreted in a given context. We can think of the property expressed by ‘is tall’ in a given context as involving something like existential quantification: as the property of having *some* determinate height above a given threshold. Thus an individual’s satisfying ‘is tall’, as interpreted in a given context, depends on or is grounded in the individual’s particular determinate height property; but the property expressed is not identical with any particular determinate height property.

For exactly analogous reasons, 3 is false: fragility is not itself a degree of the potentiality to break. To start with, there is no one property of fragility: ‘fragile’ expresses different properties in different contexts. Given a particular context, of course, ‘fragile’ does express a particular property. But that property is not identical with any given degree of the potentiality to break. There are many determinate degrees of the potentiality to break that can make an object satisfy the predicate ‘is fragile’, as interpreted in a given context. We can think

of the property expressed as involving something like existential quantification: as the property of having *some* determinate degree of the potentiality to break that is above a given threshold. Thus an individual's satisfying 'is fragile', as interpreted in a given context, depends on or is grounded in the individual's determinate of the potentiality to break; but the property expressed is not identical with any particular determinate potentiality.

Thus premise 3 is misleading: it is not true that a disposition *is* a degree of a potentiality, though it is true that the property expressed by a dispositional predicate in a given context depends on the degree of the potentiality.

Premise 5, too, is false, as is its analogue with 'tall' and 'height:

- 5'. Height ground tallness: "The notion of [height] has been introduced as the metaphysical background to the context-dependent notion of [tallness]" (96).⁸

With the term 'metaphysical background', as quoted in 5, I did not intend to introduce yet another redescription of grounding. Rather, I meant to describe the contrast between a *semantic* phenomenon, the context-sensitive variability of a predicate's intension, and the metaphysics that provides the material for that variation. The metaphysical background in this sense is the range of phenomena from which the context-sensitive expression picks its semantic values, depending on the context.

Height, both the determinable and its determinates, are the metaphysical background for 'tall', since it is from these properties that any context selects semantic values for 'tall' (not by picking one, but by setting a threshold, as described above). This is not to say, as 5' says, that height (the determinable) grounds tallness. Rather, and as we have seen above, it is the instantiated determinate that does the grounding in any particular case.

Likewise, potentiality, both determinable and determinate, is the metaphysical background for 'fragile', since it is from these properties that any context selects semantic values for 'fragile' (not by picking one, but by setting a threshold, as described above). This is not to say, as 5 says, that the determinable potentiality to break grounds fragility. Rather, and as we have seen above, it is the instantiated determinate/degree that does the grounding in any particular case.

In short, 'potentiality' is contrasted with 'disposition' not as determinable with determinate, but rather as the metaphysical level, including both determinable and determinates, with the semantic. Once this

⁸5' is false also because that is not how the notion of height has been introduced into discourse. But let's disregard this disanalogy; it does nothing to undermine the analogy that I am after.

is recognized, it should be clear that the argument does not go through, and we have no more reason to accept McKittrick's conclusion:

8. Therefore, determinable potentialities are more fundamental than their determinate dispositions: "the general dispositions are not only equally fundamental as the specific ones, they are more fundamental" (57),

than we do to accept the analogous

- 8' Therefore, height is more fundamental than its individual determinates.

But if I reject McKittrick's argument, why do I seem to endorse its conclusion in the quotation she gives under 8?

The quotation comes from a passage where I discuss, and ultimately reject, the conditional conception of dispositions (see section 1). Within that conception, I argue, we must distinguish between the general disposition to break if struck, or to exert a force of $F = \epsilon \frac{eq}{r^2}$ when at distance r from an object with charge q ; and the specific disposition to break if struck with a force of 8.35N, or to exert a repulsive force of $8 \times 10^{-8}N$ when at a distance of $5.3 \times 10^{-11}m$ from a charge of $1.6 \times 10^{-19}C$. With that distinction in place, I ask which of these dispositions are more fundamental, the general or the specific. I argue that the conditional conception favours the specific dispositions, while independent philosophical considerations on grounding and fundamentality would favour the general dispositions, thus questioning the adequacy of the conditional conception. The independent philosophical considerations that I adduce draw strongly on Jessica Wilson's arguments to the effect that determinables can be fundamental. But I am explicit that general dispositions do not relate to specific ones as determinables to determinates (Vetter 2015, 53; 55): unlike a determinable, whose instantiation necessitates the instantiation of one of its determinates to the exclusion of all others, instantiating a general disposition necessitates instantiation of all or at least very many of the corresponding specific dispositions.

While my argument about general and specific dispositions thus makes use of Wilson's arguments, I never make the corresponding claim about determinable potentialities and their degree-determinates, let alone the stronger claim expressed in McKittrick's 8. My reasons for not making that claim are very much the same reasons that McKittrick gives on p. 15. Exactly how we are to understand the relation between the determinable potentiality and its determinates, the individual degrees of potentiality, is a difficult question that I do not address in the book. I suspect, however, that it will be a question that is not specific to the metaphysics of potentiality but rather to be answered by general considerations about determinables and determinates. McKittrick may

very well be right that an answer to this question will have repercussions for our ontology of potentialities in particular, and of properties in general.

The main question posed by McKittrick remains, of course: what is the best metaphysics for the properties that I call potentialities? I will take this question up again in the next section.

5 The metaphysics of potentiality, grounding, and counterpossibles: Reponse to Giannini and Tugby

Like Jennifer McKittrick, Giacomo Giannini and Matthew Tugby ask about the metaphysics of potentialities: are they universals, and if so, are they best understood in Platonist or in Aristotelian terms? Their arguments, which I take to be offered in a constructive spirit, suggest that we (or, at any, rate, I) had better think of potentialities as Platonic universals.

Tugby (2013) has forcefully argued that dispositionalists are committed to a Platonist conception of properties; very roughly, the argument is that if a disposition is individuated (at least in part) by its manifestation, then if anything is to have a disposition to Φ , there must be some property of Φ ing in the first place. On both nominalist and Aristotelian theories of properties, the existence of such a property is dependent on its being instantiated, sometimes and somewhere; only on a Platonist conception could there be a property of Φ ing even if nothing has ever, and nothing ever will, Φ . But clearly things could have such dispositions; hence we should adopt the Platonist conception.

My resistance to such a full-blown Platonist conception is attributed, by Giannini and Tugby, to ‘ontological naturalism’, the ‘doctrine that reality consists of nothing but a single all-embracing spatio-temporal system’ (Armstrong 1981, 149, cited on p. 5). I am not sure that I am an ontological naturalist in this sense; I have certainly not excluded the existence of abstract objects (see Vetter 2015, ch.7.7). As I have briefly indicated above (section 3), I tend to think that the big metaphysical questions are, *pace* the Quinean tradition, not questions about ontology in the sense of ‘what there is’, but are rather questions about the explanatory order of the world or ‘what grounds what’ in Schaffer (2009)’s useful turn of phrase.⁹ What does motivate my approach is not so much a restriction of what there is to the spatio-temporal, but rather an Aristotelian commitment that Wang, in her contribution to

⁹For more on this, see Vetter 2018a and Vetter ms.b; in Vetter 2015, this tendency is manifested in the ontological liberalism professed on p. 29.

this issue, captures with the term ‘*de re* first’. It is simply the idea that our world is primarily one of objects, and that objects should be given pride of place in our metaphysical theories. Among the objects in our world, *concrete*, spatiotemporal objects are certainly paradigmatic, and one motivation for the theory is that we can thus start with something that is deeply familiar and epistemically accessible. But clearly my theory goes far beyond the familiar and ordinarily accessible, and I do countenance abstract objects. So the focus on concrete, ordinary objects is not so much a matter of imposing the restrictive claim that is made by ontological naturalism, but rather the implementation of another Aristotelian idea, that we should start with the familiar (even if the ultimate shape of our theory will turn out rather unfamiliar).

For these reasons, I would not describe myself as an ontological naturalist in the sense at issue in Giannini and Tugby’s paper. Nevertheless, I prefer an Aristotelian view of properties to full-blown Platonism precisely because Aristotelianism puts objects first. In Vetter 2015, ch.7.5, I suggest that the Aristotelian approach is right in thinking that which properties exist depends on how objects are. But unlike standard Aristotelian approaches, I do not claim that a property exists iff it is (sometimes, somewhere) instantiated. Instead, I suggest that a property exists iff it is instantiated, or potentially instantiated, or potentially potentially instantiated, and so forth – in short, there is a property of being Φ just in case something has (or some things have) an iterated potentiality for something to be Φ . (Given axiom T for potentiality, this includes the case where something actually is Φ .) In this way, we obtain a great many more properties than those which happen to be instantiated, and ensure that every potentiality has a property to serve as its manifestation. But unlike the Platonist, we do not make those properties quite independent of the instantiating objects. Giannini and Tugby put this by saying that on my view even ‘unmanifested properties exist in the sense that they are *grounded* in the potentialities of *things*’ (p.15, second emphasis mine; I will note my reservations about the formulation below).

Giannini and Tugby note that this view is ‘dangerously (or, [they] think, fortunately) close to Platonism’ (p. 14), and I agree: the main difference is that on my view properties must still be ultimately grounded in objects, thus satisfying my *de re* first approach. Against this view (and hence in favour of full-blown Platonism), Giannini and Tugby object that it ‘seems incoherent to suppose that potentialities, which are ontologically fundamental, could be individuated by something less fundamental than themselves and which they themselves ground’ (p. 16). I see two related objections here. The first is explicit and concerns a ‘principle of purity’, which says that potentialities, being ontologically fundamental, could not be individuated by the less fundamental properties that are their uninstantiated manifestation

properties. The second, which is only implicit, is a circularity problem: how can the potentiality provide the ground for the manifestation, when it is itself (via its individuation) grounded in the manifestation property?

To respond to both objections, I would like to clarify the grounding picture that is suggested in my Aristotelian view of properties. The Aristotelian picture I suggest is one on which objects, by being some way or another, ground their properties. But they do not ground them one by one. Rather, on the dispositionalist picture, we can think of properties as nodes in a vast network held together by the manifestation relation. By instantiating any one property, an object gives reality to the whole network to which it belongs. Despite the metaphorical nature of the description, I hope it is clear how it disarms the circularity worry: by denying that a potentiality grounds its manifestation. Rather, it is objects that ground both the potentiality and the manifestation, but by instantiating only one of them, the potentiality. So I do not, after all, want to say with Giannini and Tugby that ‘unmanifested properties exist in the sense that they are *grounded* in the potentialities of things’; rather, I want to say that unmanifested properties exist because they are grounded in things, and more specifically in those things which have a potentiality for their instantiation.

What about purity? Since potentialities do not, as I have just argued, ground their manifestations, the manifestation need not be less fundamental than the potentiality after all, and we can individuate a potentiality in terms of its manifestation without violating a principle of purity.

We might worry that potentialities aren’t fundamental after all if they, along with their manifestation properties, are grounded in objects. But in saying that (some) potentialities are fundamental, I never intended to contrast them with entities of other categories (although I did not make that explicit). The contrast, after all, is with Humeanism. According to Humeans, the properties at the fundamental level of nature are all categorical; according to dispositionalism, the properties at the fundamental level of nature, if there is one,¹⁰ at least include dispositions or potentialities. The fundamentality claim is applied within the realm of properties, and should be independent of whether there is a further dependence relation between properties quite generally and objects.

So far, I have given some motivation for the Aristotelian view of properties that I suggest in Vetter 2015, ch. 7.5, and I have tried to

¹⁰I am now inclined to think that the debate should not be framed as one about what there is at the fundamental level, but rather as one about explanatory hierarchies which may or may not terminate at a fundamental level: see, again, Vetter 2018a and Vetter ms.b.

defend it against an objection. But for all I have said, Platonism might still be the better metaphysics of potentialities, despite going against my *de re* first approach.

One intriguing reason for adopting Platonism is given in section 3 of Giannini and Tugby’s paper: only Platonism allows for super-alien properties (properties for whose instantiation nothing has even an iterated potentiality), which in turn are needed to make (dispositionalist) sense of certain scientific claims, to wit, counternomic or counterlegal conditionals in the context of idealizations (cf. p. 18-23). Giannini and Tugby note that both a fictionalist approach and my own view that counterpossibles often concern epistemic rather than metaphysical modality would provide a solution here, but argue that both solutions ‘incur the cost of leaving us with a disunified treatment of scientific modal discourse’ (p. 23). As mere pointers toward possible responses, I want to mention two things. First, how unified the relevant scientific practices are is an empirical matter which it is difficult to judge from the armchair; we would need philosophically informed sociology of science to establish it. Second, even if there is a unified practice, this does not entail that unified truth conditions underly it. As Emanuel Viebahn and I have argued elsewhere for the case of modal auxiliaries (Viebahn and Vetter 2016), different kinds of facts may play the same role in our practices and for that reason be expressed with the same kinds of terms; we should not then infer from sameness of expressions to sameness of truth-conditions. This said, it is obvious that the question of super-alien and counternomics is one that certainly merits more detailed consideration than I can give it here, and one on which dispositionalists can and will reasonably disagree.

6 Metaphysical modality, time, and methods: Response to Wang

Jennifer Wang characterizes my theory as ‘*de re* first’ and contrasts it with her own, incompatibility-based view of modality, which is ‘*de dicto* first’. I wholeheartedly endorse the characterization of my approach as *de re* first: giving pride of place to *objects* in our metaphysics is indeed one of the foremost motivations for the approach. Wang raises two objections against my particular version of a *de re* first account.

Wang’s first objection arises directly from my focus on objects. It is the worry that the approach cannot account for paradigmatically *de dicto* modal truths: necessarily, all squares have linear sides; necessarily all yellow things are coloured (both on p.6); and the sentence numbered on p. 7:

- (4) Necessarily, no negatively charged objects are positively charged.

On a *de re* first approach, Wang suggests, we cannot get the required *de dicto* readings of truths like (4). All we get are truths such as ‘[a]ll negatively charged objects are necessarily not positively charged. But’, Wang objects, ‘this is still only a *de re* modal predication rather than a *de dicto* claim.’ (p.7)

Let us be clear what the challenge is. My task is to provide, in terms of my potentiality-based theory, a *de dicto* reading of sentence (4): a reading, that is, on which the necessity operator takes scope over the quantifier ‘no’ in (4).

But this is a requirement that my approach can satisfy. The necessity operator, on my view, is defined as follows: it is necessary that *p* just in case nothing has, had, or will have an iterated potentiality for non-*p*. Plugging that into the *de dicto* statement (4), we get:

- (4DD) Nothing has, had, or will have an iterated potentiality for it not to be the case that no negatively charged object that is positively charged.
 (Or, eliminating the double negation: Nothing has, had, or will have an iterated potentiality for there to be a negatively charged object that is positively charged.)

By contrast, the *de re* statement given by Wang will read:

- (4DR) All negatively charged objects are such that nothing has, had or will have an iterated potentiality for *them* to be positively charged.

(4DD) is ‘*de re*’ in the sense that it quantifies over objects first; it has a quantifier that takes wide scope (i.e. it scopes over the potentiality operator, the negation, and the other quantifier). This is because my account sees a hidden quantifier ‘within’ the necessity operator. But my task was not to get rid of wide-scope quantification over objects altogether; it was to make sure that the explicit quantifier in (4) has narrow scope; and that it does, very clearly, in (4DD). (4DD), in combination with the potentiality-based theory of modality, does just what a *de dicto* reading of (4) should do: it excludes that there are potentialities, hence possibilities, for anything to be both negatively and positively charged; it does not exclude potentialities, and hence possibilities, for any of the actually negatively charged objects to change and become positively charged instead. (And as it should, (4DR) does the exact opposite.)

In short, the potentiality-based approach is ‘*de re* first’ in the sense that it reduces modality to how *things* are. It does not follow that the approach cannot allow for *de dicto* readings of modal *sentences*.

Wang’s second objection is also connected to my approach’s focus on objects, but with a more specific twist. Objects are typically

contingent and temporal entities. They come into and go out of existence, and while existing they change in various ways. My account appeals to just such changing features of individuals: their potentialities. Metaphysical modality, however, is supposed to be non-contingent and atemporal. This is the tension that Wang’s paper makes very clear. Her preferred account, based on incompatibility relations between properties, does not face the same problem. Properties (unlike their instantiation by objects) do not appear to exhibit the contingency and temporality that objects do.

Let me first point out that there are various ways to go here. One way to go is to remain *dispositionalist* but cease to be *de re* first, by quantifying, in the definition of modality, over properties and not objects. (Roughly: It is possible that p just in case *there is a property* Φ which is a power to bring it about that p .) That strategy is endorsed by some (Jacobs 2010, Yates 2015; I believe that Giannini and Tugby would be sympathetic as well) and, depending on the view of properties it is paired with, holds some promise of overcoming the contingency and temporality associated with objects. A second way is to remain *de re* first but cease to be *dispositionalist*, by adopting instead an essentialist account. Truths of essence, while still about objects, have been argued to be not just atemporal and non-contingent, but in a certain sense even outside the temporal and modal realm (Fine 2005).¹¹ Still, I would like to defend the combined dispositionalist and *de re* first account; so I need to respond to Wang’s worries.

More specifically, Wang’s second objection concerns potentiality’s relation with time. As she points out, the account seems to be unable to accommodate possibility claims such as her sentence (p. 8)

- (5) It’s possible for there to be an object that always exists in a universe with no beginning.

Wang says that she considers such cases not as counterexamples to my view, but as ‘unintuitive consequence[s]’ (p.9) that ‘undermine a crucial selling point of [my] theory: its intuitive attractiveness’ (6).

How is one to argue about intuitions, or alleged intuitions, such as (5)? When debating metaphysical modality, philosophers often take it to be unproblematic that we are all talking about the same thing and genuinely disagreeing about it. But there is no pretheoretical, philosophically neutral concept of, nor is there unproblematic reference to, metaphysical modality that we can use to focus on the phenomenon prior to giving a particular theory of it: unlike, say, knowledge, metaphysical modality is a theoretical concept.

¹¹This, incidentally, is one of the reasons why *pace* Wang (p.4), essence and potentiality are not duals; see Vetter ms.a.

There are, of course, related phenomena that it might be easier to get a grip on. One is our ordinary, everyday understanding of modality that qualifies as objective, albeit not as metaphysical: I can ride my bike to work, but I cannot get from Berlin to Milano in less than an hour. The other related phenomenon is logical modality, on which we have perhaps a firmer, or at any rate a formally regimented, theoretical grip. Metaphysical modality is uncomfortably wedged between the two. In our thinking about genuinely metaphysical modality, we might either start from the logical notion and see how we can account for the cases where logical does not entail metaphysical possibility; this is a route taken, in very different ways, e.g. in Hale 2013 and Chalmers 2010. Or else we might start with the ordinary notion and see how we can account for the cases where ordinary impossibility does not entail metaphysical impossibility; this is a route taken or suggested, again in different ways, in Williamson 2007 and Edgington 2004. The second route is clearly the more congenial to a potentiality-based approach like mine, which starts from our ordinary understanding of what we and the objects around us can and cannot do. Wang, on the other hand, seems to incline towards the first approach, e.g. when she writes, about the case of a glass appearing *ex nihilo*, that ‘[t]here is no logical impossibility, and hence, according to many, no metaphysical impossibility involved in the supposition’ (p. 7).

Does it matter where we start in talking about metaphysical modality? I am inclined to think that it does. Starting with the wider notion of logical possibility, we introduce restrictions: such-and-such is logically possible, but it is not metaphysically possible because The default for a proposition, at least if it is logically consistent, is possibility; it is claims of impossibility that require justification. Starting with the narrower notion that we express with everyday modals, we must instead proceed by extending the scope of our modal concept: such-and-such is impossible given the state of our technology, but it is metaphysically possible because Possibility is not the default but rather something that needs to be justified and supported. (Much of the argument in Vetter 2015 can be seen as giving this kind of justification, starting from ordinary modality in the form of dispositions and abilities.)

It is unsurprising, then, that these two starting points engender different intuitions. Are they even intuitions about the same phenomenon, or are philosophers talking past each other when coming from these two different starting points? This, I submit, is an open question that should receive more attention than it has so far received. What I would like to claim here is simply that things aren’t so clear-cut when it comes to intuitions about metaphysical modality. What is intuitive depends on where we start in getting a grip on this theoretical notion. Wang’s (5) seems highly intuitive when, like her, we start

with logical modality and require positive justification for any necessity that is not logical necessity. It seems, I submit, much less intuitive when, like me, we start with ordinary modality and require positive justification for any possibility that outstrips those possibilities which we countenance in everyday life.

I will end, thus, with a desideratum. In thinking about metaphysical modality, we need to reflect and make explicit where we start; and we need to reflect on whether and why we can assume that we are all targetting a common, albeit theoretically circumscribed, phenomenon: metaphysical modality.

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