Potentiality: actualism minus naturalism equals platonism

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Abstract: Vetter (2015) develops a *localised* theory of modality, based on potentialities of actual objects. Two factors play a key role in its appeal: its commitment to Hardcore Actualism, and to Naturalism. Vetter's commitment to Naturalism is in part manifested in her adoption of Aristotelian universals. In this paper, we argue that a puzzle concerning the identity of unmanifested potentialities cannot be solved with an Aristotelian conception of properties. After introducing the puzzle, we examine Vetter's attempt at amending the Aristotelian conception in a way that avoids the puzzle, and conclude that this amended version is no longer to be considered naturalistic. Potentiality theory cannot be both actualist and naturalist. We then argue that, if naturalism is to be abandoned by the actualist, there are good reasons to adopt a Platonist conception of universals, for they offer a number of theoretical advantages and allow us to avoid some of the problems facing Vetter's theory.

Keywords: Platonic Universals, Potentiality, Naturalism, Actualism, Dispositionalism.

1. *Introduction: Vetter's potentiality-based theory of modality*

Vetter's (2015) potentiality theory of modality is the view that the truth and falsity of alethic modal claims – in particular claims about metaphysical modality – have their source in the potentialities present in the actual world. Potentialities are the (only) truthmakers of modal discourse. According to the view, the potentialities of actual concrete objects (past and present) fix all the modal facts and determine the topology and extension of the modal space.

For the purposes of this paper, we can formulate the potentiality theory as the conjunction of the following two theses:

PPoss: 'possibly *p*' is true iff and because there is some potentiality whose manifestation, if manifested, would make '*p*' true.

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PNec: 'necessarily *p*' is true iff and because there is no potentiality whose manifestation, if manifested, would make 'not-*p*' true.[1]

This is a bare-boned version of Vetter's theory, one which could hardly hope to achieve extensional correctness, that is, to generate enough modal truths. Vetter ingenuously enhances her account in a number of ways to remedy this, introducing joint potentialities (neither Fischer-Dieskau nor Gerald Moore could perform Schubert's *Die Winterreise* on their own, but could do so together) and extrinsic potentialities (Fischer-Dieskau has the potentiality to perform *Die Winterreise* with Gerald Moore). Building on Borghini and Williams' concept of a branching disposition (2008: 32), Vetter also develops the important notion of iterated potentialities (I do not have the potentiality to speak Finnish, but I have the potentiality to learn how to speak Finnish – inelegantly, I have the potentiality to have the potentiality to speak Finnish). In this paper we will only discuss the minimal version of the theory, but it is important to keep in mind that it is because of the development of these further aspects (and many others, such as the treatment of gradability and the development of a rigorous semantics) that Vetter's work truly stands out as the canonical text on dispositions for many years to come.

There are three factors that crucially contribute to the appeal of Vetter's potentiality theory as an overall account of modality, which can be summarised under the headings of Realism, Hardcore Actualism, and Naturalism.

Vetter (2015: 33-60) presents original and persuasive arguments against the reduction of dispositions to counterfactual conditionals, based on the gradability of dispositions, which reinforce and round out the classic, well-known[2] objections based on finks and antidotes: irreducibly modal properties are part of the furniture of this world. We have to be realist about them. A tempting thought ensues: since we have to accept these properties into our ontology, we might as well make them do as much work as possible – maybe we could even explain *the whole of modal discourse* with them. However, the potentiality theory does not aim to be a reductive theory of modality, in the way that, say, Lewis's (1986) account is. Rather, it aims at rearranging the landscape: according to the potentiality theorist, we should take *localised* modality[3] to be more fundamental than the

[1] These can be formalised by expressing potentiality with a predicate modifier, POT: '$\Diamond p$' is true iff POT[Φ](xx), where Φxx would make '*p*' true.

[2] See Martin (1994) and Bird (1998), as well as Manley and Wasserman (2008).

[3] "A potentiality is localised in the sense that that it is a property of a particular object […] possibility, on the contrary, is not localised this way. Its being possible that such-and-such is not primarily a fact about any one particular object; it is a fact about how things in general might have turned out to be" (Vetter 2015: 2). In linguistic terms, the difference can be expressed by the fact that "the argument places [of non-localised modal operators] must always be filled by an entire sentence […] the

non-localised one, just like essence is prior and more fundamental than necessity according to Fine (1994); attempts at reducing dispositions to counterfactuals fail in part because they get the order of the explanation wrong. Indeed, the Potentiality Theory and Essentialism are very similar – the main difference being that the former is a "possibility-first" and the latter a "necessity-first" theory of localised modality.[4] The hope is that the unavoidable realism about dispositions and potentialities might lead to ontological parsimony elsewhere.

And indeed, one of the main features of Potentiality Theory (as well as Essentialism) is that both aim to be what Contessa (2008) has dubbed "Hardcore Actualist" theories, that is, to reject the idea that possible worlds (however conceived) should play a role in making modal statements true – in short, they reject the idea that the Leibnizian biconditionals are *metaphysically* informative, as it were. One of the purported advantages of this approach is that we need not be committed to strange and controversial entities such as possible worlds, since they play no role in fixing the modal truths. This is often taken to be a gain both in ontological parsimony and common sense; the Potentiality theorist offers the prospect of making sense of modality with a lightweight, safe and sane ontology: all we need are powerful actual objects. If we are to take the label 'Actualism' seriously, we should then think that Potentiality Theory is committed to the "Being Constraint" (Williamson (2013: 148)[5] which is best expressed by the generalisation (that is, including higher-order variables) of the following two theses:

1. $\Box\forall x\,\Box(Fx \rightarrow \exists z\, x{=}z)$
2. $\Box\forall x\Box\forall y\,\Box(Rxy \rightarrow (\exists z\, x{=}z \wedge \exists z\, y{=}z)$

In English, (1) says that necessarily, for all x, necessarily if x has a property F, then x is something. (2) says that necessarily, for all x, and necessarily for all y, necessarily if x stands in a relation R to y, then x is something and y is something.

The third noteworthy feature of Potentiality Theory is that it promises a naturalistic account of modality. This point is somewhat implicit in the com-

operators for localised modalities, on the other hand, must have at least one argument for the *object* (or objects) to which the modality belongs, and another argument place for that which is intuitively the content of the modality, and which is most naturally expressed by a predicate" (Vetter 2015: 5).

[4] These terms are usually used to refer to different approaches to the epistemology of modality; here we employ them in a metaphysical sense: for the potentiality theorist, the fundamental phenomena are what make possibility statements true, and necessity is to be obtained from there. It is tempting, but not necessary, to think that the epistemology would be isomorphic.

[5] As Williamson notes, the Being Constraint can be seen to capture what Plantinga (1983: 11) meant by "Serious Actualism".

mitment to Hardcore Actualism, and often the two are run together, but we think they contribute to the development of Vetter's theory in different respects and can pull it in different directions, and so are best kept apart. In expounding the appeal of a localised theory of modality, Vetter mentions that such an account promises to provide an account of possibility and necessity that anchors them to

> just the ordinary objects of this, the actual, world, with which we are in regular epistemic contact [...] if it succeeds then it does so by anchoring possibilities in realistically respectable bits of the world, ordinary concrete objects. (Vetter 2015: 11)

The "respectability" of Potentiality Theory can be attributed to two main factors: on the one hand, its vindication of a familiar and commonsensical Aristotelian ontology of objects and properties, and on the other hand, the fact that such objects are epistemically accessible: "actual objects, with which we have epistemic contact" (Vetter 2015: 11). Note: it is not only the fact that such objects are *actual* that makes them "respectable" and accessible: it is also the fact that they are *concrete* – spatiotemporally, and hence causally, linked to us. In order to learn about modality we can use a "powerful telescope" (Kripke 1980: 44), after all! We think that this is sufficient evidence to attribute to Potentiality Theory a commitment to Ontological Naturalism, which can be characterised as "the doctrine that reality consists of nothing but a single all-embracing spatio-temporal system" (Armstrong 1981: 149).

2. *Unmanifested potentiality and the fundamental puzzle*

As we have seen, Vetter's theory of modality aims to be both hardcore actualist and naturalistic: modality is ultimately a matter of how concrete objects are. Whilst we agree that a strongly naturalistic actualism is desirable, we are (with regret) doubtful that naturalism can provide enough ontological resources for a coherent metaphysical account of irreducible potentialities. Our aim in this section is to articulate those doubts and to conclude that a Platonic approach to potentialities (or something like it) provides the ontological resources that we need. As far as we can tell, a move to Platonism about properties would accommodate many of the details of Vetter's potentiality-based account, and it can still be considered as an actualist theory. Moreover, as we shall see in the next section, Platonism allows us to ground more possibilities than Vetter can allow, and therefore overcomes some of the objections facing her theory and displays superior theoretical virtues.

Vetter's potentiality theory of modality is to be considered naturalistic, in part, because it goes hand-in-hand with a broadly Aristotelian approach to

properties. On this view, properties (or 'universals') do not exist independently of their concrete instantiations – of how concrete things are. Unlike the Platonists, Aristotelians do not have to say that properties exist outside of space and time. Rather, Aristotelian universals exist entirely through the concrete things that instantiate them, *in rebus.* The dependence of Aristotelian universals on their instantiations is typically captured by what Armstrong calls the 'Principle of Instantiation', which for each property

> Demand[s] that it is a property of some particular[, and f]or each relation universal [it must] be the case that there are particulars between which the relation holds. (Armstrong 1989: 75, quoted in Vetter 2015: 271)

The ontological dependence of Aristotelian universals on their instantiations is fairly weak in the sense that it is generic: in order to exist, a property must be a property of *some* particular, but it doesn't matter which particular performs the job. Nonetheless, the dependence of properties on their concrete instantiations is strong enough to rule out the existence of type-uninstantiated properties, given that such properties are not properties of anything concrete whatsoever.

The problem presented in this section can be summarised as follows: if we do not have uninstantiated properties in our armoury, then it is difficult to make metaphysical sense of potentialities whose manifestations are never manifested or actualised. We will first illustrate the difficulty, and show how forever unmanifested properties are problematic for the Aristotelian conception of universals. We will then show that Vetter's amended account does not succeed in solving the problem *while* retaining its commitment to naturalism, and is therefore in no better position than Platonism in this regard. We finally argue that Platonism offers a number of theoretical advantages, and should therefore be preferred to an immanentist conception of properties.

2.1. Directedness Platitude

Versions of problem we now turn to have been discussed previously (Armstrong 1997; Molnar 2003; Bird 2006; Tugby 2013) and are acknowledged by Vetter herself (2015: Sect. 7.5). In our view, the problem is best described as a tension between the following two platitudes.[6] On the one hand, potentialities are (partially) individuated by their manifestation types: the identity of a po-

[6] We adopt the term 'platitude' in order to be terminologically consistent with Tugby (2013). By it, we mean that both 'platitudes' express what we take to be central, and in our view non-negotiable, features of powers metaphysics. Of course, defenders of certain versions of the Powerful Qualities view could reject DP, and therefore deem the term 'platitude' to be unwarranted. Thanks to an anonymous referee for highlighting this.

tentiality is determined by what it is a potentiality *for*. In order to explain *what mass is*, one can do nothing more than to say that massy objects are disposed to exert gravitational force on one another.[7] And to explain *what something is*, is precisely to show what *individuates* it. This point is often expressed by saying that dispositions are essentially "directed" towards certain manifestations rather than others. Tugby (2012: 168) dubs this the 'Directedness Platitude':

DP: Dispositions are directed towards their manifestation properties and it is in virtue of this directedness that the identity of a disposition is fixed.

To be clear, we are talking about individuation in the metaphysical sense rather than, say, the cognitive sense. Cognitive individuation is a mind-dependent act that involves singling out an entity in thought. Although it is true that we cognitively individuate dispositions by thinking about the manifestations that they are dispositions for, this is not the kind of individuation that is at issue above. Even if minded creatures were not to exist, it would still be the case that the nature of a disposition is determined by the type of manifestation that it is a disposition for. Thus, in speaking of the individuation of dispositions, we are speaking of a mind-independent *metaphysical* determination relation that distinguishes a given dispositional property from all other possible dispositional properties. As Lowe puts it, metaphysical individuation is "the relation that obtains between entities *x* and *y* when *x* determines or 'fixes' (or at least *helps* to determine or 'fix') *which* entity of its kind *y* is" (2010: 9).

By stating that the identity of powers is *partially* determined by what they are *for*, we do not wish to be committed to the idea that the nature of a dispositional property has to be *exhausted* by what it is for, or its manifestation relation (as in Mumford 2004). Other factors, such as its stimulus conditions (Bird 2007) or its reciprocal disposition partners, or even its degree and granularity (Vetter 2015), may play a prominent role.

It is less clear whether proponents of a 'Powerful Qualities' view of powers can subscribe to the Directedness Platitude. The core idea of such a view is that dispositional properties are *both* powers and qualities; they are *both* categorical and dispositional. There are two crucial issues to be settled before we can understand whether DP also applies to Powerful Qualities:

1. How to characterise what are qualities, or categorical properties
2. How to characterise the relation between the powerful and the qualitative aspect

[7] We assume here that mass is a *fundamental* property which cannot be further reduced nor analysed.

The crucial point in assessing whether DP applies also to Powerful Qualities views concerns how qualities are characterised. For instance, according to Bird (2016) the difference between a power and a categorical property lies in the fact that the former has its modal profile fixed, whereas the latter is 'modally variable'. This is due to the fact that "a power is an ontic property a) that has a dispositional essence", and b) "[…] whose identity is given by its causal/dispositional/nomic role" (Bird 2016: 347). Presumably this would mean that a categorical property *does not* have its identity given by its causal/dispositional/nomic role. That is, DP applies to powers and not to categorical properties. If the Powerful Qualities view states that powers are *also* categorical, this would mean that Powerful Qualities *also* have a primitive identity: presumably, then, DP would not apply to them.

But if we accept Bird's characterisation of the difference, and if we take the relation between powerful and qualitative aspects to be identity (Heil 2003; arguably, Martin 2009) then it would follow that Powerful Qualities views are trivially false: the very same property would have both a fixed and variable modal profile, and its identity would be both primitive and fixed by its nomic role. Obviously, this cannot be the characterisation of the distinction adopted by the proponents of the view.

Taylor (2013: 93-94), on the other hand, elucidates the difference thus: "a dispositional property is any property to which it is essential that it conveys upon the object that instantiates it the power to behave in a certain way given certain stimuli", whereas "qualitative/categorical properties essentially contribute to the overall makeup of how an object is now". This characterisation does not impinge on differences on identity conditions, and obviously does not immediately lead to contradiction when paired with Identity Theory. Nothing in the characterisation of categorical properties entails that their identities are primitive, and that DP should not apply to them.

Similarly, Heil (2012: 59) seems to suggest that the defining feature of categorical properties is just that they are actual or occurrent: "qualities are here and now, actual, not merely potential, features of the objects of which they are qualities", and Strawson even equates 'categorical' with 'being': "all being is categorical being because that's what it is to be! That's what being is!" (Strawson 2008: 278). Again, this understanding of categorical is neutral about the identity conditions of qualities, and so does not entail that DP does not apply.

Obviously, there are many versions of the Powerful Qualities view, articulated *inter alios* by Martin (1997; 2009), Heil (2003), Jacobs (2011), Ingthorsson (2013; 2015), Taylor (2013; 2018) Giannotti (forthcoming), and Contessa (forthcoming). These authors often differ over the details of the answers offered to i) and ii), and so a satisfying answer could be given only after a detailed examina-

tion. Such a project unfortunately goes beyond the scope of this paper. Perhaps not all of these versions are compatible with DP. If it is shown that a Powerful Quality theory which relies on the elucidation of the categorical/dispositional property distinction as involving a radically different theory of individuation is viable and preferable to the other Powerful qualities views,[8] then this will be a serious competitor to our theory below, and more work will have to be devoted to establish which theory has the upper hand. For the time being, we have shown that the Directedness Platitude is compatible with at least some versions of the Powerful Qualities view. So, our argument concerns at least a considerable portion of the theories of powers on the market, including Vetter's own theory which we discuss below.

2.2. Central Platitude

On the other hand, in Tugby's 2013, it is argued that a *desideratum* for any metaphysics of potentiality (or "dispositionalism"[9]) is that it accommodates what Molar (2003) referred to as "Independence", and what Tugby (2013) called the "Central Platitude":

CP: A particular can have a disposition even if it never manifests that disposition (2013: 454).

We take it that this platitude is part and parcel of any realist approach to dispositions. To say that a disposition is a real property of things is precisely to say that it can be instantiated even if it is not being exercised. Although the *manifestation* of a disposition is dependent on certain situations obtaining, such as a soluble object being placed in water, the disposition itself (e.g. water-solubility) is not itself dependent on such situations arising. If we are realists about dispositions, then we should surely accept that a piece of salt is water-soluble even if the salt (or any other substance) never finds itself in water. Even if salt's water-solubility is never actually manifested, the disposition still makes a counterfactual difference to the world: the disposition is ascribable precisely because salt *can* dissolve even if it doesn't actually dissolve.

Here is the tension between the platitudes: Per **DP** and the Being Constraint, if a potentiality is directed to its manifestation, then the manifestation

[8] Possibly on the basis that it would offer a solution to the regress of pure powers discussed *inter alios* by Lowe (2010), Bird (2007), Ingthorsson (2015). However, this might not be so easy: Taylor (2018) has argued that an Identity Theory of Powerful Qualities is not better off than a pure powers view in this respect.

[9] In what follows we shall use the terms 'dispositions' and 'potentiality' interchangeably. As mentioned earlier, Vetter's notion of potentiality is broader than the notion of a disposition, but this difference is not important for the purposes of the following arguments.

exists. But, per **CP**, the manifestation needs not occur. Armstrong (1997: 78) concluded that dispositions either give raise to a contradiction, or are committed to a "Meinongian" ontology, where dispositions are somehow related to the non-existent. Given the commitment to Hardcore Actualism, both results would be equally unwelcome. Fortunately for the friends of potentialities, Armstrong's argument is too quick and is based on an ambiguous reading of 'manifestation'. 'Manifestation' can stand both for the second *relatum* of directedness (what a potentiality is *for*) and for its obtaining – the fact that the potentiality has been successfully exercised, and brought the concrete manifestation about. A contradiction arises only if we read 'manifestation' in both **CP** and **DP** as referring to the existence of what the power is *for*, thus reading **CP** as stating that the object the disposition is for can fail to *exist*.

But there is no reason to read **CP** as concerning the *existence of the manifestation, understood as what a disposition is for.* What **CP** maintains is that such manifestation can fail to occur, or to be brought about: the manifestation (object) can fail to be manifested (be brought about). This suggests the following schema to escape the problem:

1. $\Diamond F(P) \wedge \neg F(M)$	(Central Platitude)
2. *Directed* (*P*, *M*)	(Directedness Platitude)
3. $\exists X\ (X{=}M)$	(2., Being Constraint)
4. $\Diamond\exists X\ (X{=}M \wedge \neg F(\mathrm{M}))$	(1,3)

The platitudes generate a contradiction only if *F* is taken to be 'existence', and results in possibilism (i.e., the existence of non-actual entities) only if *F* is taken to be 'actual'.[10] But there is no reason to do so: there is a variety of other relevant properties that *F* could be.[11] In particular, it was suggested by Mumford (2004: Ch. 11) that *F* could be 'instantiation', and that the manifestation could be a universal: in this case **CP** would just state that the disposition could fail to bring about the instantiation of the universal on some particular occasion, while its identity is fixed by the universal, as per **DP**. This solution preserves Hardcore Actualism (for it accepts the Being Constraint and admits only actual objects, such as universals) and, in so far as the universals in question are Aristotelian (spatiotemporally located), Naturalism. We take it that

[10] See Bird (2006, 2007).

[11] For instance, one could in principle characterise *F* to be 'concreteness' (or something like that), claiming that unmanifested manifestations display a kind of "purely logical existence" (Williamson 2002); one of us favours a solution along those lines. For the purposes of this paper, however, we will assume that 'instantiation' is the best way to articulate the proposal, and only consider universals as manifestations.

Vetter (2015: Ch. 7) adopts universals as manifestations for potentialities precisely in order to avail herself of Mumford's strategy to solve the tension and maintain a commitment to both Hardcore Actualism and Naturalism while retaining **DP**.

The problem for this approach is that the Central Platitude also establishes that all instances of a potentiality property could go unmanifested: it is possible that the Aristotelian manifestation universal is never instantiated, and therefore does not exist. This can easily be shown: either there is something special about the unmanifesting instances, or there is not. If there is not, then one has to admit that *any* instance (token) of non-maximal potentiality could fail to bring about its manifestation. But if this were the case, surely it could be the case that *all* instances of potentialities happen to fail to bring about their manifestations: since the unmanifesting instance was arbitrary, we can't block the universal generalisation: if F is true of an arbitrary x of the domain, then $\forall x Fx$. So, whole potentiality types can fail to manifest.

The other option is to say that there is something special about certain instances. Let's call this distinguishing feature '*K*', and maintain that only a subset of the token potentialities happen to have it. Then it would seem that Token-Independence (to adopt the terminology of Molnar 2003) is not a feature of *potentialities per se*, but rather of *K*: *K* is the difference-maker and hence **CP** applies only to *K*-potentialities. But this clashes with the Central Platitude, which was supposed to be a principle of dispositions *qua* dispositions.

Vetter (2015: 85-94) allows potentialities of maximal degree that necessarily bring about their manifestations, and hence will reject the idea that the Central Platitude obtains in virtue of the nature of potentialities *qua* potentialities – rather, she will maintain that **CP** holds in virtue of the degree of a potentiality. Still, the problem remains, although on a slightly more limited scale: even if we think that **CP** does not hold for all potentialities, it will hold for all the non-maximal potentialities, which can be Type-Independent.

Call the universals that are never manifested 'aliens', and potentialities that are directed to them 'alien potentialities'. Given that Aristotelian universals ontologically depend on their instantiation, if they are never instantiated they do not exist. This leaves us unable to adopt Mumford's solution in the case of aliens. We are then left with what we call the alien puzzle of potentiality: how are alien potentialities individuated? It is difficult to see how this puzzle can be solved without renouncing Hardcore Actualism, or renouncing Naturalism.

One could salvage Naturalism and Aristotelian universals by denying the validity of the derivation from 2. to 3. This is the move that the defenders of "physical intentionality" make (e.g. Molnar 2003). But that would mean violat-

ing the Being Constraint and hence force Vetter to abandon her commitment to Hardcore Actualism. We take it that Vetter would find this solution to be highly undesirable, and we wholeheartedly agree.[12]

Alternatively, one could renounce (ontological) Naturalism and adopt Platonic Universals: since these do not depend upon their instantiations for their existence, it is perfectly acceptable to think that there are uninstantiated (alien) universals – no modification of the account would be required to make sense of alien potentialities. But Vetter seems to think that this would be an unacceptable loss: Naturalism plays an important part in making the ontology of Potentiality Theory "respectable", because

> the picture of metaphysical modality that I am offering derives its attraction, I believe, not merely from the fact that it thereby locates modality in properties, viz. potentialities, but also from the fact that it thereby locates modality in *objects* of the ordinary kind: concrete objects. (Vetter 2015: 270)

So Vetter finds herself in the uneasy situation of accepting the force of the fundamental puzzle for the Aristotelian potentiality theorist (2015: 271), without being willing to give up either Actualism or Naturalism. In order to reconcile Actualism with Naturalism, Vetter proposes to modify the Principle of Instantiation discussed earlier in a way that can ground talk of unmanifested properties within an Aristotelian framework. The modified principle, called the 'Principle of Potential Instantiation' (PPI) is as follows:

> **PPI:** Every universal must be at least potentially instantiated: there is a property universal of being F only if there is some particular thing which is F, is potentially F, or is potentially such that something is F; there is a relation universal of R-ing only if there are some particular things which R, or which potentially R, or which are potentially such that some things R. (Vetter 2015: 272)

Vetter then explains how this modified principle of instantiation gets around the problem of unmanifested dispositions:

> … the claim that something has a potentiality to have (or produce or constitute something which has) the actually uninstantiated property of being F is not in jeop-

[12] Note that it is not wholly clear that such a move would preserve Naturalism, either: it is far from clear what it means for a physical state to be directed towards something that does not exist. In the mental case, we can at least say that the non-existent intentional objects are represented and that those representations serve to individuate different mental states. But since Molnar (2003) maintains that physical intentional states do not represent, it is not obvious how such intentional states are individuated; the risk is that physical intentionality *de facto* makes the individuation of potentialities a primitive, undetectable fact. But this would violate DP, as well as make them epistemically inaccessible.

ardy because there might be no property of being F. Rather, that claim, if true, guarantees that there is such a property, because this is precisely what it takes for there to be a property of being F. (2015: 272).

This is a striking quotation because on a natural reading of this proposed solution, ontological naturalism seems to be under threat. Both **PPI** and the application of it employs existential quantification: it is said *there is* a property universal only if there is some particular thing which is *F*, is potentially *F*, or is potentially such that something is *F*. Crucially, in cases where something is potentially *F*, but nothing ever manifests that potentiality, then *F* surely remains *uninstantiated*. Hence, on a natural reading of this principle, it commits us to the existence of *uninstantiated properties.* The approach remains Aristotelian, in so far as it maintains that universals depend on concrete entities for their existence: not only their instances, but also the potentialities that are directed at them. The problem is that, it seems to us, such Aristotelianism is no longer naturalistic. It was not the fact that properties are dependent upon something that made them naturalistically *kosher*, but rather the fact that they were located in space-time: they were located where their instances were. But now consider the uninstantiated Aristotelian universals allowed by **PPI**: where in space-time are they? Surely they are not located where their instances are, because there are none. But they cannot be located where the potentialities directed to them are, either, because i) nothing grants that the manifestation is co-located with the potentiality, and ii) if they were located there, then by Aristotelian lights they would surely be *instantiated* by the bearers of the potentiality, which would catastrophically mean that every power is always already manifested.

If the Aristotelian universals allowed by **PPI** are not located in space-time, then a theory invoking them is not compatible with Naturalism as we understand it. But if this is the case, it is no longer clear how Vetter's approach differs from Platonism. We take the allowance of properties which are not instantiated to be the core commitment of Platonism and one that is inconsistent with the ontologically naturalistic commitment to locating all entities in space and time. Vetter's position seems dangerously (or, we think, fortunately) close to Platonism.

Later on Vetter distances herself from Platonism by associating Platonism with the view that there are super-alien properties, where super-alien properties are properties that "no actual thing ever had a potentiality to have, to produce, or to constitute" (2015: 69). However, we do not see why all Platonists have to accept the existence of super-alien properties. As we shall see in section 3, we think there are good reasons for accepting that there are super-alien properties. Nonetheless, a version of Platonism which follows Armstrong's "a posteriori realism" about universals (1978), and uses science as guide as to what

(non-super) alien properties there are, is perfectly coherent. Again, we take the core commitment of Platonism to be that properties do not need to be instantiated in order to exist. Whether or not there are super-alien properties is a matter for in-house dispute between Platonists.

We can think of a couple of interpretations of the Principle of Potential Instantiation that avoid Platonism, as we understand it, but neither of them is appealing. First, it could be said that the existential quantifier employed in the **PPI** does not entail an ontological commitment to uninstantiated properties. This move would require us to distinguish between so called "quantifier commitment" and "ontological commitment" (see e.g. Azzouni 2004). However, the problem with this approach is that it is precisely the sort of move that is employed by some Meinongians, as a way of denying an ontological commitment to non-existent objects (see e.g. Priest 2005). Hence, this approach to uninstantiated manifestations would arguably place Vetter in the category of Meinongian dispositionalists. We agree with Armstrong that this is best avoided.

However, there is another option. Recall that the difference between Vetter's position and Platonism lies in the fact that Aristotelian universals are not ontological independent, whereas Platonic universals are. So, perhaps a more promising way for Vetter to avoid ontological commitment to uninstantiated properties is to say that unmanifested properties exist in the sense that they are *grounded* in the potentialities of things. This option is open to Vetter because she independently accepts that grounding is an important relation (2015: 26-28).[13] Grounding is a metaphysical determination relation that provides an explanation for why something is so (see e.g. Schaffer 2009 and Rosen 2010). Importantly, grounded entities can be thought to be derivative and "ontological free lunches", given that their being is fully explained by their grounds. One could think that the only ontological commitment that *really* matters concerns only *fundamentalia*. Hence, if uninstantiated manifestations were grounded in the relevant potentialities, quantifying over them would involve no increase in *genuine* ontological commitment. We would not have to say that uninstantiated manifestations exist over and above the instantiated potentialities, and therefore a full-blown Platonic commitment to uninstantiated manifestations would be avoided. We suspect that a view along these lines may be what Vetter ultimately has in mind.

[13] Note that it is far from obvious that Potentiality Theory is in the end compatible with grounding. Grounding is typically thought to be a modally-laded notion. For instance, the orthodox (e.g. deRosset 2010; Fine 2015) view of grounding is that if Γ (fully) grounds B, then it is metaphysically necessary that B exists if Γ does. It is not clear that Potentiality Theory can explain such modal consequences in a plausible way. For the sake of argument, we will not press this point and assume that the use of grounding is compatible with Potentiality Theory.

Unfortunately we think that this line of defence faces some thorny problems. The most serious difficultly concerns the original difficulty of individuating potentialities that are unmanifested. As we have seen, potentialities are plausibly individuated by their manifestation properties. If those manifestation properties are ontological free lunches, then we have a problem: for it is difficult to see how something that is not an ontological free lunch can be individuated by something that is itself an ontological free lunch (see e.g. Barker 2009: 247 and Tugby 2016: sect. 3.1 for related points). 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. To think otherwise is to violate the metaphysical analogue of what Sider calls the 'principle of purity' (2011: 106), which says that "fundamental truths involve only fundamental notions" (see also Jaag 2014: sect. 3 for a closely related discussion of purity in the context of dispositionalism).

To sum up this section, we have argued that Vetter's attempt to solve the fundamental puzzle of potentialities either fails, or she ends up precisely with a sort of ontologically non-naturalistic approach to properties that is close to Platonism. The choice between Aristotelian and Platonic universals is, of course, a metaphysical matter, and should be settled in the canonical way: weighing costs and benefits of the overall theory. The difference between a Platonist position and Vetter's **PPI** boils down to this:

PLATONISM: Potentialities depend upon their manifestations (universals) for their identity. These universals can exist uninstantiated and do not depend upon concrete potentialities for their existence.

VETTER'S ARISTOTELIANISM: Potentialities depend upon their manifestations (universals) for their identity. These universals, in turn, depend for their existence upon their actual instantiations or the concrete potentialities for their instantiation.

One of the canonical advantages of Aristotelian universals over Platonic ones was that it did not need to commit to non-spatiotemporally located entities and thus did not violate ontological naturalism. Vetter's theory cannot, we have argued, enjoy such a benefit. While this does not amount to a knock-down argument against Vetter's position, we struggle to see what other good reasons there are to retain the commitment to **PPI**. Here's one hypothesis: Vetter (2015: 270) does not wish to attribute potentialities to Platonic universals (e.g. the potentiality to be instantiated), because "the picture of metaphysical modality that I am offering derives its attraction [...] from the fact that it locates modality in properties, viz. potentialities, but also from the fact that it thereby locates modality in *objects* of the ordinary kind: concrete objects" (2015: 270). Perhaps Vetter is worried that, were one to adopt Platonic universals, she would be

drawn to attributing potentialities to them, rather than concrete objects. Note that the problem with this move is not that of attributing potentialities to abstract entities (since she attributes them to numbers: see Vetter 2015: 279-80) but rather that it tempts us into a 'catch-all solution', in which all we need to ground modal truths are the potentialities to be instantiated of all the universals. We think that the Platonist can resist such temptation just as well as the Aristotelian does. The point is orthogonal to the dependency of universals: it concerns the *bearers* of potentialities, not what potential properties are or what they depend upon. The Platonist is free to maintain that potentialities can only be instantiated by concrete objects, and yet the properties they are directed toward are metaphysically independent. Conversely, a proponent of Aristotelian universals is free to think that universals can be the bearers of potentialities: potentialities are had by non-fundamental entities, too.

More interestingly, resisting the 'catch-all' strategy does not mean that we can *never* attribute potentialities to universals – we think that it is open to the Platonist who accepts super-aliens to do so, in order to ground certain scientifically interesting truths. More precisely, we will try to show in the following section that Platonism is able to elegantly accommodate scientific possibilities involving so-called super-alien scenarios. In contrast, these are possibilities that Vetter's metaphysical framework struggles to accommodate. To reiterate: Platonists need not be committed to super-aliens, but we believe that such a commitment is highly beneficial to our understanding of scientific practice. In short, we think there are reasons to prefer a metaphysical outlook that is compatible with the possibility of super-aliens.

3. *Platonism, idealisation, and scientific possibility*

In the previous section we saw how Platonism is generally regarded as a non-naturalistic position, given that it allows entities which need not have concrete being. However, we do not think it follows that the theory of Platonism is divorced from science. Indeed, we think that certain kinds of scientific theorising may lend support to Platonism. For example, for various reasons scientists often reason about scenarios that involve what Vetter would regard as 'super-alien' properties, as defined above. If there are truths about which super-alien scenarios are and are not possible, then it is natural to enquire about the truthmakers for such claims. Here, the Platonists have a straightforward truthmaking story to tell: truths about super-alien possibilities are grounded in the modal profiles of uninstantiated properties. As we shall see, Vetter does not have the metaphysical resources to provide truthmakers for super-alien possibilities, which by her own admission leads her to deny that there are any

super-alien possibilities (2015: 270). Hence, if we accept Vetter's naturalistic framework, we can no longer take scientific talk of such possibilities at face value, which, as we shall see, leads to a disunified picture of scientific discourse about alien possibilities. We believe that this is a serious cost of Vetter's theory. To be clear, we do not think that, by itself, this problem is fatal. However, once the arguments of the previous section are also taken into consideration, the case for Platonism begins to look strong.

Why then does Vetter's potentiality-based theory of modality present a disunified picture of alien possibility? On the one hand, in cases where scientists theorise about possibilities concerning uninstantiated properties that some concrete thing has the potentiality to have (or produce), Vetter is happy to say that there are truths about such possibilities and that the relevant potentialities are the truthmakers. Indeed, science is awash with such truths, as exemplified by the *Journal of Computer-Aided Molecular Design*.[14] But on the other hand, in the case of alleged truths about super-alien possibilities – alleged possibilities that no concrete thing has the potentiality to realize – Vetter has to deny that there are any such truths, metaphysically speaking. Since, by definition, such possibilities are not tied to potentialities that some concrete thing has, Vetter has to deny that there are such possibilities after all. Super-alien possibilities might be assertible in the sense that they are epistemically possible, or true in some fictional sense, but strictly speaking no claims about the metaphysical possibility of super-alien properties can be (non-vacuously) true, since there is nothing in Vetter's framework that can serve as truthmaker. To be fair to Vetter, she accepts that this is a bullet she has to bite (2015: 269). However, we think that this is a more serious problem than Vetter acknowledges. Talk of super-alien possibilities is widespread in science. Moreover, as we shall see, some of the accepted laws of nature plausibly concern how *idealised* systems would behave in various circumstances and in many cases there are reasons for thinking that such systems are not physically realizable by anything. Hence, it seems that these laws – which are posited in science for various explanatory purposes – concern metaphysical possibilities that are super-alien on Vetter's definition. Given that we think laws of nature should be taken metaphysically seriously, we believe that super-alien possibilities should be too.

What then are examples of scientific claims about super-alien possibilities, and why do scientists think that these possibilities are important? Super-alien possibilities are typically expressed using what philosophers call counternomic or counterlegal conditionals. These are counterfactuals whose antecedents describe a scenario that is not possible in physical worlds like ours. The counter-

[14] We learnt about this journal from James Franklin (2015).

nomics that are of most interest in science involve idealisations. In such cases, the antecedent describes a scenario that is similar in some respects to a phenomenon that we are interested in in the real world, but which differs in other ways. In other words, such a description is an inaccurate representation of the real world phenomenon that we are interested in. It is inaccurate in the sense that it ignores certain properties that the real world system has or attributes properties that the real system does not have (see Psillos 2011: 7). Why then are counternomics useful in science, if they do not accurately represent scenarios in the real world? The answer is that idealisations help us to reason about the causal contributions made by specific properties of a system – contributions that are described in the consequent of the counternomic claim. Idealisations are "simplifying distortions" (Teller, 2012: 272), which make "immensely difficult physical problems computationally tractable and calculable to close approximations of their actual values" (Tan 2019: 44). If we want to investigate the relationship between, say, the length and trajectory of a natural pendulum, it seems we have no choice but to consider how a pendulum would behave in the absence of other causally relevant factors such as the mass of the pendulum string and air resistance. But since massless pendulum strings are not nomically possible, such reasoning inevitably rests upon counternomic claims.

Other examples of counternomic idealisations in science abound. Classical mechanics provides a rich stock of examples in the literature on counternomics, such as frictionless planes, point mass planets, ideal gases, models of projectile motion and so on. It is also plausible that modern theories in fundamental physics are heavily idealised. For example, "the quanta of quantum field theory are an artifact of describing space-time as flat" (Teller 2012: 269) and in physical theory "the velocity of light is the constant c (which of course we do not know precisely) – but only in a vacuum, and there are no perfect vacua" (Teller 2012: 263).

In any case, what is important for our purposes is that i) counternomic reasoning is employed in at least some areas of natural science, ii) many such counternomics describe properties that are super-alien in the sense defined earlier, and iii) some counternomic claims are true in a non-vacuous, metaphysically serious sense. We do not think that ii) is difficult to establish. It seems clear that nothing in our physical world has or will have the potentiality to instantiate or produce a frictionless plane, a massless piece of string, perfect vacua and so on. For example, in order for something to have the potentiality to produce a frictionless plane, it would have to be able to violate laws concerning molecular force. In favour of iii), it is prima facie plausible that there is an important difference between vacuously true counterpossible claims, whose antecedent describes a logically impossible scenario, and some of the counternomic claims

described above. In the case of vacuous counterpossibles, like "if 2+2 were to equal 5, then the moon would be made of cheese", any consequent whatsoever follows from the antecedent. But in the cases described above, there is surely a substantive right or wrong answer as to what would follow counterfactually if, say, my car were travelling on a frictionless plane. The non-vacuity of such counterfactuals becomes even more clear when we note that many idealised counterfactuals are used to capture facts about the actual laws of nature are in our world. Brian Ellis (1987: 54) has discussed a number of such examples. For instance, the principles of special relativity tell us how things would behave in inertial systems, though general relativity implies that nothing actually has the potential to physically realize such systems. The laws of thermodynamics provide other examples. Some of them describe how perfectly reversible heat engines would behave, even though other thermodynamic principles rule out the physical possibility of anything constituting or producing such engines. In short, if there are no super-alien possibilities, metaphysically speaking, then the metaphysical status of even scientifically supported laws of nature is brought into question. Assuming, then, that many counternomics in science are true in a non-vacuous, substantive way, it is natural to enquire about their truthmakers. The Platonist potentiality theorist has a ready-made answer: these counternomics are made true by the super-alien properties involved, such as *being a frictionless plane* or *being a Carnot engine*, which have a dispositional essence but which remain uninstantiated in our physical world.

What, then, is the problem for Vetter? As we saw earlier, Vetter does not have the metaphysical resources to provide truthmakers for counternomic claims, because all metaphysical possibilities have to be grounded in the potentialities of actual concrete things. Since no concrete thing has the potentiality to instantiate or produce an instantiation of a super-alien property, then there can be no such possibilities, metaphysically speaking. This means that scientific talk of super-alien possibilities must in some sense be second rate when compared with non-super alien possibilities. On Vetter's theory, non-super alien possibilities are in perfectly good standing: claims about them are non-vacuous and metaphysically substantive. But on Vetter's theory, as soon as we start thinking about super-alien possibilities, we are no longer thinking about genuine possibilities and are deceived if we think we are. This leaves us with a disunified account of scientific modal discourse, and we think this is a significant cost given the ubiquity of super-alien counternomic idealisation in science.

How then could someone like Vetter get around this worry? One option would be to accept that counternomics are true, but only in a vacuous sense. For reasons given above, we do not think this is a feasible option. Those who think otherwise are guilty of not paying close enough attention to examples

from science (see Tan 2019 for a detailed argument along these lines). A more promising solution would be to accept that our world contains objects with what Jenkins and Nolan (2012) call "impossible dispositions", which are dispositions for impossible manifestations (or stimuli). This solution allows someone like Vetter to maintain that super-alien manifestations are metaphysically impossible and at the same time the impossible dispositions would provide substantive truthmakers for the relevant counternomic claims.

Despite the promise of the impossible dispositions strategy, it is not one that Vetter herself endorses. In a discussion of the paper by Jenkins and Nolan, Vetter (2015: 250-257) discusses precisely this solution and rejects it. This is not surprising, given that the whole point of Vetter's project is to align possibility with potentiality; impossibilities arise when there is a lack of potentiality rather than a potentiality for an impossibility.[15] Many of Vetter's arguments against Jenkins and Nolan rely on a rejection of what she calls the "conditional conception" of dispositions (2015: Ch. 3). We do not have the space to discuss the details of Vetter's arguments but we agree with the conclusion that the impossible dispositions approach will not be plausible in many scientific cases. To be fair to Jenkins and Nolan, we do not think it is obviously absurd to say that an actual car has the disposition to move in a certain way on an inclined frictionless plane. However, we agree with Vetter (2015: 256) that in the example of the scientific idealisation that Jenkins and Nolan discuss (Jenkins and Nolan: 2012: 746), it is implausible to think there as an impossible disposition. The case allegedly requires us to say that a rabbit population has the disposition to increase by 0.1 rabbit per month. But given that these kinds of increases are ascribed to actual populations by scientists, surely such ascriptions must either be understood in non-literal way or else regarded as false, strictly speaking; in which case the dispositions for such increases can also be treated in a similar way (Vetter 2015: 256). Consider also the kind of counternomic claim discussed by Handfield: "if gravity had obeyed an inverse cube law, the planets would have had very different orbits" (2004: 403). We think it is implausible to suppose that masses have an impossible disposition to give rise to inverse cube gravitational behaviour. In our world, gravity is generated by mass, whose dispositional essence concerns inverse square behaviour rather than inverse cube behaviour. Moreover, if we are to accept that masses have impossible 'inverse cube' dispositions, we would surely have to posit an endless number of such

[15] This is also why Vetter should not appeal to the notion of masked potentialities in order to accommodate super-alien possibilities. For example, if we claimed that a heat engine had the potentiality for fully reversible behaviour, but that this potentiality would always be blocked by other properties of the engine, this would be tantamount to saying that the engine has a nomically impossible potentiality.

dispositions, with each one corresponding to a different inverse function. For these reasons, we believe that a Platonic analysis of Handfield's counternomic conditional is much more plausible. In line with Handfield's suggestion (2004: 406), we can interpret the antecedent as describing a case in which 'schmass' rather than mass in instantiated, where schmass's dispositional essence is to give rise to inverse cube behaviour. According to the Platonic analysis, the truthmaker for this counternomic is the property of schmass, which exists in an uninstantiated state. To be clear, this does not mean that it is possible that gravity obeyed an inverse cube law – only that super-aliens allow us to explain why that counternomic is true, as opposed to "if gravity had obeyed an inverse cube law, the planets would have had the very same orbits".

Another non-Platonic option to for someone like Vetter to take seriously is to say that although no particular object has the potentiality to produce super-alien instantiations, the world as a whole does. Indeed, Vetter discusses this strategy and explores whether it could be used as a catch-all solution for alleged cases of possibility for which potentialities are not easy to find (2015: 257-263). [16] As Vetter points out (2015: 261), this general strategy will remind some of the explanation of conservation laws given by Bigelow, Ellis and Lierse (1992), according to which conservation principles are grounded in the dispositional essence of the 'world kind'. Vetter is however sceptical of this solution and argues convincingly that spelling out the nature of the world-level object in the appropriate way is difficult to do (2015: 258-261). We would merely add that ascribing potentialities to the world as a whole also leaves us with explanations which arguably suffer from the same problems as those provided by Bigelow, Ellis and Lierse in the case of conservation laws. As Livanios (2010: 302) argues, such explanations are either poor ones or deeply *ad hoc*. According to Livanios such explanations are often poor because they are too coarse grained. That is to say, world-level explanations are so general in character that they are not informative. Moreover, as Tugby discusses elsewhere (2017: 2071), the world – level strategy is suspiciously easy to employ, because it provides an automatic recipe for explaining any modal phenomenon that is otherwise difficult to explain. Surely doing modal metaphysics should be more difficult than this.

What then are the remaining options for those who accept Vetter's metaphysical framework? We think that the least problematic options all involve biting the bullet, by conceding that there are no super-alien metaphysical possibilities. There are at least two ways of doing this. One is to employ a fictionalist account of scientific idealisation along the lines Frigg's theory of scientific

[16] We are also grateful to Daniel Nolan for raising this possibility during discussion.

models (2010). According to such a theory, claims about counternomics are not literally true but are true in some weaker sense: true according to scientific fiction. The other option is one that Vetter has recently endorsed (2016), which involves viewing claims about super-alien possibilities as counterpossibles that can be true, but which concern *epistemic* rather than metaphysical possibility. On this account, true counternomic claims are truths about the compatibility of a certain counterfactual (or counterpossible) with our knowledge or evidence. Claims about the potentialities or dispositions of things are, in contrast, metaphysical or "circumstantial" (2016: 2694). Unfortunately, we do not have the space to discuss the proposals of Frigg and Vetter in the detail that they deserve. We accept that if Platonism is rejected, then the fictionalist and epistemic approaches will be strong contenders. However, our point for current purposes is that, unlike Platonism, both theories incur the cost of leaving us with a disunified treatment of scientific modal discourse. On these theories, many scientific modal claims are both literally true and metaphysically serious, but as soon as scientists engage in idealised, counternomic modal discourse, the claims are either literally false or not metaphysically serious. We cannot help feeling that this makes the latter sort of scientific discourse appear second rate. Moreover, if people like Teller (2012) are right, and almost all fundamental scientific theories are idealised and rest heavily on counternomic assumptions, then we worry that the fictionalist and epistemic approaches strike a blow against scientific realism itself. If one wants to take scientific theories metaphysically seriously, then Platonism is a very tempting route to take.

4. *Conclusions*

We have argued that Vetter cannot accommodate both Hardcore Actualism and Naturalism. We recommend that Vetter loosens her commitment to Naturalism and accepts a Platonic theory of potentiality or something like it. The Platonic theory provides an elegant solution to the fundamental puzzle of potentiality and brings a variety of peripheral modal benefits, especially in the context of natural science.

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