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RELATIONAL TROUBLES STRUCTURALIST WORRIES FOR AN EPISTEMOLOGY OF POWERS-BASED MODALITY

By Giacomo Giannini[1,†] and Tom Schoonen[2,†]

Dispositionalism is the theory of modality that grounds all modal truths in powers: all metaphysically possible and necessary truths are to be explained by pointing to some actual power, or absence thereof. One of the main reasons to endorse dispositionalism is that it promises to deliver an especially desirable epistemology of modality. However, so far this issue has not be fully investigated with the care it is due. The aim of this paper is to fill this gap. We will cast some doubts on whether the dispositionalist really is in a better position to explain our modal knowledge. In fact, we argue that there is a tension between some core tenets of a powers metaphysics and the very features that make dispositionalism the ideal backdrop for a desirable epistemology of modality. We conclude that this leaves dispositionalists who want to deliver the promised epistemology with a hard, currently unfulfilled, task.

Keywords: epistemology of modality, perception, powers structuralism.

I. INTRODUCTION

According to powers ontologies, (at least some of the) properties that populate the world are irreducibly dispositional. That is to say, an object that instantiates a certain power is thereby *disposed* to behave so-and-so. For instance, if a glass is fragile, then it is thereby disposed to break (in the right circumstances; we'll omit the proviso in what follows for the sake of readability).

Dispositionalism is the theory of modality that grounds all modal truths in powers: all metaphysically possible and necessary truths are to be explained by pointing at some actual power, or absence thereof.[1] Very roughly, the theory can be summarised by the following two claims:

† Both authors contributed equally.

[1] The problems we will raise apply equally to powers-based, disposition-based, and potentiality-based accounts of modality, so we will use these terms interchangeably for the purposes of this paper.

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DPoss: 'possibly p' is true iff and because there is some power whose manifestation, if it obtained, would make 'p' true.[2]

DNec: 'necessarily p' is true iff and because there is no power whose manifestation, if it obtained, would make 'not-p' true.

As a theory of modal metaphysics, dispositionalism is gaining popularity: it has a lot going for it from a metaphysical point of view (Borghini and Williams 2008; Jacobs 2010; Vetter 2015; Kimpton-Nye 2021). However, one of the most enticing and often cited reasons to endorse dispositionalism is that it promises to deliver an especially desirable *epistemology* of modality. This is where dispositionalism claims to have a decisive advantage over rival approaches.

The main reason is that it is a 'hardcore actualist' theory of modality. As such, it affords us empirical access to modal facts, 'by anchoring possibilities in the right kind of objects: actual objects, with which we have epistemic contact' (Vetter, 2015: 11). If the truthmakers of modal claims are actual entities that are neither abstract nor spatiotemporally separate from us, then they seem to be well within our epistemic grasp: powers are the entities we are regularly in commerce with. In acquiring knowledge about powers, we thereby acquire knowledge about the sort of everyday modal facts that represent the core of our modal beliefs: that the teapot can break if I drop it on the floor, that I could climb up that tree, etc. In short, dispositionalism seems to afford the right resources to solve the problem of modal epistemic friction (Vaidya and Wallner, 2021).

In particular, friends of powers claim that we can come to know many modal truths in a simple, anti-exceptionalist, and empiricist-friendly way: by perceiving them. 'Given a sufficiently rich view of perception, it is not implausible even to think that in some cases we can perceive an object to have a certain disposition: I can see that the glass is fragile' (Vetter, 2015, 12).[3] While powers theorists are not the only ones who have suggested that we can come to know some modal truths via perception,[4] they seem to be uniquely well placed to integrate the idea with their overall metaphysics. For instance, the view that we perceive Gibsonian affordances (Gibson, 1979) sits very naturally with the idea that affordances are just powers (Vetter, 2020).

Perception alone is probably not going to be sufficient to yield knowledge on *all* modal matters; while it seems well geared to give us knowledge of

[2] Throughout the paper, we will switch quite liberally between talk of powers being the truthmakers of modal claims and powers being the grounds of modal facts.

[3] Recently, Vetter (forthcoming) has moved away from a perception-based epistemology of modality, towards an *agency-based* epistemology of modality. However, this move does not seem to be motivated by dispositionalism, but rather by trying to give an epistemology of modality independently of a particular metaphysical theory of modality.

[4] Legg & Franklin (2017) have argued that we can come to know certain necessities (e.g. some mathematical truths) by looking at diagrams, and both Strohminger (2015) and Nanay (2011a, 2011b) have argued that we can come to know truths about mere possibilities perceptually.

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mundane modal truths (the teapot can break; I can climb that tree), it is unlikely that it will be able to deliver sound judgements concerning the more exotic issues that interest philosophers and scientists alike.[5] Therefore, the dispositionalist's epistemology of modality will have to go beyond the truths that can be perceptually acquired. Following Vetter (2016) this will involve a two-step strategy. The first step is to secure a set of perceptually acquired truths about mundane modal facts (call it the 'entry point'), and then expand it to include propositions about the more abstract matters via a series of acceptable offline reasoning methods. This second step need not be uniquely available to dispositionalism. So, what most clearly sets dispositionalism apart from other metaphysics of modality is the first step—the acquisition of the entry point to modal reasoning.

However, so far this issue has not been fully investigated with the care it is due. The aim of this paper is to fill this gap and focus precisely on this first step: the acquisition of the 'entry point' by means of perception. We will cast some doubts on whether the dispositionalist really is in such a better position with regard to the mundane modal truths that form their entry point. There is, we argue, a tension between some core tenets of a powers metaphysics and the very features that make dispositionalism the ideal backdrop for a desirable epistemology of modality.

The structure of the paper is as follows. In Section II, we present in more detail how dispositionalism is supposed to yield knowledge of modal matters. This is due, we argue, to the interplay between the principle that the essence of powers is relational (**Structure**) and the principle that perception can reveal the essence of powers (**Transparency**). In Section III, we highlight the virtues and appealing features of the resulting picture. In Section IV, we present the problem for the dispositionalist epistemology of modality: the very same principles needed to get the account off the ground are jointly very implausible. In the following sections, we examine some attempts to dissolve the tension. In Section V, we consider attempts to weaken (**Structure**). In Section VI, we examine weakenings of (**Transparency**), and in Section VII, we consider weakening both principles. We will argue that none of these proposals is ultimately acceptable. We conclude in Section VIII.

II. POWERING UP THE EPISTEMOLOGY OF MODALITY

The picture offered by the dispositionalist about the acquisition of the mundane modal truths that constitute the entry point to our modal knowledge is fairly straightforward: the properties of concrete objects are powers and powers are the truthmakers of modal claims. Perception informs us of (at least some of) the

[5] Like could there have been nothing rather than something? Can there be disembodied minds? Are laws of nature contingent?

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properties that concrete objects have, thereby presenting to us the truthmakers for some modal truth. But this, alone, is not enough to give the dispositionalist what they wanted, i.e., knowledge of the relevant modal claims. A further, crucial step is needed. Call it '(**Grounding**)':

(**Grounding**) By perceiving powers, we thereby can come to know the modal truths they ground.

This principle is really crucial. Without (**Grounding**), it is not easy to see how we can get from perception of powers to the entry-point, that is, to the set of mundane known modal claims that dispositionalists need to set everything else in motion. But how does this work? How does one go from the perception of powers to knowledge of the modal truths they ground? This is, in our opinion, the crucial question for the dispositionalist's epistemology of modality. Though nobody in the dispositionalism literature has explicitly addressed this issue, there is a very seductive justification for (**Grounding**) available to the dispositionalist that we think many implicitly accept. The justification relies on two further principles, one metaphysical and one epistemological.

The metaphysical principle needed to establish (**Grounding**) is that powers are relational entities. Powers, we have noted, are properties *for* a certain behaviour, event, or property. They are directed towards their manifestation.[6] The link between a power and its manifestation is stronger than a mere necessity: it is an essential one (Molnar, 2003; Bird, 2016). Mass just wouldn't be the property it is if it were *directed at* repelling, rather than attracting. This means that manifestations (at least partially) fix or determine the identity of the power. The nature of powers is (at least partially) fixed by other entities: they have a relational essence. What make a power the very entity that it is are facts concerning other entities, namely (at least) its manifestations. In short:

(**Structure**) Powers are (at least partially) essentially characterised by their places in a structure of directedness relations.

This means that the structural component of the essence of a power is *functional* and can be captured by the relevant open sentence in the Ramsified book of directedness relations (Hawthorne, 2001; Jacobs, 2010). There are two important open debates about (**Structure**). The first concerns whether manifestations alone suffice to fix the identity of powers, or whether other factors (e.g. stimuli) play a role. Another debate concerns whether their place in a structure exhausts the essence of powers, or whether there is more to it. We will be neutral

[6] Different powers theorists disagree on the nature of this directedness: some take it to be simply a second-order relation (Bird, 2007; Tugby, 2021); others refuse to consider directedness as a relation proper, and compare it to the directedness of intentionality (Heil, 2003; Molnar, 2003; Martin, 2008). In this paper, we will be neutral on this debate. We will often speak of directedness as a relation, but this will just be for reasons of clarity of exposition.

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about both debates: the tension with the perception-based epistemology of modality that we are concerned with arises regardless (see Section V).

(**Structure**) explains how powers can ground non-trivial modal truths: it is because they are directed at the truthmakers of the claims within the scope of the modal operator. Fragility makes it true that its bearer can break precisely because it is directed at breaking.

This alone is not enough to yield (**Grounding**), though. In order to come to know the grounded modal truths via perceiving the powers that ground them, we must be able to come to know what powers we are perceiving. For this, we need a 'sufficiently rich view of perception' (Vetter, 2015, 12). Dispositionalists do not not provide much detail as to what this 'rich view' amounts to. We suggest that what is needed is that perception reveals something of the essence of the perceived entity to the perceiver.[7]

(**Transparency**) We come to know the essence of powers by perceiving them.

(**Transparency**) is not explicitly endorsed by any powers theorist, even though there are some traces of it in the literature: For instance, Mumford and Anjum maintain that 'causes can be perceived, and furthermore that such perception reveals their dispositional character' (2011, 195). The main reason for the dispositionalist to adopt (**Transparency**) is that, in conjunction with (**Structure**), it offers an appealing explanation of (**Grounding**)—at least, *prima facie*.

The explanation goes as follows. By (**Structure**), the essence of powers concerns their place in a network of directedness relations: the essence of *P* is to be directed to *M*. In turn, this is what explains why a certain power is the truthmaker for a certain modal claim: power *P* makes 'possibly, *q*' true because *P* is directed to some manifestation *M*, and *M* would be the truthmaker for *q*. By (**Transparency**), perception yields access to the essence of powers, and thus one perceives that *P* is directed to *M*. Thus, we come to know the relevant modal truth. With this 'sufficiently rich view of perception', the dispositionalist can justify and explain (**Grounding**) and deliver a very desirable epistemology of modality.

III. VIRTUES OF POWERS AND MODAL KNOWLEDGE

We think that the picture sketched above yields an epistemology of modality that has a number of very attractive features. In this section, we quickly review some.

[7] The dispositionalists only need to hold that something of the essence of the perceived *powers* is revealed via perception, and they may leave it open whether this is also the case for the perception of non-power entities. We will ignore this subtlety here.

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First of all, on this picture, (metaphysical) modality is objective and mind-independent. That is, what is true is due to how the world is, rather than how the human mind works. While realism is the standard, orthodox position in contemporary debate in the metaphysics of modality, it is also the one for which the epistemological problems are most pressing and hard to tackle (Blackburn, 1993; Peacocke, 1999; Thomasson, 2020). Dispositionalism, in combination with a perception-based epistemology of modality, seems to be able to overcome these worries.

Secondly, it vindicates the pre-theoretical idea that we do have at least some modal knowledge, importantly including knowledge of unactualised possibilities (i.e., mere possibilities) (cf., Leon, 2017). It is of particular importance that an epistemology of modality ensures that we have knowledge of certain mundane modal matters, e.g. that we could have caught the train if we had left the house earlier (Hawke, 2011, 360).[8]

Thirdly, the proposed epistemology is *anti-exceptionalist*—i.e., the view that our way of acquiring knowledge of modality is continuous with how we acquire our everyday knowledge of the world and does not require separate faculties or cognitive mechanisms (Williamson, 2007).

Finally, the package, dispositionalism and perception, provides a step towards a satisfactory solution to the *Integration Challenge* (Peacocke, 1999; Sjolin Wirling, 2021; Roca-Royes, 2021). The Integration Challenge is the challenge to 'reconcile a plausible account of what is involved in the truth of statements of a given kind with a credible account of how we can know those statements, when we do know them' (Peacocke, 1999, 1). Solving the Integration Challenge is a tall order in itself, but the task becomes especially arduous if we hold fast to the other virtues—not every metaphysics of modality will be able to deliver the goods. Dispositionalism seems to offer us just that.

IV. THE PROBLEM: I CAN'T SEE FOR MILES

The desirable epistemology of modality available to dispositionalists owes much to the interaction between (**Transparency**) and (**Structure**). The problem is that these two principles are also in tension, and it is implausible that they are jointly true.

To illustrate why this is the case, we will first present the obvious difficulties that emerge if one were to adopt both principles in their strongest form. This will be the goal of this section. In Sections V–VII, we will argue that weakening

[8] This leaves open the question whether we currently possess knowledge of the more sophisticated or abstract issues that chiefly are of interest to philosophers, such as whether laws of nature are necessary, whether there could have been something rather than nothing, etc. (Van Inwagen, 1998; Hawke, 2011).

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one or both of these principles does not really help, either. Let's start by spelling out both principles in their strongest form:

(**Full Transparency**) *S* comes to know the *full essence* of *P* by perceiving it.
(**Pure Structure**) The essence of powers is fully fixed by their place in a structure of directedness relations.

The problem is that the structure of powers will be really extensive. In fact, there are good reasons to think that it must encompass at least all physical properties (see Williams, 2010, 2019). Clearly, the resulting structure will be enormously complex, even if exactly how complex will in part depend on how fine-grained we think the manifestations of powers are (see Giannini, 2021; Livanios, 2022).

Now, it should be evident why the conjunction of (**Full Transparency**) and (**Pure Structure**) is implausible. Because of (**Pure Structure**), the essence of powers is immensely complex. And, by (**Full Transparency**), such essence is available to us in perception, thus endowing us with incredible cognitive capacities.

We can distinguish two different worries at bay here. The first was already raised by E.J. Lowe (2010)—call it the *Universal Knowledge Worry*. Since a difference at *any* point in the structure would change the identity of all the other properties, it follows that to know the essence of a property *P*, we need to know the structure of all physical properties. While the individual essence of each power is given by a different open sentence in the Ramsified book of laws, the content of these sentences is pretty much the same, namely the whole Ramsified book of laws. In order to know one property, one needs to know the whole book of laws.

The real bite of the worry here is not so much that such a state of total knowledge is impossible for entities like us.[9] Rather, the issue is that it's hard to see how we could distinguish between the mundane modal truths that we assumed we possess knowledge of and the more exotic, 'interesting' truths, whose possession is more uncertain. If knowledge of even the most mundane modal truth presupposes knowledge of the total causal structure of the universe, then it seems that either we know absolutely every modal truth or we do not know any at all.

The Universal Knowledge Worry raises, then, some trouble for (**Pure Structure**) alone. But things become much worse when we consider (**Full Transparency**). For not only does it seem that dispositionalists must be committed to us having total modal knowledge if any, they also seem committed to the idea that such knowledge can be acquired by means of perception. But

[9] Powers still retain the epistemic upper hand over quiddities. For quiddities are completely unknowable, powers are just really hard to know, as they might be known only by a completed science. Thanks to a reviewer for pushing us to make this clear.

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this seems preposterous: surely, it is not by just looking at a coffee mug that we can come to know Schrödinger's Equation. Yet, if knowledge of the whole structure is a necessary condition for knowledge of the nature of a power, then this is exactly what the argument above requires of us: we'd need to know everything to know that the apple is edible or the tree climbable, and so if we could learn perceptually that the tree is climbable, we must be able to thereby know the whole book of laws. Call this the *Perception Worry*.

We think that these worries are serious enough to represent a *reductio* of the dispositionalist epistemology based on (**Full Transparency**) and (**Pure Structure**).[10]

V. WEAKENING (**STRUCTURE**)

The dispositionalist need not give up so soon on their ambitions to deliver a desirable epistemology of modality. We have argued that the conjunction of (**Transparency**) and (**Structure**) in their strongest form [i.e., (**Full Transparency**) and (**Pure Structure**)] is implausible. But one might reasonably protest that in doing so we have artificially made the problem look worse than it is. Perhaps we can weaken one of them (or both) to dissolve the worries and still reap the epistemological goods that were promised. Since (**Pure Structure**) seems to be at root of both worries, we will start by considering two ways of weakening it: (**Powerful Qualities**) and (**Mixed View**). We argue that they are both ineffective.

V.A Powerful qualities

(**Pure Structure**) has it that there is nothing to a property but its dispositional character: its essence is exhausted by the directedness relations it is in, its identity fully fixed by the structure it is a part of. Proponents of the Powerful Qualities (PQ) view, on the other hand, maintain that properties are both dispositional *and qualitative* (e.g. Martin, 1997; Martin & Heil, 1999; Heil, 2003; Martin, 2008; Jacobs, 2010; Williams, 2019; Giannotti, 2021; Coates, 2021).

It is not easy to find a clear-cut definition of what, exactly, friends of PQ take these qualities to be nor how exactly the thesis is to be spelled out coherently

[10] A reviewer noted that this might raise some worries for those (e.g. Chakravartty, 2007) who think that the aim of science is to discover the dispositions of entities. The issue is interesting and thorny, and we cannot address it with the depth it deserves here; we'll limit ourselves to a few observations. First, note that the Perception worry does not apply here, for there is more to scientific knowledge than perception (model building, hypotheses, etc). Secondly, the Universal Knowledge worry arises only for a non-completed science, which has yet to uncover the entirety of the book of laws. As to current science, our instinctive reaction is that here the dispositionalist will have to develop some account of (structural) approximate truth, and hope it does the job: in this, they are not in a very different situation from any other realist.

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(Taylor, 2018). For example, some suggest that properties have two aspects (Giannotti, 2019, 2021) or are dual-sided, 'Janus-faced' (Martin, 1994), while others insist that qualitatively and dispositionality are one and the same thing: As Heil puts it, '*P*'s dispositionality, *Pd*, is *P*'s qualitativity, *Pq*, and each of these is *P*: $Pd = Pq = P$' (2003, 111).

For our purposes, these issues do not matter much, for we can understand the notion in purely negative terms: powerful qualities must be properties whose essence is *not exhausted* by their place in the directedness network and whose identity is not wholly fixed relationally, without thereby being quiddities or categorical properties. Concisely:

(**Powerful Qualities**) The essence of powerful qualities is partially, but not wholly, fixed by their place in a structure of directedness relations.

How does this help dispelling the worry? Presumably, the idea is this: qualities are self-contained. They are 'all there' to be perceived, as it were. So, if powers really are powerful qualities, this means that they have a qualitative component or a qualitative aspect of sorts. Presumably, such a component or aspect has nothing to do with the enormously complex structure of directedness. So, if a powerful quality is to be understood as a property whose essence is in part fixed by its place in the structure, but also in part given primitively, then one might hope that perceiving the property could at least inform us of the qualitative part of its essence—that we could come to know the qualitative aspect of a powerful quality perceptually, which might be enough knowledge of the property's nature for the empiricist epistemology to get going.

We do not think that this could work. Even if we assume that an intelligible positive account of what it is to be a powerful quality that does not collapse the view to pure powers (Taylor, 2018) could be given, it would do very little to assuage the Universal Knowledge and Perception worries. The reason for this will have to be spelled out differently, depending on the exact version of PQ adopted, but the common theme is that the identity of the property will remain partially unknown to us—insofar as the structure partially fixes it. But, first of all, insofar as (**Full Transparency**) is true, this will not matter: the claim remains that perception reveals the full essence of the property, which in the case of PQ will still include the enormously complex structure. The essence of powers according to PQ is a superset of the essence of powers according to (**Pure Structure**), so the move cannot help at all. Secondly, the part of the essence that is relevant for establishing modal truths is the dispositional one. So, if we only came to know the qualitative aspect of a powerful quality, we would not thereby know much about what sort of modal facts are grounded by it.

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V.B Mixed view

One might think that what went wrong with (**Pure Structure**) is not the fact that powers are wholly determined by their place in the structure, but the tacit monistic assumption that all manifestations are further powers—that is to say, that the structure is composed only of powers. Contrary to this, one might think that some of the vertices of the world-graph are not powers, but rather some other entity with their own primitive identity (for instance, categorical properties, as in Lowe, 2010). These would be, as it were, dead-ends in the structure: while they could be the manifestation of some powers, no further arrows would stem from them. Assume that these dead-ends are qualitative, categorical properties,[11] i.e., have a self-contained essence, and that only manifestations determine the nature of the powers (Vetter, 2015).[12]

It seems then we have an easy solution to our worries. Some powers are directed at categorical properties, which have a self-contained primitive identity. Assume that the nature of such categorical properties is not too complex and could be unproblematically grasped by us. A power *P* immediately directed to a categorical property *Q* would have its identity fully fixed in one single step. Suddenly, it seems that both the Universal Knowledge worry and the Perception worry become much less threatening, at least in cases where a power is closely connected to a categorical property. While it seems unreasonable that beings like us could grasp perceptually the whole of the Ramsified book of laws needed to specify the essence of a pure power, it seems that we could be able to perceptually grasp the essence of a power with a much simpler essence, e.g. a power whose direct manifestation is a dead-end in the structure.

We think that this proposal has a lot going for it: it is simple, elegant, and can be independently motivated, provided we can accept mixed views in general.[13] However, there are two kinds of considerations that prevent us from being fully satisfied by it, and which ultimately will force us to reject it. The first reason is that the solution can be, at best, *partially successful*: it can only work for a certain subset of powers. Call this the **Closeness Objection**. The second reason is that the solution works well only schematically, but is not in fact viable, given the candidates for the role of dead-ends. Call this the **Candidate Objection**. Let's look at these two issues in turn.

[11] This picture is still compatible with the idea that powers are pure powers: there is nothing that fixes the identity of a power but what it is for. The idea is even compatible with the thesis that all properties are powers: one just needs to allow entities other than properties to be manifestations of powers (e.g. Giannini, 2021), as long as they have a primitive identity.

[12] If we allowed stimuli to play a role, then we'd have the same structuralist worries in the backward cone, as it were.

[13] See Williams (2019) for arguments against mixed views.

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V.B.1 Closeness objection

The mixed view holds that some chains of powers terminate in categorical properties that act as dead-ends and anchors. This dispels worries about identity regresses of powers (Lowe, 2010) without having to appeal to controversial structuralist considerations (Bird, 2006; Oderberg, 2011, 2012; Busse, 2020, 2021). However, it is not obvious how helpful this view is from an epistemological point of view, at least in most cases. The problem is that chains of powers, even if not infinite, can still be very, very long. By (**Full Transparency**), when we perceive a power, we are revealed its full essence. But this might include an enormously long chain of further powers, before it eventually bottoms out. And, just as it is implausible that perception can reveal the structure of the entire cosmos to cognitively finite entities such as ourselves, it's equally implausible to think that it can reveal us a very long chain, even if it terminates after a finite amount of steps. For example, assume that fragility is for breaking, breaking is for cutting, cutting is for..., etc. After n steps, we get to some categorical property G, which has a self-contained essence. Now, n might be in the order of millions of steps. It is not much more plausible to think that perception gives us that much information than it gives us knowledge of the whole cosmos.

So, the mixed view might be helpful epistemically only in case we are perceiving powers that are *relatively close* to their categorical dead-end. Therefore, it would work only for a fairly restricted class of powers. This raises a number of worries. First, this set might be too small for our purposes: we might not gain enough of an entry point from which our modal knowledge can expand. More worryingly still, we need to make sure that the sort of macro-properties that we are generally acquainted with in everyday experience are among the powers that are very close to their dead-ends. Otherwise, the ability of dispositionalism to deliver the mundane modal beliefs we manifestly possess would be under threat. This leads to the question: what sort of properties are the proponents of the mixed view envisaging as being categorical? This issue is at the heart of the second objection against the mixed view.

V.B.2 Candidate objection

What sort of entities are the dead-ends? In the powers literature, there seem to be four candidates for the role of non-dispositional properties (Ellis, 2001; Molnar, 2003; Lowe, 2010). These are (i) pure quiddities, (ii) spatiotemporal locations, (iii) mathematical and geometrical properties, and (iv) phenomenal properties. The problem is that we don't think that any of these is very apt for the role of anchoring our mundane modal knowledge. For reasons of space, we can't offer a systematic overview. We will focus only on two candidates, quiddities and phenomenal properties.

Quiddities are the equivalent of haecceities for properties: properties whose essence just consist of some self-identity fact. If F is an quiddity, then its

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essence is 'being *F*' or 'being identical to *F*'.[14] These are bad candidates. First, quiddities are anathema to powers theorists: one common reason to adopt a powers metaphysics is to avoid a commitment to quiddities and the possibilities they generate, such as swapping nomological roles (Black, 2000; Mumford, 2004; Bird, 2006, 2007). More importantly, even friends of quiddities admit that they are beyond our epistemic grasp. The essential features of quiddities (namely, their bare identity facts) do not play a role in our theorising (causal or modal) and are explanatorily idle. Thus, Lewis (2009, 204) advocating for Ramseyan Humility: 'no amount of knowledge about what roles are occupied will tell us which properties occupy which roles'. Quiddities won't help with our knowledge of the nature of powers.

Now consider phenomenal properties. In favour of the proposal, there is the fact that the idea that the full essence of phenomenal properties is presented or revealed to us when we experience it (Kripke, 1980; Johnston, 1992; Chalmers, 2003; Nida-Rümelin, 2007; Goff, 2011, 2015), so (**Full Transparency**) seems reasonable here. Moreover, clearly we have knowledge of some phenomenal properties, and phenomenal properties are more substantial than simple thin quiddities. (We will treat them as thick quiddities.) The issue is: can phenomenal properties do the job they are supposed to do? Can the knowledge of their essence, and that of powers closely related to them (e.g. the power to give rise to a yellow experience), give rise to mundane modal knowledge that forms the basis of dispositionalism's two-step epistemology of modality?

There are some reasons to be sceptical. Because of the Closeness Objection, the only powers we could know would be (almost) immediately leading to some phenomenal property. This means that the entry point would consist of subjective knowledge of phenomenal properties. But our ordinary mundane modal beliefs are largely about concrete entities, not subjective states: the vase can break; I can catch the bus; Labour can win the next general election.

So one would need to show how we can get from the subjective knowledge of phenomenal properties to the knowledge of objective claims about ordinary objects. The history of philosophy is a testament of how hard it is to do so (Carnap, 1956). Consider how one would argue from the subjective possibility of something seeming like a blue horse to me, to the objective possibility of their being a blue horse (cf. Gregory, 2020 for such an attempt). Even if we could get around this worry, then still we might think that without any linguistic content, purely qualitative content (based on merely qualitative properties) severely underdetermines possibilities in such a way that it cannot serve as a proper base for an epistemology of modality. For example, purely qualitative properties could not ground that it is possible that Wittgenstein is blonde, but only that 'something-qualitatively-similar-to-Wittgenstein' is blond (cf. Kung,

[14] We are here referring to what Hildebrand (2016) calls 'thin quiddities'. We will talk about 'thick quiddities' when discussing phenomenal properties.

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2017; Berto & Schoonen, 2018 for a discussion on purely qualitative content in the epistemology of modality).

This is not a knock-down argument: perhaps one can show that we can get from knowledge of phenomenal properties to knowledge of everyday claims. However, it undoubtedly saddles the dispositionalist with a hefty task. So, weakening (**Pure Structure**) alone won't quite solve the Universal Knowledge and Perception worries.

VI. WEAKENING (TRANSPARENCY)

Another natural reaction to the Universal Knowledge and Perception worry is to protest how demanding (**Full Transparency**) is. One could deny that we need to know the *full* essence of a power in order to know that it grounds certain modal truths. Perhaps we can perceive the relevant powers and merely gain knowledge of a *part* of their essence (cf., Lowe, 2012, 2013; Tahko, 2017, 2018), embracing

(**Weak Transparency**) *S* comes to know the *partial essence* of *P* by perceiving it.

We can think of two ways to weaken (**Full Transparency**): call them 'slimming' and 'cutting'.

VI.A Slimming

Slimming can only be applied to powers that are *multi-track*. These are powers that have different (chains of) manifestations with different stimuli or disposition partners—that is, powers that have multiple arrows departing from them in the world-graph. For instance, one might think that speaking Spanish is a multi-track disposition, one that has the manifestation of uttering p in response to q, p^* in response to q^*, p^{**} in response to q^{**}, etc.

A full specification of the essence of a multi-track power would require us to know what the power would do in every relevant circumstance. But this might seem too demanding: we would say that we grasp what the dispositional property is, and could derive some modal truths from it, even if we only knew some subset of the stimuli-manifestation pairs. For example, it seems we can know what it is to speak Spanish, and be able to ascertain that Sonia speaks Spanish, by observing her reply with 'Un cafe por favor' to the question '¿Qué beberás?' and a few other sentences. We don't need to observe her respond to every possible cue in Spanish.

Unfortunately, this proposal won't help much. Even if we consider only one chain of directedness relations stemming from a given node, nothing guarantees that this chain is not itself infinite in length, or at any rate incredibly

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long. This is enough to make the view as implausible as our initial case: it would still strip our limited cognitive abilities. There is not much difference between coming to know, via perception, one infinite chain of powers, or ten of them.

VI.B Cutting

Cutting is the idea that, even if (**Pure Structure**) is true, perception does not need to reveal us the entirety of the chains of directedness relations in order to grasp what some power *P* is, and therefore what modal claim *P* makes true.[15] To know what *P* is and what modal propositions *P* makes true, we just need to acquire knowledge of a few neighbouring nodes of *P*, or even just one. One can simply know that *P* is directed at *M*, without having to know at what *M* is directed.

Kit Fine (1995) distinguishes between the mediate and immediate essence of an entity. Informally, the immediate essence of an entity *x* concerns the propositions and entities that directly appear in the essence of *x*: What we obtain when we apply the essentialist operator to *x*. On the other hand, the mediate essence has to do with the immediate essences of the entities that belong to the immediate essence of *x*. For example, the essence of {Socrates} is to contain Socrates. The essence of Socrates, on the other hand, is to be human. That Socrates is human is not part of the immediate essence of {Socrates}; it belongs to its mediate essence. It is commonly assumed in the literature that the immediate essence of *x* 'includes what has a direct bearing on the question as to what *x* is' (Spinelli, 2018, 423), while *x*'s mediate essence only has 'an indirect bearing on what *x* is' (*ibid.*). So, it is natural to think that in order to know what *P* is we only need to know its immediate essence, and that will be enough to know what sort of modal claims *P* does make true. We do not need to know that Socrates is human to know all we have to know about {Socrates}, and know that necessarily, Socrates belongs to {Socrates}.

The proposal seems to dissolve the Universal Knowledge and the Perception worry alike. Even if some power *P* is just a node in an extremely complex structure, *P*'s immediate essence only concerns the nodes that are directly connected to it. Fragility is the power to break. We do not need to know what breaking is for in order to fully grasp what fragility is, and that it makes breaking possible. Thus, even assuming (**Pure Structure**), this would relieve us from the need of knowing the entire Ramsified book of laws, if we are to know any single power. Moreover, it does not seem very implausible that cognitively limited entities like us are capable of acquiring information about the immediate essence of powers, i.e., a limited number of directedness relations.

[15] We are heavily indebted to an anonymous reviewer for raising this point and very helpful discussion.

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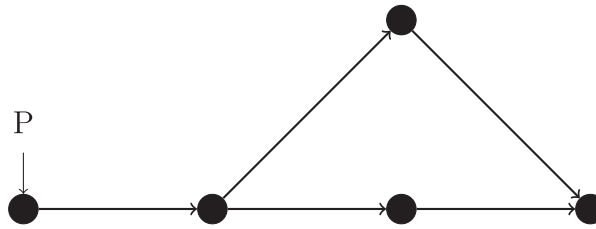

Figure 1. Example of a directed graph.

We do not think that this strategy can be successful. There are two problems with cutting. The first one is that the proposal misunderstands powers structuralism. Cutting is based on the idea that the essence of a power *P*, according to (**Pure Structure**), is given by a *chain* of claims. That is, it consists in spelling out *P*'s immediate directness relations to *M*. Then, since also *M* is a power, we have to take a second step and spell out what *M* is for, and so on until we have worked through all the physical properties. So, it is possible to distinguish between the immediate and mediate essence of *P*, where the mediate essence contains all but the first links of the chain.

But this is not what the identity conditions for powers in a structuralist setting look like.[16] According to (**Pure Structure**), the immediate essence of *P* has the form: being this particular node in such-and-such structure (Bird, 2006, 2007). For instance, consider the elementary directed asymmetric structure in Fig. 1.

The identity conditions of *P* would be spelled out, in structuralist terms, as being the node that points to the only node from which two arrows depart, and which then converge on a unique node. But, this means that the *whole structure is directly mentioned*, when we specify what *P* is. In other words, the entire structure of directedness relations appears in the immediate essence of *P* already. But then, appealing to the immediate essence would not reduce the quantity of information that needs to be conveyed. This is a significant disanalogy between this case and that of {Socrates}. In the latter case, the mediate essence conveys a lot more information (e.g. that Socrates is human). Not so in the case of structuralist powers.

The second problem concerns how informative and useful the weakened (**Full Transparency**) thesis would be. We are not confident it would be able to guarantee knowledge of the desired mundane modal truths. Assume that the immediate essence of some power *P* is just that it is directed to some property *M*, and as per (**Weak Transparency**), this is all the information we would gain by perceiving *P*. Would we be in a position to know what

[16] Although, it is how mixed views envision the identity conditions of powers. See Section VII for a discussion of that combination.

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modal truths are grounded by *P*? This seems doubtful: it depends, after all, on what truths would *M* be a truthmaker for. But this we could not know, since any sort of information about *M* lies beyond the immediate essence of *P*. *M* could be completely opaque to us. Of course, from perceiving *P* we could know that possibly, *M*. But we would have absolutely no idea of what *M* is. Is that genuine modal knowledge? Compare: when asking about the nature of bosons, we are told that it's essential to bosons that they are *F* and *G*. We are not given any sort of information about what, exactly, *F* and *G* are. Have we really learned something about bosons? How are we to link some specific sentence 'possibly *p*' to power *P*, if we don't know anything about the nature of the manifestation? How do we know that *P* is directed to breaking, as opposed to schmreaking, if we know nothing about *M*? The examples we used above, concerning {Socrates} and fragility, were misleading, because we know something about Socrates and breaking. But, of course, this need not be the case in a context where (**Pure Structure**) holds, yet we are screened off from any of that information.[17]

The obvious rejoinder would be: we will learn something about *M* when we perceive it, later on. Our modal knowledge is something we acquire slowly by systematic observation of the natural world, not something that is given to us in one go. But this risks undermining some of the most attractive features of the promised epistemology of modality, such as the ability to acquire knowledge about *mere possibilities*. In this case, we would lose much of the advantage of adopting powers in the first place. Thus, we suggest that weakening (**Full Transparency**) while retaining (**Pure Structure**) does not suffice to deliver the promised epistemology of modality, either.

VII. WEAKENING BOTH

We have seen that neither weakening (**Pure Structure**) nor (**Full Transparency**) alone can yield us the desired result. There is still one option to consider: weakening both, with the following two options: (i) (**Weak Transparency**) + (**Mixed View**) and (ii) (**Weak Transparency**) + (**Powerful Qualities**). Unfortunately, once again, we find both proposals wanting.

[17] Compare with the criticism of physicalism, and in particular of the Phenomenal Concepts Strategy (Loar, 1990; Papineau, 2007), moved by the proponents of the Revelation Argument (Goff, 2011). An anonymous referee suggested that perhaps one could think that manifestations are not, in cases of cutting, 'radically opaque', but only 'moderately opaque', to use Goff's terminology, and that we might still know some non-essential features of *M*. Unfortunately, we do not have the space for discussing this point with the depth it would require, but we recognise that, if correct, it would weaken this second argument against cutting.

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*VII.A (**Weak Transparency**) + (**Mixed View**)*

The first position combines the (**Mixed View**), according to which the identity of powers is fixed by some categorical property that has a self-contained essence and acts as a regress-stopper, with the thesis that we only acquire partial knowledge of the essence of powers (e.g. the immediate essence) via perception.

The view is a non-starter. The problem that plagued the (**Mixed View**) (aside from the lack of good candidates for the role of categorical properties, which stands) was the fact it would only work for powers that were immediately pointing at a categorical property, or at any rate very close to such a dead end, leaving us in the dark with regard to a myriad of other powers. How could this situation get any better by only considering the immediate essence of the power, namely *just the entity directly linked to it*? This would just result in an even more austere theory, according to which the only powers we could acquire any knowledge of would be those that had quiddities (be they thick or thin) as they *direct* manifestation. So, if anything, this combination is worse off than (**Full Transparency**) + (**Mixed View**).

*VII.B (**Weak Transparency**) + (**Powerful Qualities**)*

The second position, which combines (**Weak Transparency**) with (**Powerful Qualities**), might, surprisingly, be more promising. Of course, one way to cash out this combination is to maintain that perception only reveals to us the qualitative aspect of the (**Powerful Quality**). That would, obviously, not do, for it is the dispositional component of the property that is crucial for the grounding of modal truths and therefore for our epistemology of modality. If a powerful quality has a dispositional as well as a qualitative aspect, then it is natural to think that the modal implications of the property will be due to its dispositional aspect alone. It is not the qualitative aspect of the property that grounds the relevant modal truths. But, *that* is still wholly fixed relationally. Gaining perceptual knowledge of the self-contained qualitative aspect still leaves us in the dark as to what these relations are and therefore of what the property empowers its bearers to do. We can put the point more vividly with a sceptical scenario: what guarantees that the same qualitative aspect is not coupled with a vastly different dispositional side, one that grounds different modal facts. Note, the qualitative aspect cannot contain any information as to what the dispositional aspect is like—or it would be infected with the very same structural issues it was meant to solve.

However, if we adopt a slightly stronger form of (**Transparency**), then we might go somewhere. The idea would be roughly this: when we perceive some powerful quality F, we perceive/come to know (i) F's qualitative aspect, Q, (ii) the fact that F is directed at some G, and (iii) G's qualitative aspect, Q^*.

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What we *do not* come to know is *G*'s dispositional aspect (its being directed at some *H*). This seems, at least, to get us somewhere. By perceiving *F*, we come to know that some quality Q^* is possible. By perceiving a fragile entity, I can come to know that it can bring about the quality related to being broken, even if I don't know what being broken does or is for.

The last suggestion seems promising, but of course some problems remain for this proposal. In particular, all the Candidate objections we moved against the (**Mixed View**) would apply here: what are, exactly, the qualitative aspects of (**Powerful Qualities**)? If they are thin quiddities, then we would learn absolutely nothing useful (and it's doubtful that these would be given to us in perception anyway). If, on the other hand, these were phenomenal properties, then we are still left with the task of moving from the knowledge of phenomenal properties to our target, that is, the knowledge of mundane facts about external objects.

VIII. CONCLUSION

It is crucial to the success of the dispositionalists' perception-based epistemology of modality that (**Grounding**) holds: it has to be the case that by perceiving powers, we thereby acquire knowledge of the modal claims the powers make true. This is how the dispositionalists secure the entry point to our modal knowledge. So, the dispositionalists have to justify (**Grounding**) and show how, exactly, it works.

In this paper, we have done a lot of groundwork of the dispositionalists, making explicit some *prima facie* intuitive principles that would justify (**Grounding**). This is based on the interaction between (**Structure**) (the principle according to which powers have relational essences) and (**Transparency**) (the principle according to which powers reveal their essence to us via perception). We have argued that, ultimately, this initially plausible justification for (**Grounding**) doesn't work due to a deep-seated tension between (**Structure**) and (**Transparency**). Moreover, we have argued that any combination of weakenings of these principles also doesn't support the crucial (**Grounding**) principle.

This leaves the dispositionalists with a dilemma if they want to deliver the promised, desirable epistemology of modality: either they come up with a different justification and explanation for (**Grounding**) or they offer a strong argument to the effect that the principle of (**Grounding**) is in fact *not* needed after all. In order to maintain their claim that dispositionalism is in a unique position to explain our knowledge of modality, the dispositionalists will have to take either horn of the dilemma, while maintaining that the solution is *uniquely* available to a power theory of modality.

This task will be hard, but hopefully not impossible. We both hope that some form of dispositionalism is up to the task. In future work, we would

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like to attempt something like a defence of dispositionalism to these worries ourselves.

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