

Dispositional essentialism and the grounding of natural modality

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0. Abstract

Dispositional essentialism is a non-Humean view about the essences of certain fundamental or natural properties that looms large in recent metaphysics (of science), not least because it promises to explain neatly the natural modalities such as laws of nature, counterfactuals, causation and chance. In the current paper, however, several considerations are presented that indicate a serious tension between its essentialist core thesis and natural “metaphysical” interpretations of its central explanatory claims.

1. Introduction

1.1 *Ambitious dispositional essentialism*

Dispositional essentialism is the thesis that “[a]t least some sparse, fundamental properties have dispositional essences” (Bird 2007: 45).¹ Furthermore, such potencies or powerful properties are supposed to “provide natural necessity and possibility and are fit to be truthmakers of modal truths. They are not the truthmakers of all modal truths: only the natural or *de re* modal truths” (Mumford 2004: 170). Accordingly, this “raises the hope that dispositionalism can provide a unified metaphysical grounding for natural modalities in general that may serve as an alternative to Humeanism” (Choi and Fara 2012: section 3).

Let us call the claim that the natural modalities are grounded in the (natures of) potencies *ambitious dispositional essentialism* (ADE).²

1.2 *The ambitious dispositionalists' vision*

Before we examine the ambitious dispositionalist’s package, let us quickly mention two reasons why ADE might be regarded as superior to several rival metaphysical accounts of natural modalities.

1. Since it might be regarded as an empirical question whether there is a fundamental level at all, it may be favourable to formulate dispositional essentialism as a thesis about fairly natural properties. For reasons of convenience, we follow Bird (2007) and use the label “potency” for fundamental or natural dispositional properties.
2. For less ambitious versions of dispositional essentialism, cf. section 4.1 of the current paper.

First, according to ADE, (the nature of) a fundamental property seems to fully ground certain natural modalities, and so, contrary to David Lewis' version of Neo-Humeanism, there is no need to invoke the entire 4D-mosaic of property instantiations and the regularities therein to explain these modalities.³ For instance, the fact that it lies in the nature of a determinate mass to exert a certain gravitational force on other masses, when at a certain distance from them, seems to fully ground the law that masses exert certain gravitational forces on other masses, when they are at a certain distance from each other.⁴ Correspondingly, ADE seems to make room for the possibility that, in contrast to Neo-Humeanism, the pattern of property instantiations itself is explained by (the modalities pertaining to) the natures of potencies.⁵

Second, since facts about (the natures of) first-order potencies are sufficient to ground laws, natural necessity, counterfactuals and the like, there seems to be no need to postulate any additional primitive (non-Humean) facts to account for these natural modalities. So, for example, instantiations of irreducible second-order relations,⁶ primi-

3. Cf. Lewis (1973) for a Neo-Humean account of laws and counterfactuals. The central tenet of Lewis' Neo-Humeanism is Humean Supervenience, "the thesis that the whole truth about a world like ours supervenes on the spatiotemporal distribution of local qualities" (Lewis 1994: 473). Accordingly, also the laws and the remaining natural modalities hold in virtue of the entire mosaic of instantiations of natural properties: "Like any regularity theory, the best-system analysis says that laws hold in virtue of patterns spread over all of space and time" (Lewis 1994: 479).

4. Cf. Bird (2007: 3.1.2) for the derivation of a law from the fact that a single potency has a dispositional nature.

However, dispositional essentialism seems to be also compatible with a less direct connection between potencies and laws. Cf. Demarest (forthcoming) for an attempt to couple dispositionalism with a best-systems account of laws.

5. For instance, Bird (2007: ch. 4.3.2) takes this as a significant advantage of dispositionalist over Neo-Humean accounts of laws. However, cf. Loewer (2012), Hicks and van Elswyk (forthcoming) and Miller (forthcoming) for defences of the claim that Neo-Humean laws can explain. I want to thank an anonymous referee for this journal for drawing my attention to these recent publications on behalf of Neo-Humean conceptions of laws.

6. Cf. Armstrong (1983: Part II), Dretske (1977) and Tooley (1977) for slightly different versions of a second-order-necessitation theory of laws.

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tive laws of a *sui generis* ontological kind,⁷ brute natural necessity or fundamental subjunctive facts⁸ are rendered superfluous.

Accordingly, ADE promises an account of natural modalities that is more "local" or "direct" than the Neo-Humean approach, enables explanations seemingly unavailable on the latter doctrine and is at the same time metaphysically more parsimonious than several other non-Humean views. Consequently, the tenability of ADE would be strong metaphysical evidence in favour of a dispositionalist metaphysics not based on controversial epistemic or semantic assumptions that have been frequently utilized to motivate dispositionalism.⁹

1.3 Ways of contesting ADE

The main purpose of the current paper is to challenge the tenability of ADE in a novel way. Usually the attacks on ADE come in two different guises:

Since, obviously, ADE incorporates dispositional essentialism, ADE is susceptible to attacks on its essentialist core claim. For instance, it has been argued that pandispositionalism plus property structuralism, *i. e.*, the view that the nature of *every* fundamental property is *exhausted* by its dispositionality, is incoherent, since the attempt to individuate properties exclusively via (dispositional) relations to other properties leads into vicious regresses or circles.¹⁰ A second line of criticism contests the grounding claim. For instance, it has been argued that various laws (*e. g.*, functional laws, the principle of least action, symmetry laws and conservation laws) seem not to be grounded in the (natures of) potencies.¹¹ Moreover, Eagle (2009) has argued that certain counter-

7. Cf. Maudlin (2007) and Carroll (1987) for the view that laws are primitive

8. Cf. Lange (2009) for primitivism about subjunctive facts.

9. Cf. Hawthorne (2001) for a critical discussion of certain epistemic and semantic arguments for dispositionalism.

10. Cf. Armstrong (1997: 80) and Lowe (2010) for variations of this objection.

11. For instance, Katzav (2004) argues that dispositionalism cannot account for the principle of least action, and Vetter (2012) discusses functional laws as a problem for Bird's version of dispositional essentialism. Cory (2011) in turn

factuals cannot be grounded in a disposition and Schrenk (2010) has called into question that a potency is appropriate to yield (monotonic) necessity in nature.

There have been several dispositionalist responses to both of these worries. While Bird (2007: 138–146) suggests a graph-theoretic vindication of the regress objection against dispositional monism, others have pointed out that more “moderate” versions of dispositionalism — such as dualism, the double-sided view or the identity view — are not affected by regress-type problems.¹² Regarding the second line of attack, some dispositionalists suggest accounting for the “missing” natural modalities in a broader essentialist framework,¹³ whereas others take a more deflationist attitude towards them and deny that a metaphysical account has to be given at all.¹⁴

Instead of joining the discussion of these important but piecemeal attacks on ADE, we take one step back and question whether ADE’s essentialist core claim is even compatible with its grounding claim. If it turns out that already the two core components of ADE pull in different directions, this amounts to a very general and principled challenge not based on assumptions possibly inessential to ADE or answerable by adding auxiliary theoretical machinery. Moreover, the discussion of this challenge clarifies what a dispositional metaphysics in principle can accomplish.

1.4 The roadmap

The structure of the present paper is as follows: In the next section, we first state the essentialist core of ADE more carefully and then take a

criticizes Bird’s account of laws based on the observation that the manifestation of potencies can be interfered with.

12. Dualism is advocated in Ellis (2002) and Molnar (2003). The identity view is presented in Heil (2003: 111) and has been developed more recently in Jacobs (2011) and Tugby (2012).

13. Cf. Bigelow et al. (1992) and Ellis (2005) for two versions of this answer.

14. For instance, according to Bird (2007: 214), conservation and symmetry laws are pseudo-laws. For a critique of this move, cf. Lange (2012).

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closer look at the explanatory claim(s) associated with ADE. In section 3 we examine arguments to the conclusion that the essentialist core is incompatible with various versions of the explanatory claim. If conclusive, these arguments show that dispositional essentialism is in principle unsuited to deliver a unified grounding of the natural modalities, *i. e.*, that ADE is untenable. In section 4, assuming that the arguments presented in the previous section are sound, several versions of dispositionalism are examined that drop or modify at least one of ADE’s components. Section 5 finally summarizes the results of the present discussion.

2. A precisification of ADE’s core claims

In this section we want to examine the essentialist core, *i. e.*, dispositional essentialism, and the explanatory thesis associated with ADE in more detail.

2.1 *The modal account of dispositionality*

Dispositional essentialism is a compound of two theses. The first is anti-quidditism about fundamental properties, *i. e.*, the thesis that at least some natural properties have non-trivial essences, and the second is a claim about the “content” of these property-essences, namely that the content consists of the property’s dispositionality. The question that presents itself is what exactly a dispositional essence is.

According to Bird (2007), the real or constitutive essence of a natural dispositional property includes (or is even exhausted by) its dispositional character:

Essentially dispositional properties are ones that have the same dispositional character in all possible worlds; that character is the property’s real rather than merely nominal essence. (Bird 2007: 44)

Since Bird endorses a stimulus-response model of dispositions, more accurately, the dispositional character is described as follows:

Thus, according to dispositional essentialism, the real essence of some potency P includes a disposition to give some particular characteristic manifestation M in response to a characteristic stimulus S . Hence, in all possible worlds, any object that possesses P is disposed to yield M in response to S :

$$(DE_p) \quad \Box (Px \rightarrow D_{(S,M)}x). \text{ (Bird 2007: 45)}$$

Finally, Bird equates this essential dispositional character with certain subjunctive or counterfactual conditionals:

The straightforward dispositional essentialist account of laws equates dispositional character and subjunctive conditionals, as is found in the conditional analysis of dispositions. (Bird 2007: 64)

Note, however, that according to Bird (2007: 50–64), this holds just for fundamental potencies. For non-fundamental potencies, the subjunctive has to be modified in a certain way.¹⁵

Putting these remarks together and substituting a subjunctive conditional for $D_{(S,M)}x$, we get the result that certain subjunctive or counterfactual conditionals pertain to the essences of potencies.¹⁶ Since the subjunctives make up the “content” of a potency’s essence, potencies “are essentially modal properties” (Bird 2007: 129).

Accordingly, if we follow Bird and let S be the stimulus and M the manifestation property of a potency P , that P is essentially dispositional or modal means that P is essentially such that P s (P -instances) are

15. For non-fundamental mask- or finkable dispositions, the antecedent of the subjunctive has to include the clause “and finks and antidotes to $D_{(S,M)}$ are absent” (Bird 2007: 60). In addition, if potencies were multi-track (*pace* Bird), the corresponding subjunctives would have to be more complex.

For the purposes of the present paper, however, it is irrelevant whether the subjunctives pertaining to the nature of potencies are simple or complex.

16. Bird (2007: 46) formally expresses this as ‘ $\Box (Px \rightarrow (Sx \Box \rightarrow Mx))$ ’.

such that they would M if they were S .¹⁷ Using the sentence operator \mathcal{E}_F , which is the formal expression for ‘it lies in the nature of F that’ or ‘it is part of the essence of F that’, this can be stated as ‘ $\mathcal{E}_p (Px \rightarrow (Sx \Box \rightarrow Mx))$ ’.¹⁸

(Notice that $\mathcal{E}_F (Fx \rightarrow Gx)$ is to be understood as an objectual essentialist statement about the property F and not about the natures of the things that have it.¹⁹ Since, *e. g.*, a particular negatively charged object q need not be essentially so charged, it seems wrong to say that it is true in virtue of the nature of q that it would repel other negative charges if it were in the proximity of them.²⁰ Furthermore, according to Fine (1994), essence is primitive. Although we agree with Fine that essence cannot be adequately framed in modal terms, \mathcal{E}_F is intended to be neutral on this issue. This neutrality is a welcome feature, since a primitivist non-modal account of essence does not seem to be mandatory for ADE.²¹ For instance, although Bird (2007: 149) seems to sympathise with Fine’s criticism of a purely modal account of essence, formally he expresses the claim that potencies are essentially dispositional in modal terms, *i. e.*, as ‘ $\Box (Px \rightarrow D_{(S,M)}x)$ ’ or ‘ $\Box (Px \rightarrow (Sx \Box \rightarrow Mx))$ ’, respectively.)

However, it should be noted that if it is held that dispositional essences “contain” natural modalities, subjunctive or counterfactual conditionals are not the only candidates.²² In causal versions of dispositional essentialism the natural modality in question is of a causal kind instead, and in nomic versions of dispositional essentialism the

17. It is assumed here that P is a non-probabilistic or “surefire” potency.

18. In the present paper, we use an operator formulation of essentialist claims mainly for reasons of convenience.

19. For instance, in Fine (1995a, 2000) the sentence operator \Box_F is to be understood as ‘it is true in virtue of the nature of the objects which F that’.

20. This problem might be avoided if instead *q-qua-being negatively charged* is considered. Cf. Lewis (2003) for more on “qua-objects”.

21. However, Yates (2013) has argued for a version of dispositional essentialism employing a Finean conception of essence.

22. Cf. section 4.2 for non-modal conceptions of dispositional essences.

natural modality is nomological modality.²³ Correspondingly, and again ignoring interfering factors such as finks and masks, that a non-probabilistic potency P has a dispositional or modal essence might be stated semi-formally as ' $\mathcal{E}_p (Px \rightarrow (Sx \text{ causes/causally necessitates } Mx))$ ' or ' $\mathcal{E}_p (Px \rightarrow (Sx \text{ nomologically necessitates } Mx))$ ', respectively.²⁴ Alternatively, there are also primitivist versions of dispositionality or dispositional modality. According to the powers view of Mumford and Anjum, "the modality of dispositionality is *sui generis*, of its own kind, and certainly not reducible to pure necessity or pure contingency" (Mumford and Anjum 2011: 175). If we let \diamond_{disp} be the operator expressing dispositional possibility, ' $\mathcal{E}_p (Px \rightarrow \diamond_{\text{disp}} Mx)$ ' seems to be a reasonable candidate to express this version dispositional essentialism.²⁵ Alternatively, the dispositionalist may keep to the stimulus-response model of dispositionality but, *pace* Bird, refrain from equating $D_{(S,M)}x$ with a subjunctive conditional or a causal/nomological connection. Instead she might view $D_{(S,M)}x$ as a *sui generis* dispositional modal connection between stimulus and manifestation and regard $\mathcal{E}_p (Px \rightarrow D_{(S,M)}x)$ as the appropriate expression of the essentialist core.²⁶

2.1.1 Excursus: Dispositional primitivism and dispositional essentialism

Before we go on and introduce a neutral schematic formulation of ADE's essentialist core, it is important to make a widely overlooked distinction: namely that primitivism about dispositional modality and

23. Choi and Fara (2012) characterise dispositional essentialism thus: "The dispositionalist holds that the essence of a property P is wholly constituted by the nomic or causal roles P plays ..."

For an early presentation of a nomological version of dispositional essentialism, cf. Swoyer (1982). The *locus classicus* for a sophisticated variant of a causal version of dispositionalism is Shoemaker (1980).

24. Philosophers convinced by Russellian arguments against causation on the fundamental level might favour the nomic over the causal version.

25. Also, combinations of different natural modalities might be regarded to be included in the dispositional natures, as for instance in $\mathcal{E}_p (Px \rightarrow (Sx \square \rightarrow (Sx \text{ causes } Mx)))$.

26. Of course, this list of candidate modalities is not exhaustive. For instance, Barker (2009: ch. 4.3) proposes to analyse dispositionality in terms of chance.

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dispositional essentialism are two mutually independent theses and can be motivated in entirely different ways.

On the one hand, it might be held that conditional analyses of dispositionality fail and that this shows that dispositionality is a *sui generis* modality not reducible to counterfactual modality.²⁷ However, *per se* this does not commit one to the view that any natural property is essentially equipped with this primitive kind of dispositional modality. So *dispositional primitivism without essentialism* is a coherent view.

On the other hand, several dispositional essentialists take it to be impossible that a natural property and its actual nomological, causal or counterfactual profile come apart and therefore hold that it is essential for a natural property. But this does not require them to hold that there is a *sui generis* dispositional modality. To the contrary, one may think that the introduction of such an *additional sui generis* dispositionality makes the connection between laws and natural properties less straightforward and so unnecessarily complicates matters. Accordingly, endorsing *dispositional essentialism without dispositional primitivism* seems to be perfectly coherent as well.²⁸

2.1.2 A schematic formulation of the modal account of dispositionality (MAD)

Since, however, for the main arguments against ADE in section 3 it is irrelevant whether these natural modalities are different from each other and, if so, which is the one really pertaining to the essences of potencies, we will formulate the essentialist component of ADE in a schematic way that is neutral on these questions.²⁹ Accordingly, a natural way to state the essentialist core of ADE is via the following schema, where NMx is a placeholder for the corresponding natural modality:

27. Mumford and Anjum (2011: 193) seem to endorse this kind of reasoning.

28. "Nomic essentialism" or "causal essentialism" might be appropriate labels for such a view.

29. Notice, however, that when we examine some more moderate forms of dispositionalism in section 4.1.1 below, these distinctions become relevant.

(MAD) $\mathcal{E}_p (Px \rightarrow NMx)$.

Before we turn to the explanatory claim associated with ADE, notice, first, that MAD is neutral on the question whether NMx exhausts the nature of a potency or is just a part of its essence.³⁰ Second, MAD *per se* does not imply pandispositionalism but is consistent with the view that there are natural properties that are not essentially dispositional. And third, MAD is compatible with a trope theory (cf. Molnar 2003: ch. 1.2), a universals view (cf. Bird 2007: ch. 3.2.2) and even a set-theoretic account of dispositional properties (cf. Whittle 2009).

2.2 The dispositionalist account of natural modality (DAM)

Bird (2007: 200) states that “Mumford and I agree that the existence of regularities in nature, the truth of counterfactuals, and the possibility of explanation are explained by the potencies”. Focusing on the natural modalities, the question is how exactly the explanatory claim is to be understood.

In Vetter (2011) we find three different candidate-readings of the dispositionalist account of modality:³¹

For dispositional essentialists, the laws of nature are *grounded in the dispositional properties* at the fundamental level of nature: for instance, the law that like charges, when in proximity of each other, repel each other is *grounded in the fact that it is the very nature of charge* to repel like charges when in proximity to them. It would be surprising, to say the least, if that very same *dispositional nature should not also ground* the truth of counterfactuals

30. That the natural modality exhausts the nature or constitutes the individual essence of P might be expressed via ‘ $\mathcal{E}_p (Px \leftrightarrow NMx)$ ’.
31. As we read her, Vetter herself is not an advocate of dispositional essentialism. Instead, in Vetter (2010) she is engaged in a project alluded to in section 4.1.1 below, namely analysing metaphysical possibility and necessity in terms of primitive dispositionality or potentiality. The quoted passage, however, nicely presents the various possibilities of what the grounding claim associated with dispositional essentialism might be.

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of the form ‘If x were in proximity of another negatively charged object, it would move away from it.’ (Vetter 2011: 749; my emphasis)

The first formulation might be put thus:

(DAM₁) NMx is grounded in Px .

The second formulation in the passage above might be paraphrased as:

(DAM₂) NMx is grounded in $\mathcal{E}_p (Px \rightarrow NMx)$.

And finally, the third formulation suggests the following:

(DAM₃) NMx is grounded in the dispositional nature of P .³²

And again, the various versions of NMx give rise to different specific versions of DAM₁, DAM₂ and DAM₃, respectively.³³

Before examining the tenability of ADE (*i.e.*, the conjunctions of MAD and one of DAM_{1–3}), some general remarks about grounding are in order.

Although it is widely accepted that ‘grounding’ marks a kind of non-causal metaphysical priority, there are several questions concerning the conception of grounding on which different accounts of grounding diverge. In the remaining part of this section, we will outline some lines of divergence and lay out which features of grounding are central for the purposes of this paper.

32. Besides the ones already quoted here, further recent grounding or truthmaking formulations of the explanatory part of dispositional essentialism can be found in Ellis (2002: 102), Bostock (2008: 155), Jacobs (2011: 90), Mumford and Anjum (2011: 182), Tugby (2012: 729) and Yates (2013: 119).
Since we agree with Barker (2013: 64of.) that the relation between natural properties and natural modalities according to dispositional essentialism is metaphysical rather than semantic, it is more appropriate to express it in terms of grounding.
33. Note that NMx is variably constant in MAD and DAM_{1–3}, *i.e.*, designates an arbitrary but fixed natural modality throughout MAD and DAM_{1–3}. In 4.1.1 we discuss versions of dispositionalism that give up on constancy.

First, a grounding explanation, according to Fine (2012: 37), is “a distinctive kind of metaphysical explanation, in which explanans and explanandum are connected, not through some sort of causal mechanism, but through some constitutive form of determination”. Such a *sui generis* metaphysical kind of explanation seems to be needed, because exclusively modal notions like supervenience do not seem to be suited or fine-grained enough to capture central features of grounding and metaphysical dependence.³⁴ In contrast, Wilson (2014) denies that a distinctive grounding relation is needed and maintains instead that several specific metaphysical dependence relations can do all the work grounding is meant to do.

Second, authors agreeing with Kim (1994: 67) “that dependence relations of various kinds serve as objective correlates of explanations” treat grounding as a (multigrade) relation between entities. In contrast, mainly for reasons of ontological neutrality, several authors, including Fine (2001, 2012) and Correia (2010), reject an entity-relation view of grounding and frame grounding claims with the help of a sentence operator instead.³⁵

Third, Schaffer (2009) assumes that grounding admits of relata of different ontological categories. In contrast, other authors, including Rosen (2010), want to restrict the relata of the grounding relation to the ontological category of facts instead.

And fourth, although most of the authors take grounding (partial as well as full) to be irreflexive, asymmetric, transitive and well-founded, every one of these features has been contested in the relevant literature.³⁶

34. Cf. Fine (1995b, 2012) for a critique of modal accounts of metaphysical dependence and ground. Correia and Schnieder (2012: 14) give a nice example that is indicative of the hyperintensionality of grounding.

35. Fine (2001: 16) points out that “there is no need to suppose that a ground is some fact or entity in the world or that the notion of ground is inextricably connected with the concept of truth. The questions of ground, upon which realist questions turn, need not be seen as engaging either with the concept of truth or with the ontology of facts.”

36. Since asymmetry implies irreflexivity, it is enough to demand the former. For a survey of diverging views on the structural principles governing grounding, cf. Trogdon (2013: ch. 4).

For reasons of convenience, in the present paper we talk as if grounding is a (multigrade) relation that admits of entities from arbitrary ontological categories. However, it should be noted that, *mutatis mutandis*, the central results of the present paper seem to be also obtainable if, e.g., one adopts a sentence-operator view of grounding instead or if grounding is construed as a relation whose relata are restricted to facts. In contrast, the assumptions that a ground (partial or full) is metaphysically prior to what it grounds and therefore that grounding is asymmetric are indispensable on various occasions in the present paper.³⁷

3. Challenging ADE

Let us now consider the question whether the essentialist core (*i. e.*, MAD) and at least one of the grounding claims (*i. e.*, DAM_{1–3}) go together. At first, we will briefly outline a rather general worry for ADE (section 3.1). After that, we will scrutinize the conjunction of MAD and DAM₃ (section 3.2) and then examine the tenability of MAD together with DAM₂ and DAM₁ in more detail (sections 3.3 and 3.4).

3.1 The impurity worry

Never mind which version of DAM is adopted — *prima facie* there seems to be a rather general worry for ADE. Let us assume with Bird that potencies are fundamental properties. Further, according to dispositional essentialism, MAD is a fact about the real essence of a fundamental potency P and not just a nominal essence of dispositional predicates or concepts.

The essences of potencies are real essences, which is to say they concern the nature of the property in question

37. Since the asymmetry excludes self-grounding, the notion of ground at issue here is non-weak. Cf. Fine (2012: 51ff.) for the distinction between weak and strict ground.

The denial of the asymmetry of metaphysical explanation and its consequence for ADE will be discussed towards the end section 3.4.3 and in section 4.1 below.

and are not merely reflections of the meanings of the corresponding terms. (Bird 2007: 45)

The reason for this seems to be that if such a deflationary account of property essences were adopted, it would be doubtful whether dispositional essentialism would amount to a metaphysical and non-Humean claim at all.³⁸ But if MAD is understood in such a non-deflationary way, the dispositional character NMx (at least partly) individuates and so makes a fundamental potency what it is. Yet, according to all versions of DAM, NMx is grounded; and therefore, together with the widely held assumption that grounded entities are non-fundamental, NMx turns out to be non-fundamental.³⁹ Putting this together, we seem to obtain the highly contentious result that at least some fundamental properties are individuated in terms of the metaphysically posterior/non-fundamental. Furthermore, MAD itself arguably is a fundamental fact, but again, seems to include a non-fundamental component. This, however, seems to amount to a massive violation of the doctrine Sider (2011: 106) calls “purity”, namely the view that “*fundamental truths involve only fundamental notions*”.

Since, however, Sider’s purity thesis cannot be discussed in the present paper, we will not examine this worry in more detail. Instead, we turn to more detailed criticisms of the various grounding claims that are not based on the assumption of the purity of the fundamental.

3.2 *Against MAD & DAM₃: No ground in (modal) essence*

According to MAD, the essence or nature of a potency is exhausted by or contains NMx . Correspondingly, substituting ‘ NMx ’ for ‘the dispositional nature of P ’ in DAM₃, we get:

38. If dispositional essentialism were understood in such a way, it would be compatible, *e.g.*, with neutral monism about properties. Furthermore, in principle even a Humean could hold that ‘is negatively charged’ non-rigidly picks out in every possible world whatever quidditistic property plays the actual nomic role of negative charge.
39. Cf. Schaffer (2009: 373) and Bennett (manuscript) for statements of a tight connection between grounding and (relative) fundamentality.

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(DAM₃*) NMx is grounded in NMx .

However, since, according to the orthodoxy concerning explanation in general and (partial) grounding in particular, both of these relations are irreflexive, DAM₃* is false, and therefore DAM₃ seems to be incompatible with MAD.

3.3 *Against MAD & DAM₂*

The combination of MAD and DAM₂ does not seem very promising either. Assuming that a truth’s being essential grounds its being metaphysically necessary, $\mathcal{E}_p(Px \rightarrow NMx)$ grounds $\Box(Px \rightarrow NMx)$ and, arguably, also $Px \rightarrow NMx$.⁴⁰ However, it is utterly unclear how we obtain also the grounding of NMx in $\mathcal{E}_p(Px \rightarrow NMx)$. So it seems that, at best, what is grounded in $\mathcal{E}_p(Px \rightarrow NMx)$ is that the potency does not (and cannot) come apart from its associated natural modality.⁴¹

3.4 *Against MAD & DAM₁*

Let us now consider the question whether MAD and DAM₁ go together. Before we present arguments that support a negative answer (ch. 3.4.2), we briefly examine one kind of reasoning that might be invoked to justify the claim that a potency P grounds the natural modality pertaining to its own essence.

3.4.1 *Against essential necessitation as grounding*

The advocate of ADE might concede that DAM₂ is untenable but claim that, nonetheless, the considerations in 3.3 provide the key to establish DAM₁, namely the observation that $\mathcal{E}_p(Px \rightarrow NMx)$ implies that Px necessitates NMx . The dispositionalist might utilize this and claim

40. These grounding claims are of course non-trivial, but we do not have the space to discuss them in the present paper. For detailed elaborations of the idea to explain necessity in terms of essence cf. Fine (1994, 1995a, 2000).
41. Following Fine (1995b: 273), $\Box_x p$ says that p is true in virtue of the identity or nature of x . Accordingly, ‘ $\mathcal{E}_p(Px \rightarrow NMx)$ ’ might be understood as ‘ $Px \rightarrow NMx$ is grounded in the nature of P ’. But again, even if true, that does not amount to grounding NMx .

that the holding of this necessary connection just is the grounding of NMx in Px and conclude from this that she has shown that DAM₁ naturally flows from ADE's essentialist core MAD.

This reasoning, however, is surely a *non sequitur*. Consider the property of being a bachelor. It is plausibly true in virtue of the nature of bachelorhood that if someone is a bachelor, he is unmarried. If we let B stand for bachelorhood and U symbolize the property of being unmarried, this may be stated as $\mathcal{E}_B (Bx \rightarrow Ux)$. And again, assuming that essence implies necessity, we get $\Box (Bx \rightarrow Ux)$ and therefore that being a bachelor necessitates being unmarried. However, it seems clearly wrong to claim that bachelorhood grounds being unmarried (or, *mutatis mutandis*, being a man). In contrast, it seems to be much more plausible to claim that the grounding holds in the opposite direction. Analogously, assuming scientific essentialism as advocated by Ellis (2002), being an electron necessitates being negatively charged. However, being negatively charged is surely not grounded in being an electron.⁴²

The general moral to be drawn from examples like these is that the necessary connection that holds between an entity and what pertains to its essence is not to be confused with grounding the latter in the former.⁴³

3.4.2 The argument from essential dependence

Let us now turn to a more direct argument against the conjunction of MAD and DAM₁.

42. Here is a somewhat analogous case concerning individual objects. Consider the singleton set $\{a\}$. Because arguably a pertains to the essence of $\{a\}$ – or, more accurately, containing a is an essential property of this set – it is necessarily true that if $\{a\}$ exists, a exists. However, $\{a\}$ ('s existence) is surely grounded in a ('s existence) and not the other way around.
43. A similar reasoning might be relevant for certain subset accounts of property-realization according to which properties are exhausted by certain sets of causal powers. If the realized property is identified with a subset of the set of causal powers that makes up the realizer property, arguably the realizer set/property, qua having its subsets essentially, necessitates the realized set/property. Nonetheless, it might be maintained that subsets are metaphysically prior to their supersets and thus claimed that realization, thus construed, incorrectly reverses the metaphysical order of realizer and realized property.

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The central problem fleshed out in this argument roughly is that an entity cannot metaphysically explain or ground what pertains to its own essence or what figures in its real definition, respectively.

Assuming:

$$(MAD) \quad \mathcal{E}_p (Px \rightarrow NMx).$$

and a principle stating a certain essential dependence between P and what figures in P's essence:

$$(1) \quad \text{If } \mathcal{E}_p (Px \rightarrow NMx), \text{ then } Px \text{ is essentially dependent upon } NMx.$$

together with a principle connecting essential dependence and grounding:

$$(2) \quad \text{If } Px \text{ is essentially dependent upon } NMx, \text{ then it is not the case that } NMx \text{ is grounded in } Px.$$

we get from MAD, 1 and 2 via *modus ponens*:

$$(\neg DAM_1) \quad \text{It is not the case that } NMx \text{ is grounded in } Px.$$

In the remainder of the present paper we will call this argument *the argument from essential dependence*.⁴⁴ Let us now turn to the examination of the premises in order of their appearance.

44. We take this reasoning to be an instance of a more general argument. Accordingly, there seems to be an analogous general argument for the case of particular objects, which might be relevant for certain other doctrines. For instance, a similar tension might arise for the conjunction of priority monism and mereological essentialism:

Assume

$$(E) \quad \mathcal{E}_x p.$$

where p is a sentence or proposition true in virtue of the nature of a particular x . Further, let o be a constituent of p , *i.e.*, an object p is about.

$$(O) \quad o \text{ is a constituent of } p.$$

If we follow Fine and "take x to depend upon y if y is a constituent of a proposition that is true in virtue of the identity of x " (Fine 1995b: 275), this yields:

$$(1^*) \quad \text{If } o \text{ is a constituent of } p, \text{ then } x \text{ is essentially dependent upon } o.$$

3.4.3 Assessing the argument from essential dependence

Premise 1 might be attacked on the basis that property essences could be conceived as conceptual truths instead and so a connection between essence and essential dependence does not need to arise. However, as we saw in 3.1 above, such a deflationary conception of property essences does not seem to be available for the defender of dispositional essentialism.

Let us now turn to premise 2 and so to the question how we can establish the link between essential dependence and grounding.

A first possibility to establish this link is indirect, *i. e.*, via a general connection between essential dependence and constitution. Accordingly, the first additional auxiliary premise says:

(A1) If u is essentially dependent upon v , then u is constituted by v .⁴⁵

and the second states a general principle connecting constitution and grounding:

(A2) If u is constituted by v , then it is not the case that v is grounded in u .

A1 and A2 yield premise 2 via *hypothetical syllogism* and the appropriate substitutions. The question now is whether they are true.

A2 seems to be highly plausible: If we assume that in the case of grounding “the explanans or explanantia are *constitutive of* the explanandum, or that the explanandum’s holding *consists in nothing more than the obtaining of the explanans or explanantia*” (Fine 2012: 39), it

together with a principle connecting essential dependence and grounding:
(2*) If x is essentially dependent upon o , then it is not the case that o is grounded in x .

we get from E, O, 1* and 2* via *modus ponens*:
(¬G) It is not the case that o is grounded in x .

45. In the rest of this subsection, the variables u and v may stand for entities from arbitrary ontological categories.

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appears natural to claim that if v is grounded in u , then v is constituted by u . If we further and plausibly assume that constitution does not allow for circles, A2 follows.

Prima facie A1 looks correct, too: If u essentially depends upon v and so v makes u what it is, it seems natural to claim that u is constituted by v .

However, since we are dealing with properties (or property instantiations, respectively), two problems for A1 might arise. The first rather general problem is that “it is unclear what it means to say that properties have constituents or parts” (Stoljar 2008: S.266).

Secondly, A1 can be denied, even though it is granted that properties in principle can have constituents. Conceiving of essences as real definitions, Rosen (2010: 125) points out that if one property figures in the real definition of another, the former need not be a constituent of the latter. He illustrates this point with the example of the property of being grue. While the properties of being blue and being green figure in its real definition, he maintains that it is wrong to say that these properties constitute the property of being grue. Rosen concludes that in general we should think of the items appearing in the real definition as arguments of a function and not as constituents.⁴⁶

A first rejoinder to these worries may be that, in the case of fairly natural non-disjunctive properties like potencies, the items figuring in their real definitions indeed are constitutive for them; and so even if A1 has to be restricted to fairly natural properties, the argument is still general enough to affect ADE.⁴⁷

Secondly, since Rosen (2010: 125) and Stoljar (2008) seem to think that the constitution relation is composition or part-whole, another route to bypass these considerations would be to maintain that the

46. Against A1, it might be maintained that although it is implausible to think of the arguments of a function as constituents or parts of their values, it seems natural to say that the value of a function depends upon its arguments.

47. Rosen (2010: 125) acknowledges that, *e. g.*, in the case of conjunctive properties, the claim that the conjuncts constitute the conjunctive property has some plausibility.

constitution in the case of properties is of a non-mereological kind and therefore A1 can be retained.

A third related rejoinder consists in claiming that the kind of constitution in the case of essential dependence simply is grounding and there is no need to frame the latter in mereological terms. Assuming that, the case for premise 2 is even more straightforward, since we can derive it solely with the help of the asymmetry of grounding, in the following way:

Given the assumption that

(A3) If u is essentially dependent upon v , then u is (partially) grounded in v .

and the asymmetry of grounding

(A4) If u is (partially) grounded in v , it is not the case that v is grounded in u .

premise 2 follows, *mutatis mutandis*, by *hypothetical syllogism*.

One could even go further and take the synonymous use of 'essential dependence', 'grounding' and 'metaphysical priority' by several authors at face value and equate these relations.⁴⁸ If this is done and correspondingly 'is grounded in' is substituted for 'is essentially dependent upon' in premise 1,⁴⁹ then only MAD and A4 (with the appropriate substitutions) have to be added to derive \neg DAM1.

However, equating essential dependence and grounding as well as A1 and A3 might be rejected, since grounding and constitution are asymmetric and therefore irreflexive while essential dependence arguably is not;⁵⁰ *e.g.*, one may hold that certain entities mutually

48. Cf. Schaffer (2010: 345), Rosen (2010: 109) and Clark and Liggins (2012: 812).

49. Rosen (2010: 122–123) seems to accept a very similar principle connecting the propositions figuring in a real definition and the holding of a grounding relation between the corresponding facts.

50. Here is another consideration that militates against equating essential dependence and grounding: Arguably the fact that p or q is grounded in the fact that p , but the former disjunctive fact is not essentially dependent on the fact that p .

essentially depend on each other or that essential self-dependence is possible.⁵¹

So the central question is whether there is a way to establish premise 2 without the identification of essential dependence with grounding, A1 or A3. If the following reasoning is sound, the answer is yes.

To do this we will appeal to a principle we already mentioned in 2.2 and utilized in 3.1, namely the apparent platitude that the grounding entity or fact is metaphysically prior to or more fundamental than the grounded entity or fact:

(A5) If v is grounded in u , then u is metaphysically prior to/more fundamental than v .

And even if one holds that two distinct entities can be reciprocally essentially dependent or that essential self-dependence is allowed, it seems to be utterly incoherent to claim that the depender is metaphysically prior to the dependee. So it seems to be equally plausible that:

(A6) If u is essentially dependent upon v , then it is not the case that u is metaphysically prior to/more fundamental than v .

From A6 and the contraposition of A5 we eventually get premise 2 via hypothetical syllogism.

Here is a possible riposte to this reasoning. Both A5 and A6, it might be claimed, are compulsory only on fairly strong conceptions of grounding and essential dependence, respectively. However, these notions can be spelled out in more deflationary ways, such that A5 and A6 turn out to be wrong. On a simplistic modal (existential) conception of grounding, according to which, roughly, grounding reduces to the necessitation of the grounded by the ground, metaphysical priority or comparative fundamentality do not seem to be required, and so A5

51. Cf. Lowe (2010: section 4) for an example of mutual essential dependence. However, Bird thinks that "[e]ssentially dispositional properties have their identities fixed by their dispositional characters" (Bird 2007: 44). Since in this case essential dependence is identity dependence, it is not clear anymore that the alleged difference obtains, since identity dependence is arguably also asymmetric.

can be rejected. A corresponding move might be made in the case of essential dependence and essence and utilized as a basis for rejecting A6. Again, on a naive modal account of essential dependence, for example, that u is essentially dependent upon v also roughly comes down to the fact that it is impossible for u to exist without v existing, *i. e.*, that all u -worlds are v -worlds. It might be claimed that the holding of this necessary connection between u and v is not in principle in conflict with u being metaphysically prior to or more fundamental than v .

To respond to this, a general discussion of grounding, essence and essential dependence would be required, which cannot be accomplished in the present paper. However, some very general remarks are in order. Most notably, Fine (1995b, 2012) presents strong arguments against modal accounts of essential dependence and grounding; and it is thus unclear whether such reductive accounts are available at all. For instance, the modal account cannot accommodate the asymmetry of grounding in a straightforward manner, let alone its hyperintensionality. Additionally, on the assumption that the metaphysical priority of the ground is the basis for the asymmetry of the grounding relation,⁵² its missing directionality on a modal account can even be explained by the failure to ensure A5. So instead of thinking of the fact that a naive modal conception of ground allows for grounding without metaphysical priority as a virtue, we regard it as a *reductio* of this account. Similarly, on our view the possibility that a simplistic modal account of essential dependence in principle makes room for an entity to be prior or more fundamental to the entities pertaining to its essence is a defect of the account and not a merit.⁵³

Another more general and principled response to the argument of essential dependence would be to keep to a unified and maybe non-modal conception of ontological dependence but to explicitly deny that grounding is asymmetric, which has recently been suggested in

52. Cf. Rosen (2010: 116).

53. For instance, the implausibility of the claim that Socrates depends on its singleton seems to be based on the intuitions that, first, Socrates is prior to its singleton and, second, the depender cannot be prior to its dependee.

Barnes (manuscript) and Wilson (2014). Since priority and relative fundamentality are obviously asymmetric, also the widely held connection between grounding, on the one hand, and priority and relative fundamentality, on the other hand, is broken, and so A5 must be denied. Within the present paper, however, there is no space to discuss this move in detail. We think, however, that there is a notion of asymmetrical ontological dependence that is closely connected to relative fundamentality or priority and, maybe more importantly, to explanation; and giving up on these connections makes appeals to grounding relations less interesting for many philosophical purposes.⁵⁴ For instance, in 4.1 below, it will be argued that if the dispositionalist appeals to holistic metaphysical explanation instead of (asymmetrical) grounding, the view loses much of its initial attraction.

We leave the discussion of premise 2, and thus of the argument from essential dependence, at that. The above considerations show that the argument has some plausibility, and in order to rebut it, some fairly contentious and far-reaching assumptions have to be made. If it is indeed sound, however, the conjunction of MAD and DAM₁ is untenable.

4. Whither dispositional essentialism?

Assuming that the considerations in section 3 are correct, there is a serious tension between the essentialist thesis MAD and the claim that (the natures of) potencies ground the corresponding natural modalities (DAM), and since $MAD + DAM = ADE$, the latter has to be rejected. If this tension cannot be resolved, dispositionalism cannot provide “a unified metaphysical grounding for natural modalities in general” (Choi and Fara 2012: section 3), since the natural modalities pertaining to the potencies’ essences must remain ungrounded. So it seems worthwhile to take a look at some remaining options for the dispositionalist.

54. *E. g.*, if the connection between grounding and relative fundamentality is denied, it is not sufficient for the advocate of the non-fundamentality about x to show that x is grounded. In the following, we will therefore reserve the label ‘grounding’ for asymmetric metaphysical dependence.

4.1 Deny DAM and retain MAD: Fundamentalism about natural modality

Given MAD, potencies depend upon or, assuming A_1 or A_3 , are even constituted by or grounded in certain natural modalities (in contrast to what is claimed by ADE). If the latter, it might be maintained, for example, that certain subjunctive facts are primitive, as suggested in Lange (2009), and then held that these facts metaphysically explain the potencies. Alternatively, a form of nomological primitivism as, e.g., presented in Maudlin (2007) and Carroll (1987) or causal primitivism might be adopted, and it might be held that fundamental properties are grounded in these primitive nomological or causal facts.⁵⁵ However, there are two problems with these variants of dispositional essentialism. First, they sacrifice the explanatory aim of ADE, because dispositional properties are metaphysically explained by certain (natural) modalities instead of explaining them. Dispositional essentialism thus construed does not deliver any explanation of the natural modalities but boils down to the postulation of an essential dependence of the natural properties upon certain natural modalities. So instead of considering such a view to be a dispositionalist theory of natural modalities, it seems more appropriate to describe it as a modal (counterfactual, nomic, causal, etc.) theory of natural properties. Secondly, assuming again a tight connection between grounding and relative fundamentality, if potencies are grounded in natural modalities, the former seem to turn out to be non-fundamental — counter to what most dispositionalists claim.⁵⁶

As has been already indicated in section 3.4.3 above, an alternative and presumably more attractive view would be that although potencies essentially depend upon natural modalities, the latter also depend

55. Again, for those persuaded by broadly Russellian considerations against fundamental causal relations, the second alternative is not very attractive.

56. Although Bird considers potencies to be fundamental (cf. the cited passages in section 1), it is tempting to read Bird (2007: 138–146) as claiming that first-order potencies are indeed grounded in graph networks built up solely from a single higher-order manifestation relation.

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upon the potencies, and this mutual metaphysical dependence somehow amounts to a certain kind of holistic or mutual explanation.⁵⁷

However, even if it can be made plausible that there are metaphysical explanations of a non-asymmetric kind, the fundamental structure of reality posited by the dispositionalist is (at least ideologically) very rich and non-Humean in two respects: *Substantial facts about property essences* (or the associated metaphysical necessities, respectively) as well as the “*contents*” of these essences (natural modalities such as counterfactuals, laws, causation or primitive dispositionality) carve nature at its joints.

Of course, despite being not very parsimonious, such a form of dispositional essentialism might still be regarded as an interesting non-Humean view, *i. e.*, one in which certain natural modalities are necessarily connected to fundamental properties.⁵⁸ Whatever its merits may be, however, since it is a version of fundamentalism not just about essential facts about properties but about natural modality, too, it can hardly be claimed to be as sparse as Humeanism or more parsimonious than its non-Humean rivals. If the dispositionalist’s vision sketched in section 1.2 above turns out to be an illusion, though, a dispositional metaphysics seems to lose much of its initial attraction.

4.1.1 Not ADE but something near enough?

Even if the natural modality essential for P cannot be grounded in P or its dispositional essence and so ADE must be abandoned, there still seem to be several interesting grounding projects compatible with MAD left alive. Here is a list of three (families of) less ambitious grounding projects.

57. Arguably, such a less ambitious form of dispositional essentialism is presented in Shoemaker (1980).

58. Or, more exactly, natural properties and natural modalities are necessarily connected in every metaphysically possible world where these properties exist.

Assuming that there are different kinds of natural modalities, the first possible grounding project compatible with MAD is grounding the remaining natural modalities in the one natural modality considered to be essential for the potencies and therefore to be fundamental. For example, if it is held that the dispositional essence of a potency P contains a *sui generis* dispositional possibility \diamond_{disp} , the claim might be that the remaining natural modalities are grounded in \diamond_{disp} .⁵⁹ Alternatively, if counterfactuals, laws or causation are considered to be the fundamental modalities, it might be argued that the other modalities are grounded in it. Accordingly, ADEs essentialist core is consistent with the claim that dispositional essences ground natural modalities as long as the base modality figuring in the particular instance of MAD is different from the natural modality in the grounding claim.⁶⁰ However, two remarks about this project are in order: First, as already noted, it is based on the assumption that some natural modality is fundamental, *i. e.*, ungrounded; and, second, figuring out the metaphysical hierarchy in the realm of natural modalities like \diamond_{disp} , nomological modality, counterfactual modality, causal modality, etc., is largely independent from the question whether the “base modality” is essential for some natural property or not. For example, certain subjunctive facts, laws or facts about primitive dispositionality (cf. the excursus in section 2.1.1) might be regarded as being fundamental, and the remaining modalities, assuming there are any, as being grounded in them. However, this view does not commit one to the further thesis that any of these modalities pertain to the essences of natural properties.⁶¹ So if the dispositionalist is interested just in this kind of grounding project, it seems

59. Of course, it would have to be made plausible how a *sui generis* dispositional modality is apt to ground causation and the like. Cf. Mumford and Anjum (2011) for an attempt to demonstrate this.

60. If P is identified with the “base modality” essential for it (and we ignore hyperintensionality), it might even be maintained that P itself grounds the natural modalities different from the “base modality”.

61. For instance, Lange (2009) pursues the project of grounding laws in primitive subjunctive facts without subscribing to essentialism.

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that the essentialist part of ADE does not play a vital role and can be dispensed with.

A second interesting grounding project compatible with MAD is alluded to on the final page in Bird (2007):

This opens up the possibility of a dispositional account of modality. Note that $\Box p \equiv \neg p \Box \rightarrow p$. So if [the conditional analysis] were true, we could use this equivalence to provide a dispositional analysis of necessity; details await development. (Bird 2007: 218, Fn. 143).

The project here is to derive metaphysical necessity and possibility from counterfactual modality. Alternatively, instead of grounding metaphysical necessity in counterfactuals, it has been tried to ground metaphysical necessity in *sui generis* dispositional possibility or potentiality.⁶² But again, important as these projects may be for a naturalist account of metaphysical necessity, they are different from DAM1–3 and again independent from the question whether fundamental properties are essentially dispositional.

A third grounding project is suggested by Bird’s derivation of the laws of nature (cf. Bird 2007: 46–48). Since the crucial premise of the derivation is $\Box (Px \rightarrow (Sx \Box \rightarrow Mx))$, first, Bird equates the dispositional character $D_{(S,M)}x$ in $\Box (Px \rightarrow D_{(S,M)}x)$ with a subjunctive conditional. From $\Box (Px \rightarrow (Sx \Box \rightarrow Mx))$, then $\forall x ((Sx \wedge Px) \rightarrow Mx)$ is logically deduced in a straightforward way (for the details, cf. Bird 2007: 46). However, $\forall x ((Sx \wedge Px) \rightarrow Mx)$ is simply a non-modal regularity; so, if we understand this derivation as grounding the laws in the fact that potencies have a dispositional or subjunctive nature, this derivation is a case not of grounding a natural modality, but of grounding a non-modal regularity in an essentialist and therefore metaphysically necessary fact containing a counterfactual. It might be emphasized, though, that $\Box (Px \rightarrow (Sx \Box \rightarrow Mx))$ does not entail just the regularity

62. Vetter (2010) and Borghini and Williams (2008) are two different versions of a dispositionalist approach to metaphysical necessity and possibility.

but also $\Box \forall x ((Sx \wedge Px) \rightarrow Mx)$, and it might be claimed that this shows that the thus derived laws are metaphysically necessary and that therefore nomological necessity is grounded in and equally strong as metaphysical necessity.⁶³

However, showing that $\forall x ((Sx \wedge Px) \rightarrow Mx)$ or $\Box \forall x ((Sx \wedge Px) \rightarrow Mx)$, respectively can be logically deduced from $\Box (Px \rightarrow (Sx \Box \rightarrow Mx))$ is not sufficient to establish the corresponding grounding claim. For instance, p can be logically deduced from p , but p is surely not grounded in p . Even worse, q can be logically deduced from p and q but the (partial) grounding plausibly goes in the opposite direction.⁶⁴

In response, it might be claimed that $\Box (Px \rightarrow (Sx \Box \rightarrow Mx))$ itself is grounded in $\mathcal{E}_p (Px \rightarrow (Sx \Box \rightarrow Mx))$, and be claimed that, following Fine (1994), the latter is non-modal; and thus that the metaphysical and therewith nomological necessity of the laws has a (non-modal) ground after all. Note, however, that if this strategy is pursued, the only grounded necessity, *i. e.* nomological necessity, seems to fully originate from Finean essence and not from the content of the potency's essence, *i. e.*, its dispositional nature.

Be that as it may, for the purposes of our present discussion, it is important to note that the above derivation is based on $\Box (Px \rightarrow (Sx \Box \rightarrow Mx))$ or $\mathcal{E}_p (Px \rightarrow (Sx \Box \rightarrow Mx))$, respectively, and therefore on a fact that contains an ungrounded natural modality.

In sum, while these three grounding projects seem to be interesting and worth developing, it is important to keep in mind that in all of them a certain kind of natural modality is postulated to be fundamental, *i. e.*, ungrounded, and therefore ADE is abandoned.

63. Of course, in a possible world where P fails to be instantiated, the generalization is only vacuously true and so lacks the status of being a law. To obtain the stronger claim that all possible worlds are governed by the same set of (non-vacuous) laws, additional assumptions have to be made. For a critique of equating metaphysical and nomological necessity, cf. Fine (2002).

64. Furthermore, logical deduction is also not necessary for grounding. Arguably, singleton Socrates' existence is grounded in and therefore necessitated by Socrates' existing. However, singleton Socrates' existing cannot be logically deduced from Socrates' existing in a straightforward way.

4.2 Deny MAD and retain DAM: De-modalizing dispositionality

In contrast to what is suggested by most formulations of dispositional essentialism, it might be maintained that dispositionality need not be understood in terms of a natural modality and, accordingly, MAD might be denied. In this subsection we briefly address several ways in which this strategy might be spelled out.

4.2.1 Direct Property Grounding Dispositionalism

A first possible view of this kind says that natural modalities are directly grounded in fundamental properties whose essences (if they have them) do not involve natural modalities.

Note that this variety of dispositionalism is different from Lewis' Neo-Humeanism, since on the former view (the instantiation of) a natural property is supposed to fully ground a certain natural modality, whereas according to Neo-Humeanism, (the instantiation of) a natural property, as part of the Humean mosaic, is only a partial ground. Furthermore, assuming that grounding implies necessitation, Direct Property Grounding Dispositionalism has the consequence that, contrary to Neo-Humeanism, a natural property and its actual modal profile cannot come apart.

4.2.2 Quidditistic/Qualitative Essence Grounding Dispositionalism

Instead of grounding the natural modalities directly in the non-modal properties, one could maintain that they are grounded in non-naturally modal property essences instead. So a second option might be to claim that natural modalities are grounded in (thick) quidditistic or qualitative property essences, which themselves are not essentially modal.

Such a view might be an option for adherents of the view that fundamental properties are qualitative but nonetheless thereby ground the natural modalities, such as Martin and Heil (1999), Jacobs (2011) and Tugby (2012).⁶⁵

65. Two variants of the powerful-qualities view are examined in more detail in section 4.4 below.

4.2.3 Structural Essence Grounding Dispositionalism

A third option would be to claim that first-order natural modalities are grounded in essential (asymmetric) second-order manifestation or necessitation relations between first-order properties, where these second-order relations themselves do not essentially involve a natural modality. On this view, the world does not contain fundamental natural modality, but its non-modal fundamental metaphysical inventory is richer than the mosaic of first-order property instantiations. This additional higher-order structure between first-order properties serves as the ground of the natural modalities involving the bearers of the thus connected properties.

Swoyer (1982) might be read as advocating such a view. Also, a structuralist characterization of dispositional monism as is presented in Bird (2007: 138–146) might be interpreted in that way.⁶⁶

4.2.4 Intentional Essence Grounding Dispositionalism

On a fourth view, natural modalities are grounded in the intentional nature of properties (a metaphysical pointing or directedness to their manifestation properties),⁶⁷ and the essence of this intentional nature (if it has an essence) in turn does not contain a natural modality.

This might be an option for adherents of “intentionalist” dispositionalism akin to the powers view presented in Molnar (2003).

66. One might think that if all natural n-adic relations whatsoever are dispositional, the higher-order relations themselves must have structural essences and so structuralist dispositional monism faces an additional “vertical” regress different from the “horizontal” regress that is discussed in Bird (2007: ch. 6). However, it does not seem to be terribly *ad hoc* to deny that dispositionalism is a thesis about natural relations of arbitrary order.

67. What exactly this intentional nature is is a much debated and delicate issue, since most dispositionalists endorse the claim Molnar (2003: 82) calls “type independence”. This is the claim that a potency is directed to its manifestation property even if the latter is never instantiated in the entire history of the universe. Trope-theorists therefore claim that this directedness is primitive and no relation at all (Martin 1997: 216), or at least not a genuine relation where both relata have to exist (Molnar 2003: 62). Platonist universals-theorists such as Bird (2007) and Tugby (2013), in contrast, identify this directedness with the holding of a “genuine” (manifestation) relation to a possibly non-instantiated manifestation universal.

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4.2.5 An inference problem

The options sketched in section 4.2.2–4.2.4 might be preferred to the version of dispositionalism outlined in section 4.2.1, because on the former views, natural properties clearly have essences of some kind and there is no danger that the name ‘dispositional essentialism’ is an outright misnomer for the position(s).

But the problem with all five options mentioned in 4.2 is that the holding of an explanatory relation cannot be established by mere stipulation — never mind whether this relation is posited between not essentially modal properties or quiddities and the natural modalities, or between non-naturally-modal property essences of some other kind and the natural modalities. So unless it is made plausible that the property or the additional “structure” making up the property essence is a ground of natural modalities without in turn recurring to its naturally modal nature, the options mentioned in 4.2 seem to be *ad hoc*, and it is at least unclear if they are explanatory at all. For instance, if we take P’s nature to consist in the having of a quiddity, the holding of a second-order manifestation relation R(P, M) to its manifestation property M or in a “metaphysical pointing to” its manifestation, it has to be made plausible how these facts manage to ground, *e.g.*, first-order counterfactuals. It seems that all these views have to face a challenge somewhat reminiscent of the inference problem for the Dretske-Tooley-Armstrong account of laws of nature.⁶⁸ The question here is “why should ... a fancy relation’s holding between two universals, translate into hard facts below, facts about earthly particulars that fall under those universals?” (Sider 1992: 261). In the case of the views sketched in 4.2, the situation is somewhat analogous. It is unclear *how* certain (essential facts about) properties not including natural modalities translate into naturally modal facts about their instances. Of course, we do not claim that the challenge cannot be met, but as long as it is not clear how that

68. Cf. Lewis (1983: 366) and van Fraassen (1989: 126) for two versions of the inference problem for the DTA account. Barker and Smart (2012) present a version of it as a problem for the structuralist type of dispositional essentialism.

explanatory gap can be closed, the (additional) ideological or ontological “structure” these views postulate does not pay off.

4.2.6 Powerful qualities

To conclude, we will briefly examine two versions of the brand of dispositionalism alluded to in section 4.2.2 above that might evade the problem raised in the last subsection. According to Jacobs’ powerful-qualities view, “[t]he qualitative is identical with the powerful; one and the same thing is both identical with a thick quiddity and a nature sufficient to be (part of) the truthmaker for the counterfactuals” (Jacobs 2011: 90).

To make counterfactuals true, however, according to Jacobs, properties do not need to have any modal, structural or otherwise “substantial” essence.

The appeal to truthmaking, in this case, is the end of the story. The only answer to the question, “Why is this quality, this thick quiddity, sufficient to make true this counterfactual?” is that the thick quiddity is the thick quiddity that it is (and not some other), and that the counterfactual is the counterfactual that it is (and not some other). The quiddity need not be sufficient to be the truthmaker in virtue of some ontological structure in the quiddity itself. A truthmaker is not required to be structured in the way the truth it makes true is. The truthmaker can be a unitary entity, and is in the case of the fundamental, natural properties. To be powerful is not to have some internal structure, be it relational or otherwise. (Jacobs 2011: 92)

On this view, there is no need for the truthmaker to “structurally fit” the truth it makes true. We are left with no answer at all why it is that the truthmaker is eligible to make true the corresponding truth; and correspondingly, the need to answer the inference-type problem

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presented above seems to be simply rejected.⁶⁹ There is no space here to discuss Jacobs’ construal of truthmaking in more detail, but simply postulating that (the instantiation of) a (thick) quiddity is a truthmaker for a counterfactual (truth), without any illumination of how the quiddity does it, amounts to giving no (metaphysical) explanation at all.⁷⁰

4.2.7 Grounding-natures to the rescue?

Tugby (2012) presents a cognate view to the powerful-qualities view he calls “qualitative dispositional essentialism”, or “QDE” for short. To get a grip on this variant of dispositional essentialism, it is worth citing Tugby (2012: 728) at some length:

[W]e could understand the claim that quality instances essentially dispose their possessors towards certain behaviour in the following way: *a thing’s property instantiations entirely constitute the truthmakers for certain counterfactuals true of that thing*. Schematically, we may put this as follows:

QDE schema: where P is any natural property, necessarily, if *x* has P, then in virtue of *x*’s being P, if *x* were F, then *x* would be G (*ceteris paribus*).⁷¹

The italicized part suggests that QDE just is the claim that particular quality instantiations are truthmakers or full grounds for certain counterfactuals. But the following QDE schema might be read in a slightly different and more essentialist way, which is suggested by the

69. If this general rejection were legitimate, it would also salvage all the other views sketched in 4.2, as well as the Dretske-Tooley-Armstrong account of laws from inference-type problems.

70. We take the lack of explanatoriness also to be the gist of Sider’s (2011: ch. 8.5) more general critique of truthmaker theories.

71. Tugby’s focus is on property instances instead of properties. Although this distinction helps him to avoid a problem for structuralist dispositionalism presented in Barker and Smart (2012), it seems irrelevant for our present considerations.

‘necessarily’. Interpreting the ‘necessarily’ as arising from (a part of) the essence of P, it seems that ‘in virtue of x’s being P, if x were F, then x would be G (*ceteris paribus*)’ itself pertains to the nature of P (respectively its instantiation).⁷² If this is correct, natural qualities (respectively their instantiations) do not just ground certain counterfactuals but *essentially* ground these counterfactuals, *i. e.*, the fundamental qualities have grounding natures.

Ignoring the *ceteris paribus* clause, the essentialist claim suggested by Tugby’s QDE schema might accordingly be stated as $\mathcal{E}_p (Px \rightarrow ((Fx \square \rightarrow Gx) \text{ is grounded in } Px))$.⁷³ If we put this in a formulation that is neutral on what the particular natural modality associated with P is, it reads:

$$(QDE) \quad \mathcal{E}_p (Px \rightarrow (NMx \text{ is grounded in } Px))$$

QDE obviously has the advantage over MAD that it is compatible with DAM1. Furthermore, *prima facie* it has the advantage that the grounding of the counterfactuals is not simply a brute fact, as is the case in Jacobs’ version of the powerful-qualities view, but is essentially tied to the essences of the qualities. However, there seem to be at least three serious problems for QDE.

First, postulating that grounding certain counterfactuals pertains to the nature of the fundamental qualities *per se* does not seem to illuminate the grounding claim itself. Instead of answering the inference-type problem presented in 4.2, the mystery seems to be built into the nature of the fundamental properties instead.

Second, as already pointed out in section 3.1 above, it seems to be problematic to maintain that a fundamental property is (partly)

72. We do not claim that this is the only interpretation of QDE. Rather, the purpose of this is to extract a version of dispositionalism not examined so far that might evade the problems presented above. If QDE simply is the claim that (the instantiations of) qualities are the truthmakers of counterfactuals, it collapses to the powerful-qualities views presented in the previous section.

73. QDE just is a semi-formal essentialist formulation of Tugby’s QDE schema, in which ‘ \mathcal{E}_p ’ is substituted for ‘necessarily’ and instead of the locution ‘in virtue of’, the expression ‘is grounded in’ is used.

individuated by (a truthmaking or grounding relation to) the non-fundamental.⁷⁴ A possible diagnosis of this problem for QDE (a variant of which arguably affects all versions of dispositionalism that situate the allegedly grounded modalities in one or another way in the nature of properties) is that it “is the fact to be grounded that ‘points’ to its grounds and not the grounds that point to what they may ground” (Fine 2012: 76). Thus, if essences are utilized to trace the grounding relation, it may be more promising to show that it lies in the nature of the natural modalities that they are grounded in (the essences of) certain fundamental properties rather than vice versa.

And third, since QDE seems to be a fundamental fact, (at least ideologically) a very rich fundamental structure is posited. Therefore, pace Tugby, it seems doubtful whether QDE really “is a strikingly parsimonious theory of the truthmakers for counterfactuals” (Tugby 2012: 729).

5. Conclusion

In the present paper we have introduced and motivated a *prima facie* highly attractive dispositionalist metaphysics, namely ADE (section 1), and stated several versions of it more precisely (section 2).

However, we have argued that a natural reading of ADE’s essentialist core thesis (MAD) and several grounding formulations of its central explanatory claim (DAM) are in serious tension with each other (section 3).

In section 4.1 we have discussed several forms of dispositionalism that give up on DAM and have explored what is left for them to accomplish.

In section 4.2 we have discussed four ways to alter the essentialist claim associated with dispositional essentialism by “de-modalizing” dispositionality. However, if the connection between properties and natural modalities is loosened in that way, it is hard to see how it can be reestablished.

74. Additionally, it also seems to violate “purity” (cf. section 3.1 above).

In sum, the challenge to resolve the tension for ADE presented in this paper seems to be pressing. At the very least, the efforts to meet this challenge will help to make progress in the understanding of several dispositionalist doctrines and in exploring what they can accomplish.⁷⁵

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