

A Dispositional Theory of Possibility

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ABSTRACT

The paper defends a naturalistic version of modal actualism according to which what is metaphysically possible is determined by dispositions found in the actual world. We argue that there is just one world – this one – and that all genuine possibilities are grounded in the dispositions exemplified in it. This is the case whether or not those dispositions are manifested. As long as the possibility is one that would obtain were the relevant disposition manifested, it is a genuine possibility. Furthermore, by starting from actual dispositional properties and branching out, we are able to countenance possibilities quite far removed from any state of affairs that happens to obtain, while still providing a natural and actual grounding of possibility. Stressing the importance of ontological considerations in any theory of possibility, it is argued that the account of possibility in terms of dispositional properties provides a more palatable ontology than those of its competitors. Coming at it from the other direction, the dispositional account of possibility also provides motivation for taking an ontology of dispositions more seriously.

Introduction

They say that the world is full of possibilities. You can do this or that, this could happen or that could happen – it is all familiar talk – but what does it mean to say that the glasses *could* have broken, or that they *might* break, when most of the time they do not? These are the problems that arise when we start to talk of possibilities. In what follows, we advance a theory of what must be the case for these things to be possible. In other words, we are concerned with the ontology of possibilities: what some theorists might call the ‘truthmakers’ for our modal talk, when we talk of what is metaphysically possible.¹ What we aim to provide is an account of metaphysical possibility.² What we argue is that possibilities are grounded by the

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¹ What we mean by ‘truthmakers’ is what Armstrong describes as ‘the ontological ground of truths’ (Armstrong 1989b, 9). That being said, we are *only* interested in the ontological ground of truths, and only contingent modal truths at that. We have nothing to say about statements, the truth-making relation (whatever it is, if anything at all), truth, or any other semantic matters.

² As our chosen truthmakers are dispositional properties, some might complain that this is an account of *nomio* necessity, being too restricted for metaphysical necessity. However, as the reader will see in parts 2 and 3, the account of possibility is far greater than what is typically thought of as *nomio* possibility – making the present account more like one of *super-nomio*

dispositions present in the actual world. In order for some state of affairs to be possible, there must be some actual disposition for which the possible state of affairs in question is its manifestation.³

The structure of the paper is as follows: we start in Part 1 with a basic outline of the ontology of dispositions and dispositional properties. Part 2 provides our positive account of possibility. In Part 3 we discuss a series of objections, with an eye to further clarifying the view. It is our opinion that the ontology of possibility we present is preferable to the alternatives, but even if that opinion is not shared by our readers, it nevertheless ought to be seen that: (i) a dispositional account of possibility is a genuine position within the debate, something that has not been recognised to date; and (ii) the dispositional account of possibility provides additional motivation for taking an ontology of dispositions more seriously.⁴

possibility. Moreover, as we insist that genuine possibilities have ontological grounds, we take metaphysical necessity to be far more restricted than many others might. Consequently, we claim that metaphysical possibility just is super-nomic possibility, and so ours is an account of metaphysical possibility.

A comparison with Kit Fine's work on modality might prove fruitful here. Fine defends a hard-nosed form of primitivism, according to which not only can modal facts not be reduced to non-modal facts, but also there is a wide variety of modal notions (i.e. of ways things can exist) which cannot be reduced to each other. First, something might exist essentially. For example, a dependence relation might hold essentially: that *x* has *P* essentially cannot be explained by somehow attributing *P* to *x* necessarily. See Fine 2004 and Fine 2002. As for necessity, Fine distinguishes between three kinds: metaphysical, natural, and normative.

Fine's version of primitivism allows him to countenance possibilities such as alien possibilities, as well as to explain the modal force contained within propositions such as laws, moral norms, and practical rules. Arguably, the dispositional theory of possibility does not countenance such modal notions. This is because of the naturalist character of dispositionalism. We tend to agree with Fine that more than one modal notion is at play in our language, but this does not contradict dispositionalism. The goal of the latter is to explain what Fine calls natural and metaphysical necessity. We leave aside normative and logical necessity; we believe that the kind of entities or features that we deal with when we use these two kinds of necessity differ so completely from natural necessity that they deserve an entirely different kind of treatment. (Though we offer no account of logical possibility, we do in fact make use of logical possibility when it comes to constructing the class of states of affairs. We then take members from that class to determine which are genuinely possible, given our account of metaphysical possibility.)

Thus, we agree with Fine that when we face modality we should distinguish between various types of it. We disagree with him, though, on where to trace the boundaries. For us there are two realms: the first contains essentiality, natural, and metaphysical necessity, the other normative and logical necessity. What we will show is that dispositionalism can do its job in the first realm. Perhaps it could also be put to work in the second, but we shall not attempt to do that here.

³ This is the simplest statement of the account, and applies to first-order dispositions. Once we introduce the higher order dispositions (that is, dispositions *for* further dispositions, not dispositions *of* dispositions; see Part 2) we shall see that a possibility can be grounded by the potential manifestation of a disposition that is itself the potential manifestation of a lower order of disposition, and so on, for any *n*-th-order disposition.

⁴ That is additional to the defences of dispositions already on offer. In particular, see Heil 2003, Martin's contribution to Martin *et al.* 1996, Molnar, 2003, and Mumford, 1998. Due to limited space, we will not discuss those other reasons here.

1. *Dispositions and dispositional realism*

Sometimes referred to as a ‘power’, or ‘propensity’, a disposition is the ability of an object to bring about some state of affairs (its ‘manifestation’), when met with the appropriate stimulus. This stimulus (typically)⁵ consists in an arrangement of other objects; the other objects being such that they too have dispositions, and it is owing to the complementary dispositions of the objects involved that they mutually produce their manifestation. Dispositions are characterised by the manifestations they produce, and hence are *for* that manifestation. For example, the disposition fragility has as its manifestation a shattering or breaking of the fragile object, so fragility is a disposition *for* shattering or breaking.

‘Dispositional realism’ refers to any theory of dispositions that claims that an object has a disposition in virtue of some state or property of the object. Characteristic of the realist position is the belief that objects are capable of manifestations that might never obtain. If an object has some disposition, it has it in virtue of the way (state) that the object *presently* is, and not because of some situation that might obtain in the future, or some behaviour exhibited in the past. Another way of putting the realist thesis is to claim that dispositions must have ‘bases’, where a ‘base’ is just the state in virtue of which the object has the disposition.⁶ Within the realist camp, the views are divided into two groups: the reductive accounts hold that the bases are non-dispositional; non-reductive accounts take the base to be a dispositional property. Reductivists tend to be functionalists about dispositions, arguing that dispositions are multiply realizable functional properties that are determined by (supervene on) non-dispositional properties. Characteristic of the reductivist position is the belief that dispositions are not genuine causes of their manifestations; the ‘real’ causes are the non-dispositional base properties in concert with natural laws.⁷ Non-reductivists about dispositions hold the type of view that one would expect to go by the name ‘dispositional realism’: dispositions have as base properties irreducibly dispositional properties, and it is these irreducibly dispositional base properties that produce their manifestations.⁸

⁵ Not all manifestations require dispositional partners. See Williams 2005.

⁶ Here we follow Prior 1985 in her definition of realism. It should be noted that realism is neutral with regards to what sort of property serves as the ‘base’ of the disposition: it could be itself dispositional or categorical. For brevity we treat hybrid bases (both categorical and dispositional) as dispositional.

⁷ ‘Reductivists’ include: Lewis 1997 and Lewis 1986; Prior 1985; Jackson 1995; Jackson, Prior and Pargetter 1982; Mackie 1973 and Mackie 1977; Armstrong 1968, Armstrong 1973 and Armstrong 1997. All but the last five are also functionalists.

⁸ Non-reductive realists include: Martin 1994 and Martin 1993; Heil 2003; Mellor 1974 and Mellor 2000; Mumford 1998; Molnar 1999 and Molnar 2003; Popper 1990; Harré 1970; Ellis 2001 and Ellis 2002. As far as we can tell, ‘capacity’ realists fall into this group as well; they include: Cartwright 1999 and Cartwright 1989; Dupré 1993.

Talk of dispositions is almost always coupled with talk of counterfactual conditionals. Included in our dispositional realism is the belief that dispositions cannot be analysed in terms of counterfactuals. If anything, counterfactual conditionals will be true (at least in some cases) in virtue of dispositions, but that is not a discussion we shall enter into here. What matters for our account is that dispositions have as their bases dispositional properties and not some alternative truth-maker; anything less would imply the falsity of our account. That is because we develop our account of possibility on the understanding that dispositionality is the source of causal potency; on all other treatments of dispositions, this causal potency is transferred elsewhere, either to the laws of nature, possible worlds, abstract realms, or what have you.

On our account, some (or perhaps all) of the properties that objects instantiate are dispositional properties – and this alone is sufficient for the having of certain dispositions. To have these properties is to have dispositions. That said, we think it important to distinguish the base dispositional properties from the dispositions they support. The reason for the distinction is two-fold: firstly, a single dispositional property can produce numerous varied manifestations – a phenomenon Molnar has dubbed ‘pleiotropy’; and secondly, the same dispositional property can produce many different manifestations when combined with various different combinations of other dispositional properties – what Molnar calls ‘polygeny’ (Molnar 2003, 194) (more on this in the sequel). Furthermore, any two exactly similar dispositional properties will provide their possessors with exactly similar dispositions; however, as different dispositional properties (when combined with other dispositional properties) may support the *same* dispositions, the reverse does not hold.⁹ Nevertheless, within ideal controlled circumstances evidence of exactly similar sets of dispositions provides reasonable evidence for having located similar dispositional properties, making knowledge of dispositional properties attainable.

Each disposition is such that its nature is necessary to it. We individuate dispositions according to the manifestations they give rise to, making it impossible that a disposition should be for any manifestation other than that which is its characteristic manifestation. Dispositional properties, on the other hand, are individuated according to the set of dispositions they support. Dispositional properties are also intrinsic properties – their instantiation is irrespective of the state of the rest of the world. This is why dispositions can go unmanifested: the dispositional partners required for manifestation might not ever be appropriately arranged, or in the extreme case, the partners might not exist at all. This latter circumstance will

⁹ Though we treat the dispositional properties as genuine entities, we remain neutral about whether they are tropes or immanent universals – our account can be developed with either. Hence the ‘exact similarity’ of the dispositional properties may be read as exact similarity for those who prefer to think of the dispositional properties as tropes, and as identity for those who prefer to think of the dispositional properties as immanent universals.

arise when the dispositional partners have dispositional property bases that are never instantiated. Nevertheless, the unmanifested dispositions are, to borrow C. B. Martin's phrase, 'ready to go,' regardless of how unlikely their manifestation might be.¹⁰ The existence of the disposition depends on the instantiation of the dispositional property that supports it, not the likelihood of manifestation or the presence of dispositional partner(s) required for that manifestation.

This is the ontological framework from which we develop our account of possibility. As we see it, an ontology that admits dispositional properties as fundamental constituents has numerous virtues and ought to be endorsed regardless of our account of possibility. And if we have them, and they can do the work, why not have them do so?

2. *Dispositionalism*

The ontology of *possibilia*¹¹ is concerned with two kinds of question: the first asks what *possibilia* are, the second concerns the domain of possibilities. It is not enough for a theory of possibility to explain what – if anything – *possibilia* are (sets of propositions, concrete worlds, or what have you); one must also provide an account of the range of possibilities, that is to say one must also account for how many kinds of scenarios are possible. Naturally, some theories are going to postulate domains that reach further than others; what one theory counts as a possibility, another might not, and this will depend on the type of entity the theory describes *possibilia* as being and the extent to which these entities exist. We begin the discussion with the first kind of question.¹²

¹⁰ The phrase is a favourite of Martin's – it appears in print in Martin and Heil 1999.

¹¹ Throughout the paper we make use of the term '*possibilia*'; this is nothing more than shorthand for the ontological basis of possibility, whatever those turn out to be.

¹² Before doing so, a quick explanation of procedure is in order. One might legitimately ask: 'why start a theory of possibility from the nature of *possibilia*, and not with the semantics, like everyone else?' The primary reason is meta-ontological: when it comes to ontology, we think it is a mistake to start with semantics. All too often theorists start with semantics and let it dictate their ontologies – as if the right ontology could simply be 'read off' the way we speak about possibility (for a recent example see Mellor 2000, 758). It strikes us as implausible that investigations into natural language could deliver the correct ontology. The thought that it could implies an unlikely scenario of how our language is related to the world. Even if it is the case that our language has evolved naturally with the right kind of worldly interaction, it is a mistake to think we can retrace that path in such a way that the 'deep structure' of our sentences would reveal the world to us. That is not to claim that the Quinean practice of semantic ascent is not useful, but at best it tends to tell us what sort of ontology our language commits us to, and not what the furniture of the universe is. And if it is the furniture we happen to be interested in, then semantic ascent is not going to deliver the kind of answers we are looking for. Consequently, we prefer to start from the ontology, and work our way up to the semantics from there. For more on the problems of using natural language as a guide to ontology, see Heil 2003. That being said, we will not, in this paper, venture so far as to provide a semantics for our account.

But before proceeding further, some clarification of our terminology is in order. In the sequel, we will refer to situations in which a certain number of objects instantiate certain properties (dispositional or categorical) as a ‘state of affairs’.¹³ We shall speak of the having of properties by objects as ‘states of affairs’ even if the state of affairs in question fails to obtain. Case in point, when we speak of the manifestations of dispositions, even the unmanifested dispositions, it will be in terms of states of affairs. It is the properties within those states of affairs that will make for further dispositions, and therefore further possibilities.

The basic idea is that the objects around us possess certain dispositions, and that these dispositions are all we need to ground *possibilia*. If the world contains some disposition such that its manifestation is the state of affairs *S*, then *S* is possible. We call this view ‘modal dispositionalism’, or just ‘dispositionalism’ for short.¹⁴ The basic principle can be expressed as follows:

(P1) State of affairs *S* is possible iff there is some actual disposition *d*, the manifestation of which is (or includes) *S*.

The first thing to note about P1 is that it is not required that the disposition in question ever be manifested. In order for *S* to be possible, it need only be the case that *d* is the disposition of some actual object or other, but as long as some object has the disposition *d*, it need never be manifested. If it should turn out that *d* is manifested at some time *t*, then at *t*, *S* will be some state of affairs that is not just possible, but actual. And, as all actual states of affairs are themselves the manifestations of various dispositions, any actual state of affairs is a possible state of affairs. But actuality is no requirement for the merely possible states of affairs – only the disposition that has the state of affairs as its manifestation must be actual. As long as the disposition exists, it suffices to make true the claim that *S* is

¹³ We get the set of all states of affairs from the basic logical framework.

¹⁴ There are some predecessors to dispositionalism. Most notably, Mondadori and Morton 1976 could be described as approximately dispositionalist, as it makes use of dispositional locutions. Like ours, theirs is a naturalist and actualist theory, utilising the causal features of actual objects. There are, however, some important differences between their view and ours. Mondadori and Morton assign a central role to the form that a modal assertion takes in natural language, thus distinguishing between: dispositional expressions ‘the glasses are fragile’, conditional but non-counterfactual sentences ‘the glasses could break’, counterfactuals ‘the glasses could have broken, if struck with appropriate force’, and modal properties ‘the glasses have the property of fragility’. In other words, Mondadori and Morton divide modal assertions into four categories, claiming that each of them involves a different type of entity. As we avoid making these distinctions, we are able to get away with just a single kind of entity, the dispositional properties. Furthermore, Mondadori and Morton give physical laws a central causal role; we take dispositions to be more basic than laws.

Martin and Heil (1999) also endorse a dispositional account of possibility. Though they do not develop the account, they suggest that the right kind of dispositional realism would replace the need for modal realism. As some of our thinking about dispositions has been inspired by Martin and Heil, it is possible that what they have in mind is an account not unlike the one we propose.

possible. This point is crucial to the account, and worth repeating: a disposition does not have to be manifested in order to account for a possibility. That the glassware is fragile (a disposition of the glass for shattering) is enough to account for the possibility that it could break (S here being a state of affairs in which the glass is broken); it need never do so in order for the possibility to be genuine – the *having* of the disposition is sufficient.¹⁵ Similarly, the existence of the disposition does not depend on its being manifested. In order for an object to have a disposition, it must be in some state or other. If the object is in this state, then it has the disposition; this is all that is required for the disposition to exist, likewise for the possibility. This is the most obvious and basic case of what is possible, and provides the entities that are the basis of our account.

Our account also recognises that anything that would occur as *part* of the manifestation of d is likewise made possible by d 's obtaining. Hence if the possibility in question is not something that pertains to whole or specific concrete particulars, but is a much more general or abstract possibility, it too will count as a genuine possibility if it makes up some part of the manifestation of d . For example, in the above case wherein a certain glass is fragile, this disposition also supports the possibilities that: (a) something is broken, (b) something exists, (c) glass exists, and so on.

Recall from Part I the two-tiered dispositional structure: the dispositional properties (D) support the many dispositions (d). In actuality what we have is the same thing viewed from two different perspectives: there is just the dispositional property, but from the first perspective we see a single property capable of producing many manifestations, whereas from the alternative perspective we see a specific disposition for a particular manifestation type.¹⁶ Consequently we individuate dispositions according to the manifestation types they can produce, whereas dispositional properties are individuated according to the set of dispositions they provide their possessors with. The relationship here is that of hub to spokes: each dispositional property is a centre from which numerous dispositions radiate. For example, consider a door key. It is one and the same dispositional property (D_1) in virtue of which the key has: (d_1) the disposition to open a specific door, but also (d_2) the disposition to open beer bottles, along with many other

¹⁵ It will also be necessary – but this necessity need not apply to a single token disposition d alone. There may be many other dispositions that are type identical to d in that they have S as their manifestation that are not token identical with d .

¹⁶ Based on how we individuate them, any two exactly similar dispositional properties will support the same set of dispositions. However, exact dispositional similarity for any single disposition (such as fragility) need not indicate the presence of exactly similar dispositional properties. (Different dispositional properties may support overlapping sets of dispositions, as long as is it not complete overlap.)

dispositions (d_n).¹⁷ The key has both the disposition to open the door and the disposition to open the bottle, but this does not mean that the key has two dispositional properties; the very same dispositional property is at work in both cases.

That each dispositional property supports a variety of dispositions generates a *prima facie* difficulty: it seems that objects can possess contradictory dispositions. For instance, it seems that a glass could have the disposition to break, and at the same time the disposition *not* to break. What happens if the glass is struck? Does it lose one disposition so that the other can be manifested? The simple answer is that our dispositional locutions tend to be elliptical; once they are fully spelled out, it becomes clear that dispositions like those above are not in fact contradictory. The only way the glass can be disposed both to break and not to break is if these dispositions are manifested in different conditions. Hence ‘disposition to break’ is really just a short name for the *disposition to break when struck with a heavy object with ample force*. A contradiction would only result if the object also possessed the *disposition not to break when struck with a heavy object with ample force*. For most cases, it is the failure to appreciate that our dispositional locutions are elliptical that makes for apparent inconsistency. Despite the initial appearance that objects might possess contradictory dispositions, a closer inspection reveals that no contradictions are present.¹⁸

As it turns out, this is not a very deep distinction, but it is useful when considering the overall dispositions an object possesses, and fits more naturally with the way we talk about, and ascribe, dispositions. Hence, when we say that an object has some disposition d , the object’s having that disposition is the case in virtue of the object’s having some dispositional property D that supports d . This means that we need to amend our account as follows:

(P2) State of affairs S is possible iff there is some actual dispositional property D , which supports a disposition d , the manifestation of which is (or includes) S .

As we have said, differentiating between dispositions and the dispositional properties that support them is not a deep distinction, but it requires that we make clear what exactly our truthmakers are for the metaphysical possibilities. Hence, in the end, (P2) only really differs from (P1) in terms of how we describe the

¹⁷ This is a made up example designed to demonstrate how dispositions and dispositional properties are connected. We do not claim to know which dispositions are associated with which dispositional properties; this is the task of a mature science.

¹⁸ Not all cases of apparently contradictory dispositions can be resolved by spelling out the differences in conditions. For instance, random outcomes can be contradictory without the conditions differing: a tossed coin has the disposition to land heads and the disposition to land tails under identical stimulus conditions. In cases like this both the randomness and contradiction are explained in terms of probabilistic dispositions.

dispositional ontology, but it makes clear what the various states and entities are that we see as grounding our possibilities. In other words, (P2) makes it clear that we take dispositional properties to be what grounds possibility.

So far we have been concerned with the first question of the ontology of *possibilia*, namely what they are and how to accommodate them within an ontology that is actualist and naturalist. In order to round out the ontology, we turn now to the second question, the range of possibilities.

Not surprisingly, we limit the domain of dispositions to just this (the actual) world; after all, this is what it means to have an actualist account of possibility. It is also a naturalist theory, as we claim ‘that nothing at all exists except the single world of space and time’ (Armstrong 1989a, 3). We can deal with our modal assertions on the basis of dispositions present in the actual world, so there is no need to postulate a world of propositions, or a vast array of possible worlds.¹⁹ There is just one world – the actual one. However, within that world we need not be limited to just the present. Any disposition, whenever it happens to exist, can serve as the basis for numerous veridical modal assertions. In other words, the domain covers *all* the dispositional properties that have ever been, are, or will ever be, instantiated within the world.²⁰

From those dispositional properties alone we get (almost) all the dispositions we need, as a single dispositional property can support numerous dispositions. The dispositional property of the glass that supports its fragility can – and surely will – support additional dispositions. We are in no position to say just what those other dispositions are, but as *not breaking* for some stimulus is as much a manifestation of the glass’s dispositions as shattering is, it might (epistemic might) be the case that this too is supported by the same dispositional property. That we are unable to clarify which dispositions are supported by which dispositional properties should not be seen as a weakness of the view, just an indication of where our scientific knowledge is presently at. Which dispositions are supported by which

¹⁹ Because our theory is actualist, naturalist, and realist, it has at least a *prima facie* advantage over non-actualist (Lewis 1970, Lewis 1973, and Lewis 1986), non-naturalist (Adams 1974 and Plantinga 1976) and non-realist (i.e. fictionalist; see Rosen 1990 and Armstrong 1989a) theories of possibility. (Armstrong’s Combinatorial account is fictionalist by his own admission: he introduces his theory by stating that ‘[t]he Combinatorial theory to be developed in this work is a *Fictionalist* version of Combinatorialism’ (1989a, 13).) Peter Forrest’s (Forrest 1986) theory appears to have more in common with ours, but once the uninstantiated ‘world-nature’ properties his account relies on are made ontologically respectable, he is forced to sacrifice either his realism or his naturalism.

²⁰ For those with presentist tendencies, the domain will technically be the same, but the temporal locations and the temporal locutions of the various instantiated dispositional properties will differ. If we consider the fragility of some now shattered glass, we think of the glass as having the disposition of fragility, at some previous time. The presentist might prefer to speak of some present fact about a glass that *was* fragile, but the range of dispositions in the domain should not differ.

dispositional properties is a matter for further investigation; what we are claiming is the theoretical assertion that a single dispositional property can support numerous dispositions, and therefore supports numerous possibilities.

But one further amendment is required. Recall that manifestations are the ‘enactment’ of dispositions, resulting in the having of various properties by one or more concrete particulars. Included in the properties that are part of these manifestations are further dispositional properties. Let us call those dispositional properties we find instantiated at any point in the (complete history of the) world ‘first-order dispositional properties’. These will jointly support a staggeringly large number of dispositions, that we shall call ‘first-order dispositions’. The manifestations of the first-order dispositions – regardless of whether they ever come about – are states of affairs that if manifested would include other dispositional properties: call these ‘second-order dispositional properties’.²¹ These second-order dispositional properties will be the ground of yet more dispositions: ‘second-order dispositions’.²² Further iterations make meaningful a general distinction between *first-order* dispositions/dispositional properties and *higher-order* dispositions/dispositional properties. Many higher-order dispositional properties will be type identical with various first-order dispositional properties.²³ However, it is reasonable to think that some, perhaps many, of the higher-order dispositional properties will *not* be type identical with any first-order dispositional property, thereby giving us a dispositional property not found in the world.²⁴ This means that the range of dispositional properties is much greater than just the set of first-order dispositional properties, likewise for the dispositions, greatly expanding the range of possibilities the dispositionalist can countenance.

In order to include the higher-order dispositions and dispositional properties in our account, let us fix the following definitions for first-order dispositions (FOD) and higher-order dispositions (HOD):

²¹ To be clear, what we mean by ‘higher-order’ dispositions are dispositions *for the having of further dispositions*. This should not be confused with speaking of higher-order dispositions as applied to volitions (such as the disposition to desire to have the disposition to smoke), or the mistaken claim that dispositions are somehow less real as they are ‘second-order’ properties.

²² Strictly speaking, it is the exemplified dispositional property (D_1) that is the ground for all further possibilities, regardless of their order. It is this dispositional property that we describe as ‘anchoring’ all the branching possibilities.

²³ It makes no difference to our account if a given possibility is supported by first-order or higher-order dispositional properties. In fact, it is likely that most possibilities will be supported by dispositional properties of various different orders as similar disposition and dispositional property types will appear at different orders. One might even suggest that the degree of order is connected with a possibilities’ *likelihood* of occurring (for any given time), but we will leave this exploration for another time.

To avoid any potential confusion, let us reiterate that the ‘higher order’ dispositions are dispositions *for further* dispositions, not dispositions *of* dispositions.

²⁴ These new dispositional properties will be ‘alien’ properties, and could support ‘alien’ dispositions. We discuss alien properties in more detail in Part 3 below.

- (FOD) D is a first-order dispositional property iff D is (ever) instantiated by some object
- (HOD) D^{n+1} is an $n+1$ -th-order dispositional property iff there is some n -th-order dispositional property D^n , such that D^n supports the disposition d^n , where the manifestation of d^n has as a part the dispositional property D^{n+1} .

As a consequence of this definition, for any n , a disposition d will be n -th-order iff it is supported by an n -th-order dispositional property. With those definitions at hand, it is now possible to include higher order dispositions into the account of possibility by restating P2 as follows:

- (P3) State of affairs S is possible iff there is some dispositional property D^n (of some order $n \geq 1$), which supports the disposition d^n , the manifestation of which is (or includes) S .²⁵

P3 holds for atomic states of affairs, that is for those states which, no matter what the number of their constituents is, are not conjunctions or disjunctions of two or more states. As for states of affairs that are conjunctive, disjunctive, or existentially quantified, we propose a treatment along the following lines:

- (PC) If state of affairs S is a conjunction of states of affairs S_1, \dots, S_n : $S_1 \& \dots \& S_n$, is possible iff S_1 is possible, \dots , and S_n is possible and S_1, \dots, S_n are com-possible (that is, the existence of any of S_1, \dots, S_n does not prevent the existence of any other of the S_1, \dots, S_n).
- (PD) If state of affairs S is a disjunction of states of affairs S_1, \dots, S_n : $S_1 \vee \dots \vee S_n$, is possible iff S_1 is possible, \dots , or S_n is possible.²⁶
- (PE) State of affairs X is possible iff there is some dispositional property D^n (of some order $n \geq 1$), which supports the disposition d^n , the manifestation of which is (or includes) X .

Thus the possibility of conjunctive, disjunctive, and existential states of affairs can largely be reduced to the possibility of the states of affairs constituting them.²⁷

Every dispositional property then is a central point from which various dispositions radiate. At the end of each of those disposition ‘branches’ is some state of affairs that is the manifestation of the disposition. Some of these manifestations will be voids or empty space (as might happen when two objects collide and

²⁵ We are open to the idea that n be infinite. This is entirely in keeping with the recursive definition we give of a higher order disposition, and makes our theory in one respect as powerful as modal realism, in that it allows for a cardinality of possibilities that transcends the expressive powers of any language. For a thorough discussion of the expressive power of modal realism *vis-à-vis* actualist theories see Heller 1998 and, especially, Lewis 1986.

²⁶ We are rather sceptical of the existence of disjunctive states of affairs, but as they do not pose any particular problem for our theory, there is no need to argue against them here.

²⁷ As for negative possibility, see Part 3.

annihilate each other), but most will be some object or objects in such and such an arrangement, each in possession of various dispositional properties. The dispositional properties will in turn support a series of branching dispositions, each for some manifestation, and so on. Considering once more our fragile glass, we can see how just the tiniest bit of this structure works. Take the glass at some time t , when the glass is fragile, but unbroken. It has at t some dispositional properties, one of which we will call D . In virtue of instantiating D , the glass gains some set of dispositions, one of which is its fragility. Call this disposition d . Were the glass to meet with the appropriate stimulus, (that is to say, should the glass come to be appropriately arranged with other objects in possession of the right kind of dispositional properties), d would be manifested in the breaking of the glass. That state of affairs will mean some change in the glass's properties. We are in no position to say exactly what that change is – short of describing the glass as broken – but with whatever new properties the glass has, it now has some different dispositions. One of these dispositions, not apparent beforehand, is its disposition to be used as a cutting tool. But this is just one of many; with each change of properties comes a change in dispositionality – and this means greater possibilities. As we have said, none of these manifestations needs to obtain for the possibilities to be genuine. We might note that the further one gets from the actual dispositional property, the more remote a possibility comes, but this is a purely epistemic point. These possibilities will be genuine however far-fetched they might be. It makes no difference whatsoever to the status of the possibility that the object (or objects) with the relevant disposition would have to manifest numerous other dispositions before the possible state of affairs could obtain; distance is no barrier to what is possible.²⁸

With all these branching dispositions at our disposal, it is important not to lose sight of the fact that at some point this series needs to be anchored by an exemplified dispositional property. Only with this base in place do the branching possibilities describe genuine possibilities. Regardless of how far one needs to travel back up the branch to get the disposition whose supporting dispositional property is exemplified, the exemplification of the dispositional property is required. Without it, the 'possibilities' on the branch are not possibilities at all – they are beyond the range of what is possible.²⁹ They describe states of affairs *incapable* of obtaining, regardless of what conditions transpire. They are *meta-physical impossibilities*.

²⁸ One route that is barred however is a direct move from any given possibility to any other. For this reason, we believe that none of the semantic frameworks that are suitable to represent the theory should contain a principle of transitivity, such as " $\Box P \rightarrow \Box \Box P$ " (principle 4 for Kripke-style modal logic).

²⁹ Naturally, it will turn out that some of the possibilities on the un-anchored series are to be found on other, anchored series, in which case they are perfectly good possibilities.

This is core of our account, providing the central notion of what a possibility is, and when such a thing exists. As should be clear by now, our dispositionalism proposes grounding what is possible in terms of dispositions. Dispositionalism is an actualist, naturalist, and realist theory of modality.³⁰ It is actualist because it argues that the truthmakers for our modal claims are to be found in the actual world. It is naturalist because such truthmakers exist in space and time and are causally efficacious. It is realist because it takes modal talk seriously, without trying to dismiss it as fictional talk. It is the union of these three traits that makes dispositionalism a particularly attractive position, as no theory on the market can offer the same. With the basics at hand, we turn now to a series of objections.

3. *Objections and clarifications*

In this section we examine a series of objections or worries not addressed in the presentation of the theory. We hope that responding to these objections not only meets any initial scepticism that might be harboured against our view, but also helps to clarify the view somewhat.

3.1. *Are dispositions not modal already?*

According to a first objection, an account of possibility in terms of dispositions is circular. In fact, a disposition is defined in terms of some state of affairs that *could/might/is able to* come about. By identifying *possibilia* with dispositions the dispositional account is just substituting one mysterious sort of modal entity for an even more mysterious one. Why not stick with the traditional terminology and try to render that more intelligible?

We recognize and embrace the fact that the notion of a disposition is itself modal. Simply put, ours is not a reductive account of modality. One might be of the opinion that ontology should only countenance non-dispositional properties, namely those ‘categorical’ properties that are in ‘pure act’, whose natures are not inherently causal and which fill some role without the promise of causal efficacy. We are of a different opinion; as far as we are concerned, dispositions are something we need in our ontology *anyway*, and we are not alone.³¹ A well-rounded account of worldly phenomena that does not include dispositions (or disposition-like entities) is bound to fail. And if that is the case, why bother going outside that framework to deal with possibility, if the dispositions can deal with it themselves?

³⁰ The realism here is realism about possibilities – not about possible worlds.

³¹ See footnotes 4 and 8 for just a few of the theorists who share our opinion that the correct ontology ought to countenance (realist) dispositional properties.

3.2. *Meinongianism?*

It might be objected (as Armstrong has) that dispositions of the type we defend are committed to a kind of ‘Meinongianism’.³² The idea here is that dispositional properties are objectionable because the connection they bear to the many manifestations they can produce, when those manifestations do not obtain, is a relation to something that does not exist, or exists only in the realm of the possible. This is not the case for dispositions that are in fact manifested: the relation there is perfectly sound. But when the manifestation never obtains, the disposition still has – as its very nature – a directedness towards an unactualised state of affairs (its manifestation). Armstrong writes of the problem concerning unmanifested dispositions that ‘[i]t seems to smack of a Meinongian relation to the non-existent – in this case a relation to the manifestation that does not occur.’³³

As best as we can tell, this objection is slightly off mark. For starters, it should be recognized by all that a disposition does not somehow have its manifestation stored inside it – it is simply not the case that dispositions *are, or contain*, their manifestations. Furthermore, it is recognized that when dispositions are manifested, the dispositions (or more correctly the dispositional properties that support them) stand in a causal relation to the manifestations. But when the dispositions are unmanifested, there is no relation at all, and so no mystery regarding what the relation is to. Thinking of unmanifested dispositions as relations to some mysterious non-existent manifestation might be one way of characterizing dispositions, but it is not one we endorse (nor does anyone else as best as we can tell). For this reason, we are not burdened with Meinongian entities. We likewise avoid characterizations of dispositions as *directed at* their manifestations, for similar reasons. Both relations and directedness imply that the manifestation must exist somewhere (as the object ‘pointed to’ or as the missing relata), where that somewhere cannot be actual or natural. We recognize all too well how undesirable this is.

What we are really faced with is not a matter of Meinongianism, but what the nature of dispositionality is.³⁴ We have reached a rock-bottom problem. Somehow – however it may be – dispositions produce manifestations when met with appropriate stimulus: we take the nature of dispositionality to be a brute fact.³⁵ Yet this *brutality* is not something peculiar to the dispositional account. Every ontologically serious account has its cross to bear when it comes to the brute facts about its

³² See Armstrong 2001.

³³ Armstrong 2001, 168.

³⁴ Meinongianism (i.e. that dispositions are relations from dispositional properties to non-existent states of affairs) is just one answer to that question, and a poor one at that.

³⁵ We welcome a clear analysis of dispositionality, but do not anticipate that one is forthcoming. Any metaphysical system must postulate certain fundamental features – the dispositions and dispositional properties are ours. As any genuinely informative and thoroughgoing analysis will tend to involve explaining aspects of the metaphysical in terms of more fundamental aspects, one cannot hope for such an analysis of the fundamental aspects themselves.

fundamental features. What is the modal power inside a natural law? What facts explain the existence of countless many other worlds beyond our own? In the end, we prefer brute facts about dispositions to brute facts about natural laws, brute facts about the existence of other worlds, and so on. Our best science seems to indicate that we require dispositions to account for the behaviour of the world's most basic entities.³⁶ Assuming that is the case, we are simply arguing that we already have everything we need to deal with possibilities. Dispositions are not unmysterious, but if that mystery is going to be hoisted upon us regardless, then we suggest it is just what we need to resolve a few other mysteries out there.

3.3. *A narrow-minded account of possibility?*

According to another objection, this account looks well suited for very disposition-like possibilities, such as the claim that the glasses might have broken, or that the snow might have melted, but what about the claim that JFK might not have been shot? It takes a whole lot of dispositions to account for this possibility, while a possible worlds framework has a much more straightforward treatment of alike cases. This shows that the dispositional approach works only for a certain type of cases, namely the ones involving simple causal structures and experimental conditions.

Admittedly, the claim that JFK might not have been shot gets a simple and easy interpretation using a possible worlds framework – we just imagine a world in which this state of affairs never obtains. Pure simplicity – but is the case really that simple?

What we are considering is some contingent state of affairs *S* (JFK's being shot) and asking what the dispositionalist has to say about the possibility that *S* might not have occurred. The answer is quite straightforward. On the dispositionalist account, *S*'s obtaining requires that some set of objects, appropriately disposed, acquired the appropriate arrangement for those dispositions to be manifested. In fact, there would surely have to have been a lengthy series of such arrangements, but let us stick to the most obvious: JFK had to be present (and not armoured or in a closed armoured vehicle), Oswald's gun had to be loaded, and aimed correctly, and fire successfully, and nothing else could be in the path, and the bullet had to do the right kind of damage. In a sense, to say that *S* might not have obtained is just to recognise that any one of the above could have failed to be the case. When we are considering a state of affairs as complex as JFK's being shot, numerous things have to be appropriately arranged and disposed for *S* to obtain.³⁷

³⁶ Here we follow Mumford 2006 and Ellis 2002.

³⁷ This is exactly why having a second shooter makes perfect sense, if *S* or some similar assassination scenario is what you are seeking.

In the end, *S* is quite a complicated manifestation, relying on numerous disposition partners. To say that JFK might not have been shot is just to recognize that the assassination was the result of numerous disposition partners, any one of which might not have been present. And because there are so many dispositional partners involved, we can say with confidence that there were many different manifestations that could have obtained that day – most of which were not *S*, and that is all that is required to explain that JFK might not have been shot.

Alternatively – and more directly in line with the account of possibility given in (P3) – to say that JFK might not have been shot is to say that there is some possible state of affairs (*S*^{*}) in which JFK is not shot (on that day, or at that time), where (for any *n*) there is some *n*-th-order dispositional property *D*, where *D* supports the disposition *d* and the manifestation of *d* is *S*^{*}.³⁸

3.4. *Prima facie ontological commitments*

Even considering the reply to the previous worry, when compared to its rivals, dispositionalism still seems to be at a disadvantage with respect to the analysis of some cases. Consider the claim that this glass, an ordinary one, might not have existed. It seems to say something (metaphysically speaking) meaningful and *prima facie* plausible – namely, that the glass is a contingent existent. What disposition of the glass could make this claim true? Dispositions are for potential *future* states of affairs, hence there can be no present disposition of the glass that accounts for a disposition to not exist in the past. How can the dispositionalist account for cases of this sort?

Even though we have tried to stay away from the apparent ontological commitments of natural language (and have done so thus far), this is a place where neutrality is not an option, as the terminology employed seems not to square with our ontology. In the case at hand, what looks like a statement attributing a disposition to the glass actually attributes one or many dispositions to whatever objects were involved in the creation of the glass. Hence, we take it that the claim in question is to the effect that whatever dispositions were manifested in order for the glass to have existed, might themselves not have been manifested. This purportedly troublesome claim does nothing more than restate the principle that the presence of a disposition is no guarantee of manifestation. Dispositions can exist unmanifested – even if on this occasion they did not.

³⁸ It is relevant to remark that this case, although involving a complex state of affairs, is still atomic. It should thus be distinguished from the case of a disjunctive or conjunctive state of affairs, which we would treat as indicated in Part 2.

3.5. Does dispositionalism give us all the possibilities we need?

The dispositionalist's inclusion of the higher-order dispositions provides the ontological grounds for a much wider range of possibilities than any account of nomic possibility would provide, but even so, the dispositionalist's 'super-nomic' possibility still seems to fall short of metaphysical possibility. What about all the possibilities we need that the dispositionalist cannot accommodate?

Let us start by pointing out that speaking of the possibilities we 'need' is very odd indeed. This implies that we know what is metaphysically possible, and that it is the task of an ontologically motivated account like dispositionalism to provide the truthmakers for that set of possibilities. This puts the cart before the horse. The dispositional properties provide the grounds for what possibilities there are; any state of affairs not grounded in the actual dispositional properties is not metaphysically possible. The set of actual dispositional properties determines the space of what is metaphysically possible, not the reverse.

For instance, consider some state of affairs S , where S turns out to be impossible given the range of actual dispositional properties. The objection being raised is that dispositionalism is somehow inadequate as an account of metaphysical possibility because it does not treat S as possible. But why should it? Not every logically possible state of affairs will turn out to be metaphysically possible. The space of actual dispositional properties divides the set of all logically possible states of affairs into two groups: those that are metaphysically possible and those that are not. Why does it seem so offensive that some conceivable states of affairs should turn out to be metaphysically impossible?

The mistake contained within the objection is one of taking metaphysical possibility to coincide with epistemic possibility, or worse yet, that every conceivable state of affairs should be metaphysically possible. There are many states of affairs that strike us as *epistemically* possible: they are states of affairs that *for all we know* could have taken place. But it is not the job of an account of metaphysical possibility to provide truthmakers for all those epistemic possibilities. Some of those epistemic possibilities will be genuine metaphysical possibilities (all those for which the relevant dispositional property exists), but just as many will not. According to the dispositionalist, it is only possible if there is some actual dispositional property that grounds it (as per P3 and so on above).

This is part of the motivation for the account: to provide a space of possibilities that is wider than nomic possibility, but likewise has an extra-mental, actualist and ontologically serious grounding. We find most accounts of metaphysical possibility to be far too wide to be interesting or informative; what good is a notion of metaphysical possibility if it is nothing more than conceivability or logical possibility? We need a distinct notion of metaphysical possibility; what we offer is an ontologically robust way of grounding and understanding metaphysical possibility that is distinct from other types of

possibility. And as we show below, the space of possibilities the dispositionalist can accommodate is surprisingly wide.

3.6. *Alien properties*

Finally, we want to consider a problem for the domain that David Lewis raises in his discussion of actualism, as it also applies to the dispositionalist. The problem is that there might have been properties that were never instantiated in the actual world – properties Lewis calls ‘alien’ properties, and these seem to allow for possibilities that the actualist is hard pressed to include.³⁹

Two things can be said in response to this line of objection. First of all, it is not at all obvious that the possibility of alien properties is something we need to take seriously, or that it constitutes an objection. Consider for example the following sentence:

- (A) It is possible that something exists that could not have been brought into existence by anything actual.

Is (A) true? Though we do not have any definitive answer to offer here, we should briefly consider this question. What would count as a proof of (A)? Certainly not any empirical fact, since (A) expresses a truth that does not involve any actual object if not by negation. So, if (A) can be regarded as true, then it has to be via *a priori* reasoning. What would such reasoning be? Lewis offers us an argument by analogy: as we could think of ‘poorer’ worlds (worlds with respect to which the ordinary business of the actual world could not have been brought into existence by any of the objects in such a world), so we can think of ‘richer’ worlds than our own, like the one described in (A).

The problem here is the same as that discussed above: why should we assume that conceivability or epistemic possibility is a good guide to possibility? We can *think* of ‘richer’ and ‘poorer’ worlds than our own, but it is far from clear what this implies concerning metaphysical possibility. To expect epistemic possibility and metaphysical possibility to be isomorphic is either foolish or anti-realist. It is doubtful that conceivability is even useful as a *guide* to what is metaphysically possible; it certainly does not determine it.⁴⁰

In essence what we are claiming is that Lewis is willing to take our talk at face value and take seriously the possibility of alien properties, whereas we opt for

³⁹ More precisely, alien properties are the ones that are not possessed by any actual (i.e. past, present, or future) entities, and are not obtainable by means of a conjunction, interpolation, or extrapolation, of some actual properties. See Lewis 1986, 159–165; Armstrong 1989a, 57–63; Divers 1999; Divers and Melia 2002, and Heller 1998, 298–308.

⁴⁰ For more thoughts on the use of conceivability as a guide to possibility see Gendler Szabo and Hawthorne 2002; Block and Stalnaker 1999, and Yablo 1993.

greater scepticism. It is certainly not obvious that there are such things as alien properties (in this or – for those who believe in them – other worlds), and that an account of possibility ought to countenance them. Nor is it obvious that we should treat our ‘vulgar’ thought so uncritically.

That said, unlike most actualists, the dispositionalist is not too far behind the modal realist when it comes to alien properties. Our second response to the purported need for alien properties is that in principle we can admit them. Recall the dispositional treatment of possibility as given in (P3) above. We said there that some state of affairs S is possible not only if it is the manifestation of some actual disposition d (where d is supported by some actual dispositional property D), but also if it is the manifestation of some higher order disposition d^n , (where d^n is supported by some higher order dispositional property D^n). In other words, it is not the case that the only properties the dispositional account can treat as possible are *actual* dispositional properties – there are *merely possible* dispositional properties too. Let us now consider those merely possible dispositional properties: what will they be like? Common sense, not to mention our best predictive science, tells us that many of them will be exactly similar to the actual dispositional properties. But nothing in the dispositional account requires that they must *all* be exactly similar to one or another dispositional property instanced in the actual world. Plenty of the merely possible dispositional properties could be entirely unfamiliar, meaning that they are not exactly similar to *any* actual dispositional property. Which is just to say that they are alien properties.⁴¹ The actual dispositional properties are the nodes from which possibilities branch; many of these branches will trace familiar paths across familiar nodes, but just as many will extend into areas where the nodes are unlike anything the actual world has ever seen.

In the end, there are alien properties and there are alien properties. Our account has room for a certain extent of alien properties, but not all.⁴² We recognise and embrace this feature of our account. In virtue of those alien properties and objects the account admits, it has a distinct advantage over many of its competitors, such as Armstrong’s Combinatorialism.⁴³ On the other side, we want to deny that certain describable states of affairs are genuinely possible; this is a virtue of our

⁴¹ In anticipation of a potential objection, there is no reason to suspect that these merely possible dispositional properties could be obtained by conjunction, interpolation, or extrapolation, of some actual dispositional properties. There may be some like that as well, but that need not be all of them.

⁴² Just how many alien properties and objects can the dispositionalist include? It depends on what dispositional properties are in fact instantiated, and which alien properties one can branch to from there. This is unlikely to be as wide a class as the modal realist boasts, for not every alien property can be reached from an actual one. However, there may be plenty of alien properties which can be reached from other alien properties, and if those can be reached from actual properties, we get quite a large class.

⁴³ See Armstrong 1989a.

account. We take seriously our claim that all possible properties, objects, arrangements, and so on must be grounded in some actual state of the world. Where that is not the case, the modal claim is false. However unlikely, Cartesian egos might spring up from certain combinations of dispositional properties (though we doubt it), but worlds with miracles there are not. This is a substantive part of the account. As for different pasts, one need only go back far enough then work forward – different ‘futures’ could have unfolded (dispositions allowing).

4. Conclusion

You can arrive at a modal ontology from many different starting places. If you are coming at it with a realist, naturalist, and actualist bias, dispositionalism is the right theory for you. In this, dispositionalism proposes to fill a gap within the philosophising about possibility. Its starting place is an easy, non *ad hoc* one. We have independent reasons for claiming that ontology is in need of dispositions. But, wait! Dispositions are real, actual, natural, and modal entities. They are real, in that they are part of our ontological apparatus. They are actual, because they belong to this world, the only existing one. They are natural, because their existence is rooted in concrete, spatio-temporal entities. Finally, dispositions are modal. Why look elsewhere if you have already got everything you need? Sometimes in philosophy there are open doors. This paper shows the path to one such door. We intend to step through – hopefully we will not be alone.

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