

CHAPTER I

Introduction

Dispositionalism is the view that there exist irreducible dispositions, also called ‘powers’ or ‘capacities’ or ‘potencies,’ etc. Dispositions are inherently causally significant. For instance, for an object to possess the disposition ‘fragility’ entails that under certain circumstances the object can be made to break; by contrast, other sorts of property seem not to carry inherent causal relevance. Consider geometrical/structural properties: at least *prima facie*, the fact that an object is square tells us nothing about what that object can do or have done to it; being square does not entail being flammable or soluble or visible. Properties allegedly lacking intrinsic causal significance are often called ‘categorical properties.’¹

Roughly stated, the identity conditions of a disposition involve at least: (i) a stimulus or set of stimuli; (ii) a manifestation or set of manifestations; (iii) any *ceteris paribus* clauses.² Thus the fragility of a vase could be defined at least in part by reference to (i) the sorts of external conditions necessary for triggering (ii) the ways in which the vase would break, taking into account (iii) the factors that could intrude to block or otherwise affect any of those stimulus conditions or manifestations.³

¹ Note that ‘properties’ can for now be taken as neutral between tropes and universals. Historically most dispositionalists have been realists (whether moderate or Platonic) about universals. While this remains quite a common combination in the current literature, there are some who self-identify as nominalists (e.g., Heil (2003; 2012)). I will say more about this in Chapter 2. Note too that ‘object’ can for now be taken as neutral between the various competing substance ontologies (substratum theory versus bundle theory, etc.). We will explore that topic in Chapter 5. And while my practice of taking ‘dispositions’ as synonymous with ‘powers’ and other cognate terms is often adopted, some authors draw fine-grained distinctions between them.

² Mumford (1998, chs. 3–4) remains an excellent entry point into what is now an extensive literature on how to understand the precise identity conditions of a disposition.

³ In phrasing this in terms of ‘a stimuli or *set* of stimuli’ and ‘a manifestation or *set* of manifestations’ I am trying to remain neutral between those who think that a disposition can have only a single stimulus condition and a single manifestation condition versus those who think that dispositions can be ‘multi-track,’ characterized in terms of multiple stimulus and/or manifestation conditions. I am also remaining neutral on the question of what category or categories the stimulus and manifestation belong to – whether property or event or process, etc.

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While ‘fragility’ is useful as a commonsensical illustration, in principle other powers should perhaps be referenced here, insofar as ‘fragility’ is not itself a fundamental property but rather is presumably reducible to other properties that jointly contribute to making an object breakable (in this case the defeasible bonding powers of an object’s parts). Plausibly it is *fundamental* powers that ultimately function as truthmakers for true disposition-ascriptions,⁴ and unless otherwise stated from now on I will be referring to these when using ‘dispositions’ or ‘powers,’ etc.⁵

Advocates of dispositionalism appeal to dispositions to explain the behaviour of objects, and by extension to explain the natural regularities summarized in scientific laws. As such most dispositionalists maintain that what we typically think of as laws of nature are reducible to (or even eliminable in favour of) dispositions. Dispositions are thus thought to be the truthmakers for true law-statements employed in science. Consider the universal law of gravitation: between any two bodies possessing mass there is an attractive force proportional to the product of the two masses divided by the square of the distance between them. Formalized as an equation, we get $F = GMm/d^2$, where ‘F’ is the force, ‘G’ the universal gravitational constant ($6.670 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$), ‘M’ and ‘m’ the masses of the first and second bodies, and ‘d’ the distance between them. The standard dispositionalist account maintains that this equation captures a natural regularity, which regularity is in turn grounded in a power, mass, possessed by individual objects.⁶

Dispositionalism can be contrasted with categoricism, according to which the only irreducible properties in nature are categorical (i.e., non-dispositional). Categoricists cannot reference intrinsic powers to explain the behaviour of objects; accordingly, some maintain that the natural regularities summarized in scientific laws are primitive and not subject to further ontological explanation. This strategy is taken up by advocates of the various versions of regularity theory.⁷ Other categoricists argue that

⁴ For more on this consult again Mumford (1998, pp. 228–234).

⁵ That does not automatically imply that macro-level objects lack dispositions of their own. In fact the question of whether any of the powers apparently exhibited by macro-level objects are wholly reducible to the powers of their parts is one way of framing the debate over whether macro-level objects are genuinely *objects* or whether they are merely aggregates reducible to their parts. Relatedly, the topic of emergentism will be examined in Chapter 9.

⁶ Significant dispositionalist discussions of laws include Bird (2007), Ellis (2001), and Mumford (2004). Note that it would be controversial to claim mass as a fundamental property (and therefore a genuine disposition); but for purposes of illustration it is at least a good deal closer to being fundamental than is fragility.

⁷ See for instance Barker (2013), Beebe (2011), Miller (2015), and Smart (2013).

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regularities are grounded in real, irreducible laws of nature; on this sort of view, known as nomological necessitarianism, laws are not merely *descriptive* of natural regularities, but *prescriptive*. They are conceived of as abstract (i.e., non-concrete) entities that somehow play a governing role in nature.⁸ Still other categoricalists adopt views that do not fit neatly into either regularity theory or nomological necessitarianism.⁹

I expect most readers will already have some familiarity with dispositionalism, so hopefully the preceding introductory remarks, rough and incomplete though they are, will suffice as a basic characterization. Certainly the topic is one whose importance for those working in analytic metaphysics, philosophy of science, and the hybrid sub-discipline now commonly labeled *metaphysics of science* should be uncontroversial; in fact anyone interested in the foundational question of what, if anything, accounts for the regularities in nature should take an interest in discussions of dispositionalism (pro or con), and the theory occupies a prominent place in the current literature. A clear example of this prominence may be seen in Schrenk's (2017) textbook on the metaphysics of science, structured as it is around the central theme of dispositionalism. More generally, work on the topic regularly appears in leading journals, and general textbooks in analytic metaphysics devote space to it. Koons and Pickavance (2015) for instance have a dedicated chapter on dispositionalism.

Yet a high profile for the view is a relatively new development. Even after the decline of positivism and corresponding revival of interest in traditional metaphysical debates from the 1960s onward, dispositionalism remained a marginal theory within analytic circles for some time; when it was discussed it was more critiqued (e.g., by Mackie (1977) and Quine (1966, pp. 71–74; 1974, pp. 8–15)) than defended. Yet it gradually acquired proponents such as Harré and Madden (1975), Shoemaker (1980), Swoyer (1982), Franklin (1986), Thompson (1988), Cartwright (1989), and Woodward (1992). These works contributed to the renaissance of dispositionalism that got

⁸ See for instance Armstrong (1983; 1997), Dretske (1977), Fales (1990; 1993), Foster (2004), Latham (2011), Laudisa (2015), Maudlin (2007), Psillos (2006; 2009), and Tooley (1977). The 'somehow' above is meant to highlight the fact that how exactly this works is understood differently on different versions of nomological necessitarianism; Armstrong's account is importantly different from Maudlin's, for example.

⁹ I think especially of Lange's (2004; 2009; 2009a) account, according to which laws are rooted in primitive counterfactual truths, and also Whittle's (2009) similar view referencing primitive functional facts.

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underway fully in the mid-1990s, and which has continued through to the present.¹⁰

While dispositionalists are still engaged in the project of defending the theory against rivals like nomological necessitarianism and regularity theory, it now boasts sufficient support that many today concentrate on its internal development; that is, many today work on explicating more precise accounts of the nature of powers, and exploring how they relate to other philosophical debates.¹¹ Among the questions being discussed: are all properties powers? If so, how exactly are *prima facie* distinct types of property (e.g., geometrical/structural properties) reducible to or eliminable in favour of powers? And if not, how do powers relate to distinct kinds of properties? Moreover are all dispositions properties, or might the members of other ontological categories (like *relation* or *substance*) be inherently dispositional? Can a comprehensive ontology of causation be provided using dispositionalism? Can a comprehensive ontology of modality be thus provided? Are there multi-track dispositions? Must all dispositions have stimulus conditions, or could there be some that manifest spontaneously?¹² Must all dispositions be intrinsic, or might there be *extrinsic* dispositions as well? If so, how exactly are the latter to be characterized? Are there emergent dispositions, and if so what exactly is their nature and how do they impact debates on reductionism in various philosophical sub-disciplines?

¹⁰ Note that in these historical remarks I am focusing on the analytic literature; the situation was different in other philosophical traditions. Within scholasticism, which was largely unaffected by positivist strains, work on dispositionalism continued through the whole span of the twentieth century. Over the last ten years or so, dispositionalism has in fact constituted one of several bridges between analytic philosophy and contemporary scholastic thought, which now interact much more than in the past. Examples of this interaction can be seen in the anthologies of Huntelmann and Hattler (2014), Novak et al. (2013), Novotny and Novak (2014), and Paterson and Pugh (2006). It is also evident in authors like Feser (2014) and Oderberg (2007), whose works draw on both traditions and address dispositionalism in considerable depth. Looking farther afield, within American pragmatism C. S. Peirce was a staunch defender of dispositionalism; later Peirceans followed suit, thus giving dispositionalism another support base in the days when its stock within analytic philosophy was low. For a relevant discussion of Peirce see Legg (1999).

¹¹ For a clear instance of the confidence of contemporary dispositionalists, see the introductory chapter to the anthology edited by Groff and Greco (2013), where it is claimed that greater time spent on exploring implications (as opposed to defence) is now thoroughly justified.

¹² Vetter (2015) delves into this important question in considerable depth, developing a novel view according to which stimulus conditions play no part in the essence of a power *qua* power; on her account, the traditional formulation of dispositionalism in terms of properties having both stimulus and manifestation conditions is false. So far as I can tell, the arguments I develop in this book would remain sound on either Vetter's account or on the more traditional sort of formulation I provided above.

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This book can be seen as falling mostly within this ‘internal development’ approach. My main goal is to explore the connections between dispositionalism and a variety of debates in metaphysics, with a focus on those debates that have also been areas of discussion for philosophers of science: for instance those involving laws, structural realism, fundamental material composition, etc.¹³ In other words, my chief aim is not to show that dispositionalism is true, or even more likely to be true than its rivals. Rather, I want to ask: *if* dispositionalism *were* true, what would that mean for some of these other debates? Likewise, if we were to adopt one or another specific position in some of these debates, what implications would *that* have for dispositionalism? Such conditionals ought to be of interest to dispositionalists, categoricists, and participants in these various other debates, insofar as understanding the implications of a philosophical position will inevitably assist in providing an assessment of it (whether pro or con).

In the course of drawing out such implications, novel arguments for or against dispositionalism will indeed arise in the chapters that follow; I say ‘for or against’ since, depending on one’s background assumptions, some of these implications will be more or less welcome. I generally find the implications welcome, and so I see the project as pro-dispositionalist on the whole. In that sense I like to think that the project might contribute to the broader case in favour of dispositionalism; still, that is not the primary goal, but at best a welcome side-effect.

The remainder of the book can be outlined briefly as follows: Chapter 2 I delve more fully into the proper understanding of laws. As noted above, the tendency among dispositionalists has been to adopt either reductionism or eliminativism with respect to laws. I believe this tendency is mistaken, and argue in this chapter that not only is dispositionalism compatible with a robust realism about laws, it actually entails such realism.

Chapter 3 begins with a summary of some of the literature concerning ontic structural realism, laying out a taxonomy of current versions of OSR. On some of these, objects are viewed as reducible to (or eliminable in favour of) relations; this sort of position is sometimes called

¹³ Dispositionalism arguably has significance for areas outside the metaphysics of science; Mumford, Anjum and Lie (2013) for instance argue that it has important implications for ethics, as do I in my (Dumsday 2016). Considerations both of space and of thematic unity demand that I stick to the metaphysics of science, so I will not delve into these other areas in this book.

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‘eliminativist OSR’ or ‘radical OSR.’ In others versions, objects and relations are seen as equally fundamental and perhaps symmetrically dependent. This sort of position is sometimes called ‘moderate OSR.’ Drawing on the law-friendly understanding of dispositionalism developed in Chapter 2 (labeled for convenience ‘nomic dispositionalism’), I argue that dispositionalism entails a novel version of moderate OSR that sidesteps some important objections facing existing versions.

In the literature on fundamental material composition the four main competing views are atomism (in two main versions), the theory of gunk, and the theory of extended simples. In Chapter 4 I make the case that atomism version 1 supports dispositionalism and that the theory of extended simples entails it. For those who prefer one or another of those accounts of composition, dispositionalism thereby acquires additional confirmation. Correspondingly, categoricists are given reason to reject those two accounts of composition.

In Chapter 5 I argue that each of the four major substance ontologies (substratum theory, bundle theory, primitive substance theory, and hylomorphism) supports dispositionalism, insofar as each either entails dispositionalism or is most plausibly understood in dispositionalist terms. Besides highlighting a neglected connection between these areas of metaphysics, this also permits the formulation of a novel disjunctive argument for dispositionalism – or at least it does so for anyone who is a realist about substance. For convinced categoricists, on the other hand, the conclusion opens the way to a new argument for the rejection of substance as a fundamental category (perhaps by reference to eliminativist OSR or an analogous position).

In Chapter 6 I make the case that dispositionalism ought to be paired with a particularly robust version of natural-kind essentialism, one according to which a kind-essence is something over and above its associated defining properties. Doing so allows dispositionalism to sidestep an important objection levelled against it by Lange (2004; 2009; 2009a) and by Whittle (2009). For dispositionalists the result is a new argument for robust natural-kind essentialism, while for resolute opponents of the latter a new argument against dispositionalism arises.

In Chapter 7 I look at how dispositionalism relates to three debates concerning the metaphysics of spacetime: that between substantivalists versus relationists; that over the possibility of time travel; and the debate over the nature of persistence.

Dispositionalism is supposed to answer some of our deepest questions about the activities of objects, providing us explanations of what lies

behind those activities. But might there be room within dispositionalism for a recognition of activities that are not rooted in powers? Chapter 8 explores the possibility of activities grounded not in the powers of an object (or grounded in any of its properties), but directly by the kind-essence of the object. In other words, while robust natural-kind essentialism may be necessary for the defence of dispositionalism (as advocated in Chapter 6), it also opens the door to the idea that not all of an object's activities need be explained in terms of its dispositions. Yet this idea should not be seen as conflicting with dispositionalism, and in a round-about way supports it.

Finally in Chapter 9 I take up the connection between dispositionalism and emergentism. The latter topic is of course a vast one, and I mostly limit my attention to a recent account that situates emergentism within an explicitly dispositionalist framework: the novel hylo-morphic theory of minds and of organisms propounded by Jaworski (2016). After summarizing that account and the specific version of dispositionalism it is tied to (namely *identity theory*, according to which every intrinsic property has both categorical and dispositional identity conditions), I discuss some of the existing critiques of that version of dispositionalism and suggest an alternative framework that Jaworski might employ. That alternative has the advantage of avoiding the criticisms facing identity theory, but it does involve the controversial claim that relations (in this case structural relations) can themselves be dispositional.

Before getting started, a few quick procedural points: first, since each chapter deals with the relationship between dispositionalism and an area of metaphysical debate, and since many readers may be unfamiliar with at least some of these areas, it has been necessary to include in each a concise refresher. This should have the advantage of making each chapter more accessible, and I hope that it will not prompt impatience in cases where the reader is already familiar with the recent literature on the topic. (Don't we all benefit from an occasional refresher?) Second, I recognize that some readers will be specially interested in the impact of dispositionalism on a particular area of debate, and may wish to dip into the book primarily for a certain chapter; similarly, it might transpire that an instructor teaching a course focused on, say, structural realism might wish to assign Chapter 3 to her students, but not the whole work. As such, although the book is cumulative, with some of the later chapters relying explicitly on the findings of the earlier, where that is the case I have included in those later chapters very brief recaps of the main

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conclusions of the relevant previous discussions. Each chapter should therefore be readable independently. I trust that those working through the entire book will forgive these periodic repetitions. Third, the reader should be forewarned that I am in the habit of stating core arguments in numbered premise/conclusion form. I hope that most will find this practice helpful, insofar as it can promote clarity and serve to highlight important lines of reasoning.