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Dimensions: A New Ontology of Properties

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Abstract: This thesis advances a distinctive new ontology of *objects* and *dimensions* - dimensionism, for short. Dimensions are understood, roughly, as *respects of comparability.* Dimensions are not properties; if a property is a *way* that an object is, then a dimension is a *respect in which* an object can be some way or other.

The discussion is in seven chapters. Chapter 1 introduces the dimensionist ontology, and offers an initial defence. Chapter 7 provides, in overview, an account of the 'metametaphysical' outlook that informs the thesis, drawing on work by Ted Sider, Hasok Chang, and Jonathan Lowe. Chapters 2 to 6 deal with applications of dimensionism to a selection of debates.

Chapter 2 argues that dimensionism offers the best ontology of determinable-determinate structure. I argue, too, that dimensionism is not far off the background metaphysical view of W.E. Johnson himself.

Chapter 3 offers a dimensionist treatment of the problem of universals that has much in common - so one might think - with resemblance nominalism (Chapter 6 will insist on some big differences).

Chapter 4 argues that dimensionism provides the best account of instantiation structure. Here *fact* ontologies are the main rival to beat.

Chapter 5 argues that dimensionism can offer a good account of nomic governance. In particular, the proposed account is not vulnerable to Stephen Mumford's 'Central Dilemma', and improves on the accounts of Armstrong and Lowe.

Chapter 6 considers dimensionism alongside rival accounts of property possession - resemblance nominalism, trope theory, modes, universals, and locationism - and argues that the proposed ontology competes well.

The overall aim of the thesis is to explore the explanatory resources offered by a category of dimensions, and more broadly, to argue that *respect structure* deserves a central place in ontological and metaphysical enquiry.

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X-Y. Guo

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This thesis began as a project on fact ontologies. It was in searching for a way to cash out constituenthood in fact ontologies - a notoriously obscure notion - that I found myself moving toward the dimensionist ontology that has since taken over the thesis. My interest in fact ontologies began in Cambridge, with two series of seminars run by Alex Oliver and

Fraser MacBride during the 2010-11 academic year. Thanks are due to them both, for the best introduction to the field that I could have had.

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Part of the last chapter of this thesis discusses a draft chapter of Ted Sider's forthcoming book, *The Tools of Metaphysics and the Metaphysics of Science*. I am very grateful for the opportunity to read it, and for his permission to discuss it here. I am very grateful to Jessica Wilson, too, for sharing a draft of her (2017) during the summer of 2016.

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A thesis on (meta)metaphysics is an odd sort of thing to write: people who ask me what I do are often a bit perplexed by the answer. I am grateful, therefore, to all those (especially Laura, Nicolina, and John) who have helped me keep my feet on the ground by occasionally poking (well-meaning) fun at my work. It's annoying, but I appreciate it.

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Introduction

This thesis advances a new and distinctive fundamental ontology: *dimensionism*. My aim overall will be to elucidate, defend, and recommend dimensionism as the best ontology to adopt in relation to issues pertaining to the metaphysics of properties. Along the way, I will argue that dimensionism is distinctive not only because it differs substantially from its contemporary rivals, but also because of its fresh contributions on a range of core metaphysical topics. In doing so, I will be carving out a subsidiary conclusion as a fallback position: dimensionism is, if not clearly *best*, at the very least a challenging and worthwhile competitor among more familiar alternatives.

At the core of the ontology that I am proposing are two fundamental categories - *objects* and *dimensions* - and a formal relationship of *determination* between them. Since Chapter 1 will get straight down to a detailed exposition of the core ontology, I will keep my remarks here brief. Dimensions, as I will understand them, are not properties - ways of being, to use Lowe's (2006) expression - but *respects* in which things are those ways (this is not, however, to *reify* ways, or properties). Dimensions are roughly comparable to Johnson's *highest determinables.* It is under dimensions that relationships of comparability - of resemblance and difference - find the space to obtain. Moreover, I will say that objects *determine* dimensions. This is not to say that objects *fix* or *ground* dimensions, but just that they *fall under* them: objects are various ways *in the respects* that dimensions are.

Relationships of determination are explanatorily rich. On the one hand, they allow us to associate objects with *determination profiles,* the sets of dimensions that they determine. On the other, they allow us to give metaphysical explanations based on the *factored*

structure of determination relationships. Determination relationships are factored in this sense: objects determine dimensions in a twofold way. Objects determine dimensions both *at all* - as a brick does by essentially having a *mass* - and also *somehow* - as the same brick does by having a *specific* mass, say, 2kg.

These are, in summary, the core ontological resources upon which dimensionism draws to do explanatory work. My task in this thesis will be to show that *good* explanatory work can be done on this basis.

I consider it a strength of my proposed view, that its ontological resources are not structurally occult: determination and resemblance relationships are more familiar to both common sense and scientific practice,[1] and to that degree less mysterious, than relationships of *instantiation*, *characterisation*, *participation*, *compresence*, and the like. In particular, they are plausibly the structures that underlie *measurement*, and - according to Johnson (1921) and, arguably, a growing body of contemporary literature (see Gärdenfors 2000, 2014, Magidor 2013, and also Funkhouser 2006, 2014) - also *predication*. They are structures that we *use* - structures that we run into *in practice*. Of course, no ontology should hope to demystify everything. But there is a great difference between treating a feature of reality as *primitive* - such as *quality* or *change* - and positing primitive mysteries to explain it. I will be doing plenty of the former, but - I hope - little of the latter.

Dimensionism earns its keep in two intersecting theoretical spaces. In the first, its rivals are other fundamental ontologies - other schemes of fundamental ontological categories. In the

[1] This is no hint toward the outlook of *scientific metaphysics* defended in Ladyman and Ross (2007); indeed, my view is quite the opposite. See Chapter 7 for details.

second, its rivals are other metaphysical treatments of properties, property possession, and the problem of universals. These are old debates, even by the standards of metaphysics, and one might wonder for this reason at my impertinence in presuming to say something distinctive and *new*. Let me field three related worries here. The first is that my claim to novelty merely betrays a narrowness of *historical* focus. The second is that my claim to novelty merely betrays a narrowness of *tradition*. The third is an 'exasperated stare' objection: there has been quite enough written about the metaphysics of properties already, so dimensionism's claim to mere novelty, even if true, *underjustifies* my writing about it at such length.

My response to the first two worries is: *fair enough*. A discussion of parallels to my dimensionist proposal from other historical periods, or other philosophical traditions, would be an excellent thing to pursue in further work (indeed, one aim of this thesis is to enable such further discussions to take place). But those discussions are simply not my focus in this thesis. My aim here is to present and defend dimensionism as a novel, viable, and appealing position in the *contemporary* metaphysics of properties in the *analytic* tradition.

My response to the third worry is: *(please) read on*. I hope to show, in the course of discussion, that dimensionism's claim is not to *mere* novelty of a paper-pushing sort, consisting of small tweaks to established views. While dimensionism is by no means *isolated* in the contemporary literature, it is quite radically different from the established range of available views. My remarks above have hopefully given an indication of how things will go, on this point; we will see more of it as the thesis progresses. Moreover, I will be arguing that dimensionism is not only new and distinctive, but new and distinctive

in a *well motivated* way. Its motivation centres upon the observation that reality exhibits a *respect structure*: the property structure of the world appears to be arrayed in a certain distinctive way that demands explanation. Among the central features of respect structure is the appearance that properties - determinate properties - admit of grouping into *exclusion classes*, such as the classes of (co-specific) *colours*, or *masses*, or *colours*, or *shapes*.

Respect structure has standardly been discussed in terms of Johnson's (1921, Ch.11) notions of *determinable* and *determinate*,[2] and it has been widely assumed that respect structures can be accounted for in terms of a prior account of property structure. These assumptions - that respect structure can be made tractable in terms of determinable-determinate structure, and that property structure is explanatorily prior to respect structure - are core components of what might plausibly be labelled the *standard paradigm* concerning respect structure. What makes dimensionism distinctive is, to a large degree, the way in which it turns this standard paradigm on its head. What makes its distinctiveness well-motivated is that - as I will be arguing - it is *right* to do so.

The contributions that this thesis aims to make may be grouped into three kinds: ontological, metaphysical, and metametaphysical. The ontological component of my thesis centres on the clarification and defence of the dimensionist ontological scheme itself. The metaphysical component - which takes up the bulk of my discussion, insofar as the three components can be considered separately - centres on the *application* of that ontological scheme. In particular, I will focus in detail on dimensionist metaphysical treatments of determinable-determinate structures, the problem of universals, instantiation and

[2] The notions of *determinable* and *determinate* are discussed in detail in Chapter 2. It is normal to introduce the distinction by means of examples: *red* is determinate relative to *colour*, and determinable relative to *crimson*.

predication structures, nomic governance, and property possession: I aim to recommend dimensionism over its rivals in each case.

The metametaphysical component of the thesis will be exhibited in *use* throughout most of my discussion, and will be laid out explicitly in the final chapter. It comprises a systematic framework for understanding the nature, ends, and means of ontological and metaphysical enquiry, which will provide the setting for my discussion throughout this thesis. That framework is, at bottom, one which treats metaphysics as a project of *realist* enquiry into the *structures* and *ontological forms* that reality has and contains. The notions of *structure* and *form* that I have in mind here are drawn, respectively, from the work of Ted Sider and Jonathan Lowe. I will say more about how these notions are related as the thesis progresses. The central link is that I view the Lowean notion of ontological form as a *local* correlate of the Siderean notion of structure, standing to it as *essence* stands to *necessity:* an entity's ontological form is its contribution to the structure of the world. The overall framework that I defend will combine these Lowean and Siderean components with certain resources drawn from Hasok Chang's pragmatically motivated account of scientific practice and progress. The resulting view will, however, be unambiguously realist in its commitments.

Before providing a chapter overview, let me make two general points about the coming discussions.

The first concerns my choice of examples. I have used a range of examples, some of which - such as *mass* and *charge* - are plausibly fundamental, from a physical point of view, while others - such as *colour* - are not. Not much is intended to hang on this: the proposed

structures are structures that obtain - I claim - across various strata of physical scale and fundamentality. Nevertheless, one might think that more physically fundamental examples, such as an electron and its charge, are in some sense *more genuine* examples than mid-sized cases such as an apple and its colour, a minim and its timbre, or a shoe and its smell. The problem here seems to be a general one, that befalls various ontologies of properties in the same way: it is, in Lewisian terms, the question of *naturalness*. While acknowledging this as an issue requiring some treatment on a final analysis, I will set it aside for the purposes of this thesis. This is because I suspect that the Lewisian question of naturalness presents a general choice point for any ontological theory, and consequently, that the core proposals of dimensionism can be set out and discussed without working some particular treatment of Lewisian naturalness through my whole discussion.[3]

The second general point concerns a pair of notions: that of a *feature*, and that of a *conferral ontology*. Consider Lowe's (2012a) claim that his neo-Aristotelian ontology is neither a *constitutent* ontology, nor a *relational* ontology. The claim amounts to this: modes, in Lowe's ontology, are not to be understood as qualitative *constituents* of objects that confer qualities upon the objects that they characterise. They should not, either, be understood as entities *related* to objects in such a way as to confer qualities upon them. To understand Lowe's modes aright, we must reject the idea that objects are quality-less entities - bare particulars - that need ways of being conferred upon them. Modes do not *confer* ways of being upon objects, either as constituents or as relata: they simply *are* those ways.

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[3] If anything, dimensionism stands especially *well* here, since it can avail itself of explanatory resources connected with the idea, central to the discussion of Funkhouser (2006, 2014), that certain dimensions may *vary along* others.

One way to articulate Lowe's view here is as a rejection of *conferral ontologies* in relation to the feature of *quality*. To reject a conferral ontology concerning some feature of reality is to reject the idea that reality contains entities that are bereft of that feature, and in need of further entities to confer the relevant feature upon them. Bradley's regress illustrates this point - or at least a component of it - in relation to universals and particulars: if an external relation of *instantiation* is supposed to explain how universals confer qualities upon particulars, then it simply is not up to the job. But the point goes beyond the explanatory failure of external relations: as I argue in Chapter 6, the very notion of conferral at play in such cases is obscure.

The rejection of conferral ontologies may extend to features other than quality. (I am not claiming, necessarily, that we should reject conferral ontologies in general, but only that it is useful to be clear about those features about which we *do* reject such ontologies). One example is Mumford's (2004, 2005) rejection of conferral ontologies of *animation*[4] or *change*. I will be joining Mumford in this rejection in Chapter 5.[5] Throughout this thesis, I will treat *quality* and *animation* as two features about which we should reject conferral ontologies, of both relational and constituent sorts.[6]

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[4] I am using this term in Mumford's sense: no connotation of *animism* is intended.

[5] The rejection of conferral for animation leaves room for me to hold, as I will argue, that animation - which is an unconferred feature - is nonetheless *governed* by laws, or by something similar to laws.

[6] I thus differ from Lowe over the explanation of *qualitative change*. On Lowe's view (see his 2006), such change is explained in terms of changes in the existence and nonexistence of modes. On my view, it is explained directly in terms of changes in what I am calling relationships of determination-somehow. I am not claiming here, however, that Lowe's conferral account of change (that the existence of different modes at different times confers qualitative change upon objects) is incoherent.

It remains to offer a map of the rest of this thesis. Introduction and Conclusion aside, my discussion will be split into seven chapters. These seven chapters admit of the following natural grouping: Chapter 1, Chapters 2-6, and Chapter 7. Chapter 1 is concerned primarily with *exposition*: it supplies and defends an overview of dimensionism. Chapter 7 is concerned primarily with a presentation and defence of the aforementioned *metametaphysical* framework. Chapters 2 to 6 discuss the *application* of dimensionism to a selection of metaphysical topics: determinables and determinates (Chapter 2), the problem of universals (Chapter 3), instantiation and predication (Chapter 4), nomic governance (Chapter 5), and property possession (Chapter 6). In more detail:

Chapter 1 provides a full picture, in overview, of the core dimensionist ontology. I will clarify my conceptions of the categories of *objects* and *dimensions*, and I will introduce and discuss my claim that the *determination* relationship has a *factored* structure (a further discussion of this theme will appear in Chapter 5, and elsewhere). I will discuss how dimensionism deals with *categorial uniqueness*, and the role that *determination profiles* play in the ontology. Finally, I will indicate the role that *Platonism* will play in my dimensionist proposal, in connection with the account of governance to be given in Chapter 5. With this exposition in place, Chapter 1 closes by considering some motivations for each of dimensionism's fundamental categories: I consider some general motivations for the category of *objects*, and three lines of argument for *dimensions* drawn from considerations about *respect structure*, *chance*, and the *principle of single value.*

Chapter 2 begins my survey of dimensionism's applications, by discussing its application to *determinable-determinate structure*. I will argue that dimensionism offers the best metaphysical account of determinable-determinate structure. In the process, I will briefly

argue that dimensionism is not too far from the background metaphysical view that Johnson himself held when he introduced the distinction between determinable and determinate adjectives in his (1921). The account that I give, if true, will overturn several widespread (if not universal) assumptions in the literature on determinables. It will turn out, for example, that determinable-determinate hierarchies are not *ontologically uniform*, and that determinables - at least *maximal* determinables - are ontologically prior to their associated determinates.

Chapter 3 supplies a dimensionist treatment of the *problem of universals*. The claim of Chapter 2, that determinable-determinate hierarchies are ontologically disunified, generates some complications for the task of *lining up* my dimensionist ontology with familiar ways of setting up the problem of univerals. Naturally, Chapter 3 opens by discussing these issues. I then present my account of universals. The core of the proposal is an abstraction principle **PA** - for *property abstraction* - fashioned after Frege's abstraction principle for the introduction of number. Roughly and informally, the principle says that two objects have the same property in some respect just in case they perfectly resemble in that respect. The principle is offered as the basis for a nominalist treatment of determinate properties, as either nonexistent or derivative. I discuss the proper formulation and interpretation of **PA**, and show that the Julius Caesar problem, which (arguably) troubled Frege's use of Hume's Principle, does not trouble my use of **PA**. The principle **PA** is intended to account for *maximal determinate* properties; Chapter 3 closes by sketching a way to extend the principle to account for *mid-level* determinates.

Chapter 4 focuses on *instantiation structure*. I argue that instantiation structures (and indeed, predication structures too) are ternary, *determination* structures. Dimensionism's

main rival in Chapter 4 will be *factalism*[7] - various ontologies that treat *facts* as ontologically fundamental. Accordingly, the chapter begins with a thematic survey of factalist ontologies, before proposing a general way to characterise factalism, understood as addressing instantiation structure as a focal *explanandum*. I then argue that, since instantiation has a *ternary* rather than *binary* structure, dimensionism should be preferred over factalism. Nevertheless, I argue, dimensionism can and ought to *preserve* several aspects of the factalist proposal - such as the rejection of a property-conferring conception of instantiation. I end by suggesting that dimensionism can be seen as the best expression of what factalism is aiming for.

Chapter 5 details a dimensionist account of *nomic governance*. (To be clear, this is not a chapter about *laws*, but a chapter about *governance* in which the account of governance that I defend happens to be structurally similar to some familiar accounts of laws. I am, therefore, using 'nomic' to mean governance that is *lawlike* rather than governance *by laws*.) The chapter begins with a discussion and defence of my claim - which forms the basis of my account of governance - that determination relationships have a factored structure. I then present an account of governance by focusing on the challenge of Mumford's (2004, 2005) 'Central Dilemma'. I discuss the two horns of Mumford's dilemma, in relation to Armstrong's (1983) and Lowe's (2002, 2006, 2013) accounts of laws, and argue that in both cases, it is the *principle of instantiation* that gives the Central Dilemma its bite. In light of this, I argue that dimensionism can give an account of governance that denies the principle of instantiation, and steers between the horns of Mumford's dilemma.

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[7] Throughout this thesis, I have used 'factalism', following Turner (2016) rather than 'factualism'. But my use of 'factalism' is intended to be general: I do not mean, by it, to single out Turner's view from other fact ontologies.

Chapter 6 rounds up my discussion of dimensionism's applications by considering *rival accounts of property possession*. The emphasis here will be more on what Campbell (1990) has called the *A-question,* rather than the *B-question* that is the focus of Chapter 3 (the relationship between the two questions is discussed in Chapter 3). My focus in Chapter 6 will be comparative: I argue that dimensionism should be preferred over, or at least fares no worse than, a range of rival accounts: resemblance nominalism, trope theories, neo-Aristotelian modes, universals, and Cowling's recent (2014) proposal, locationism. My aim here, in the available space, will not be to *establish* any of the conclusions that I push for, but rather, to show how they might be argued for at greater length.

Chapter 7 steps back from the task of expounding and applying the proposed dimensionist ontology. I focus, instead, on the *metametaphysical* framework - by which I mean the conception of the nature, ends, and means of metaphysical enquiry - that provides the setting for the discussions of Chapters 1 to 6. My focus in Chapter 7 will be constructive. I will not aim to engage thoroughly with the main positions in the contemporary metametaphysical debate: that is something that I hope to pursue another time. Instead, I focus on presenting the outlook that informs my discussion in this thesis. The outlook that I will defend - which I term *immersive realism* - brings together resources from the work of Ted Sider (2012), Jonathan Lowe (2006, 2008a, 2008b, 2012b), and Hasok Chang (various). The proposed position will draw on pragmatically motivated resources, but will remain entirely realist in its commitments.

I hope that these chapter summaries provide some sense of where the thesis will be going from here. Each chapter will, in addition, begin with a brief paragraph of orientation to further clarify the point that has been reached in the overall line of argument.

Chapter 1 - Dimensionism

0. Intro

The present chapter introduces *dimensionism*, the ontological theory at the centre of this thesis. My discussion is set out in three stages. First, I will introduce the centrepiece of the ontology - the category of *dimensions* - and provide an intuitive grasp of the idea. Second, I will outline the ontology, dimensionism, in which that category will be set. Third, I discuss and defend the theory's conceptions of its two fundamental categories - *objects* and *dimensions* - in more detail.

Section 1 introduces the notion of a dimension as a *respect of comparability*. Section 2 outlines the dimensionist ontological scheme. I will discuss the core ontology (2.1), ontological form (2.2), determination (2.3), categorial uniqueness (2.4), determination profiles (2.5), and Platonism (2.6). Section 3 offers supporting arguments for my proposed conceptions of objects (3.1) and dimensions (3.2).

A point of clarification before we begin. Throughout the thesis, I will assume a broadly Lowean understanding of terms like 'category', 'fundamental category', 'formal relationship', and 'ontological form'. I will assume an understanding of terms like 'structure', 'fundamental structure', and 'joints of reality' that is primarily Siderean. I will also talk about *explanatory* relationships between ontology and structure. Since my focus is on the *use* of these notions, I will exposit them only to the extent that the context demands. Nevertheless, this raises a question: how do these Lowean, Siderean, and explanatory themes combine with each other into a single, integrated (meta)metaphysical picture? This question will be taken up in detail in Chapter 7, where I offer an account of the ends and means of metaphysical enquiry that I call *immersive realism*.

1. Dimensions: The Pre-Theoretical Idea

The most distinctive element of dimensionism is the fundamental category of *dimensions*. The term 'dimension' is chosen for its relative lack of misleading connotations, though the *idea* for which it is chosen could equally have been put in terms of *respects*. Indeed, I will sometimes use these terms interchangeably, though I will keep 'dimension', rather than 'respect', as my preferred term.

One can get an initial handle on what dimensions are, by considering the category of *modes* in the four-category ontology of Jonathan Lowe (2006).[8] On Lowe's ontology, modes are a fundamental category of non-substantial particulars: they are *non-universal properties* that characterise objects. They are, to use another expression, *ways of being*. In particular, since Lowe's neo-Aristotelian ontology is neither 'relational' nor 'constituent' (Lowe 2012a), modes are not entities that *confer* upon objects their ways of being, either by being *constituents* of, or by being appropriately *related* to, the objects whose modes they are. Modes do not confer ways of being; rather, they simply *are* those ways of being, conceived as particulars rather than universals.

Sticking with this Lowean talk of 'ways', we may say that for an object to have a property is for it to be characterised by a mode: it is for the object *to be some way*. Being blue, being round, and being a gram in mass are all ways that an object might be.

Now it seems plausible, on a first pass, to say that each way of being is a way of being *in some respect*. Thus, to be blue is to be a certain way *in respect of colour*, to be round is to

[8] The priority here is expository and *heuristic*, not metaphysical.

be a certain way *in respect of shape*, and to be a gram in mass is to be a certain way *in respect of mass*. We may say, then, that *colour*, *shape*, and *mass* are the respects *in which* things are their ways - blue, round, and a gram, respectively.

Respects can be respects of sameness: two things may be blue, and thus the same in respect of colour. But they may also be respects of difference: a blue thing and a red thing are *different ways in the same respect*, namely colour. Indeed, things could hardly be different ways in *different* respects: it is the sameness of shared respects that makes things comparable at all. We may therefore talk of respects as *respects of comparability.*

To say that these things are real features of the world - that ways of being are ways of being in certain respects, and that comparability presupposes sameness of respect - is to say, in a broadly realist way, that the world has a *respect structure*. It is, in Sider's terms, to be a realist about a certain manner in which ways of being *go together.* Moreover, while the world's respect structure is closely tied to its *quality structure*, the two are not the same: respects are not themselves ways of being, but are, rather, respects *in which* things are ways.

This way of talking of respects differs from the merely *relativising* sense in which the expression 'in respect of' is sometimes used. Thus, two interpretations of a concerto may be similar *in respect of the cadenza*. These are not the respects that I mean: there is no ontologically significant sense in which a cadenza is *the respect in which* two interpretations are similar. More importantly, there is no sense in saying, if two interpretations of a concerto are similar in respect of the cadenza, and two pianists are similar in respect of their left hands, that there is something - *being a respect* - that

cadenzas and left hands have in common. To say that two interpretations are similar in respect of the cadenza is just to say that they have *parts* that are similar. Yet these parts must *themselves* be similar in certain respects. Provided these further respects are not parts again (the first four bars; the recap of the first subject, etc.), we will *here* be dealing with respects in my sense (tempo, dynamics, and so on).

This relativising use of 'in respect of' is also present in metaphysics. One instance is Rodriguez-Pereyra's principle **D** in his account of degrees of resemblance (see Chapter 6 for discussion). In that context, for two objects to resemble in a respect is just for them to have some specific property in common (in Rodriguez-Pereyra's ontology: for them to belong to an appropriate resemblance class). Again, these are not respects in my sense. To avoid these confusions, I will typically use the term 'dimension' rather than 'respect'.[9]

Dimensions, then, are respects. Throughout this thesis, I will use 'dimension' as an ontological term of art, and 'respect' as a *non-fundamental* surrogate.[10] I follow Lowe in pushing an ontology that is neither relational, nor constituent. Dimensions are not entities that *confer* respects upon objects, or upon their ways of being, either by relation or by constituenthood. Rather, they simply *are* the respects in which objects are ways (whatever one's metaphysics of ways: see Chapter 3).

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[9] Two further reasons for this preference are, first, that it is hard to come up with non-awkward terminology to go *with* respect-talk, especially in respect of (!) the notion of *determination*, and second, that the notion of a dimension has certain connotations in theoretical domains - such as *dimensional analysis* - that I want to preserve.

[10] In terms that I will clarify later in the thesis: I will take 'dimension' always to designate the fundamental category that I am positing in an *explanans* role, while 'respect' will sometimes be used to designate an *explanandum* structure.

Talk of respects of ways of being might suggest a comparison with *determinable-determinate* structure. For on one common understanding, instantiating a determinate is a *way of* instantiating a determinable under which the determinate falls. Indeed, I will argue in Chapter 2 that dimensions *are* closely tied to determinables and determinates: dimensions provide the ontological basis - the *explanans* - for which the determinable-determinate distinction supplies an *explanandum*. A detailed defence of this claim can be found in the next chapter; for now, I note that dimensions cannot be straightforwardly located in a determinable-determinate scheme.

To make this vivid, consider the example of *colour*. Suppose that a certain apple is crimson. If *crimson* is a way that the apple is, then *colour* is the respect in which it is that way. Similarly, it is standardly said that if *crimson* is a determinate quality of the apple, then *colour* is a determinable – indeed, highest determinable – quality that the apple has in virtue of its being crimson. Here, standard understandings of determinables will add that there are other, *intermediate* determinable qualities that the apple may have in virtue of its being crimson – for example, its being *red*. But there is no parallel in terms of respects: it is infelicitous, at the least, to say that the apple is crimson *in respect of red(ness)*. The apple is crimson, and it is red: *crimson* and *red* are *both* ways, at varying levels of specificity, that the apple is *in respect of colour*.

Another familiar discussion suggested by my notion of a dimension is Eric Funkhouser's treatment of determinables (2006) and the structure of kinds (2014). In both cases, Funkhouser's account makes crucial use of the notion of a *dimension of variation*. Funkhouser's core example of this idea is colour. *Colour* is a determinable - indeed, a highest determinable - under which a range of determinate colours are subsumed. What

grounds their subsumption - what makes determinate colours multiple *determinations* rather than multiple *realisations* of colour, according to Funkhouser - is that they vary along a common set of dimensions (not in my sense here, but Funkhouser's): *hue*, *saturation*, and *brightness.* As Funkhouser points out (2014:26), the property space for colour can be treated as a three-dimensional space, whose dimensions are *hue*, *saturation*, and *brightness*, and in which fully determinate colours may be represented as *points*, while mid-level *colour* determinables may be represented as *proper subregions*. In this sense, *hue*, *saturation*, and *brightness* are the *dimensions of variation* of the determinable kind *colour*.[11]

Funkhouser's dimensions of variation seem very close to dimensions as I conceive them. In particular, the notion of *variation* - the relationship between *colour* and the three dimensions along which it varies - is one that transfers very easily to the ontological picture that I will propose.[12] However, Funkhouser's *ontological* picture is rather different from my own. Funkhouser's proposal is embedded in a metaphysical view that is *realist* about properties (2014:49); indeed, Funkhouser endorses realism about *super-determinate* properties (2014:73) understood as tropes. While Funkhouser holds that dimensions are mind-independent (2014:64), it is doubtful whether his trope ontology leaves room for the kind of Platonism about dimensions that I will defend (see section 2.6 in this chapter, and also Chapter 5). Moreover, while Funkhouser treats property spaces as mere theoretical constructs - a point that I will discuss below - his account puts property spaces and mere

[11] Funkhouser: "Determination dimensions are simply those essential dimensions of a kind along which instances of that kind can vary." (2014:30)

[12] On dimensionism, *variation* will be a *formal relationship* between dimensions. I take dimensionism's straightforward accommodation of this relationship to be a point in its favour. However, the majority of this thesis will be concerned with *determination*, the relationship between dimensions and objects. I will, therefore, not pursue this theme further.

predicate spaces ontologically on a par (2014:67). This suits Funkhouser's purposes - giving an account of the logical structure of kinds - just fine. But as we will see, such a notion of a property space does not have an obvious place within my dimensionist ontology. In any case, the ontology that I will defend here is developed independently from Funkhouser's view, and I will not further discuss its relation to that view, with one brief exception in Chapter 3 that I will mention presently.

That brief exception is an exception to a more general theme in this thesis: my avoidance of the notion of a *space*. The term 'dimension' might be thought to connote the notion of a *property space*, and with it, an ontology that treats metaphysical problems by means of *geometrical* notions. Such approaches are presently on the increase (see e.g. Funkhouser 2014, Cowling 2014, and Turner 2016).[13] It is a further point of appeal, for such approaches, that they fall in well with recent discussions of geometrical models of representation and thought (see e.g. Gärdenfors 2000, 2014; Zenker and Gärdenfors 2015). My proposal in this thesis *might* be seen as a contribution to this growing area of interest. However, it differs from previous work in this area, in its avoidance of an *absolute* or *substantivalist* conception of property space (see Cowling 2014:676). I do not appeal either to the mathematician's notion of a space as a set of points (in the case of a property space, this would amount to realism about determinate properties), or to Cowling's more metaphysically full-blooded notion of a quality space in which objects can *occupy points* just as they occupy the more familiar space-time points. Instead, I will take a *relational* view of property space - in so far as I say anything about that notion at all - on which 'spatial' relations are discussed in terms of resemblance (in my discussion of universals;

[13] Cowling (2014:668) also mentions Stalnaker (1979), Van Fraassen (1967), and Hawthorne and Sider (2002).

see Chapter 3), and functional constraints on resemblance (in my discussion of nomic governance; see Chapter 5). The exception to this, as I have mentioned, will be at the end of Chapter 3, where I leave room for such approaches to offer accounts of *mid-level* and *mind-dependent* determinate properties. It *may* be possible, then, to see my proposed ontology as a relational-geometric approach to the ontology of properties. For my part, however, I will avoid talking in this way.

2. Dimensionism

With the notion of a dimension in place, I turn to the wider proposed ontology, which I am terming *dimensionism.* As noted earlier, the ontology that I am advancing here is pursued from a broadly Lowean point of view. This is not to say that I share the fourfold ontological scheme favoured by Lowe (2006, 2013), but rather, that I intend to follow Lowe's general *approach* to the treatment of ontology through the adumbration of a scheme of ontological categories and formal ontological relationships. To make my exposition of dimensionism entirely perspicuous, I will divide it into six themes: (1) the categorial scheme itself, (2) the notion of ontological form, (3) the formal relationship of determination, (4) categorial uniqueness, (5) ontological categories, and (6) Platonism.

2.1 The Categories

Dimensionism is a two-category ontology.[14] I understand the notion of a category, and the notion of a fundamental category, in a Lowean way. Ontological categories are *kinds* of being, marked out by the distinctive existence and identity criteria associated with their members. Ontological categories are kinds of being, but not themselves elements of being.[15] An entity belongs to a category not in virtue of its being related to a further *thing* - a category - but rather, as a matter of its *ontological form* (I will say more about ontological form in the next subsection).

I will say that one category is *prior* to another just in case the existence and identity conditions associated with the posterior category can be *exhaustively* given in terms of entities belonging to the category that is prior. For example, suppose that a trope bundle account of objects is correct. Then an object *exists* just in case some tropes exist compresently, and some objects are *identical* just in case they are constituted by the *same* compresent tropes.[16] Thus, object existence is exhaustively accounted for in terms of trope existence, and object identity is exhaustively accounted for in terms of trope identity:[17] the category of tropes is, in our example, *prior* to the category of objects. I will say that an

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[14] 'Dimensionism' is being used here as a term for the particular ontology that I am advancing, not as a general term for *any* ontology that includes a category, or indeed even a *fundamental* category, of dimensions.

[15] I will use 'element of being', 'being', and 'entity' interchangeably in this sense.

[16] On the nuclear theory of Simons (1994a), the nuclear tropes in a compresent bundle *hang together* in a close, mutually dependent way. For illustrative purposes, we need not ask, therefore, what such a compresence relation amounts to.

[17] This is, again, an illustrative simplification: I am assuming that bundles depend rigidly on each of their member tropes, and ignoring the distinction between a nucleus and what Simons calls its 'peripheral cloud'.

ontological category is *fundamental* just in case it is a category to which no further category is prior.

Dimensionism admits the following fundamental categories: *objects* and *dimensions*. Throughout this thesis, I will treat dimensionism as an ontology that admits *only* these fundamental categories. Thus, I am advancing an ontology whose inventory of fundamental categories purports to be *complete*. That is not to say, however, that this *thesis* claims to *show* that dimensionism's inventory is complete: such a claim is, plainly, beyond its scope to demonstrate. What I will argue, instead, is that dimensionism's fundamental categories provide persuasive accounts in a range of metaphysical applications (see the thesis introduction for an overview).

Since *objects* and *properties* are fundamental categories on dimensionism, it is not possible, within my proposed ontology, to give non-circular *definitions* of objecthood and dimensionhood. However, it is possible to give non-definitional *elucidations,* or *conceptions*, of what objects and dimensions are. I have already offered such a conception in the case of dimensions. I now offer an elucidation of my conception of objects. This matters for two reasons: first, because despite its familiarity, the notion of an object - or a *substantial particular*, in Lowe's terminology - is as much a metaphysician's notion as that of a dimension, and second, because I must set up my conception of objects that makes it clear precisely *what it is about them* that will stand, in Chapter 3, as an *explanandum* in my discussion of the problem of universals.

With these purposes in mind, I will offer a conception of objects that draws upon the least controversial assumptions possible. In particular, I will give a conception of objects that

draws only upon features of reality that *any* ontological theory ought - I suggest - to admit as *explananda*. I will present my conception of objects in four steps; once all four steps are presented, I will explain how they are combined to give a conception of objects.[18]

Step 1: Consider two pre-theoretically familiar features of reality:[19] *particularity* and *quality*.[20] I do not mean *particulars* and *qualities*, understood as entities that populate the categories of an ontological theory. Rather, I mean simply those features of the world that are familiar *prior* to ontological theorising, even if they are also open to retroactive amendment in light of it: the features that stand in as the *explananda* to which the entities, particulars and qualities, relate as *explanans*. Particularity is, roughly, that *explanandum* feature of reality that enables sense to be made of asking *which* thing is F, or of saying not just that *apple is red*, but rather, that *this* apple is red.[21] Quality is, equally roughly, that general feature of reality in virtue of which sense can be made of *saying of* something that it is F, or thus-and-so. This is all compatible with a great deal of further room for error in identifying the *loci* of particularity (objects, or tropes, and so on) and the *ranges* of quality that may be ascribed to things (*self-identity*, for example, may be something that can be ascribed to things without describing, in an intuitive sense, *what they are like*). But

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[18] These steps are not intended to be detailed *arguments*. This is not to say that they could not be developed into detailed arguments. But in the present context, they simply play the role of defeasible considerations that provide the background for a conception of the category of objects.

[19] I am using 'reality' in a broad, non-theoretical sense, in the kind of manner exemplified by Hasok Chang (2012; for further discussion, see Chapter 7 in this thesis). I am using 'feature' in a similarly unsharpened sense.

[20] I am running the present discussion on the basis of just these features. However, in Chapter 5, I will take up a similar point in relation to *dispositionality* and *animation*. The present discussion, therefore, is not intended to make particularity and quality the *only* features relevant to my conception of objects.

[21] The implicit idea here - that of a feature of reality's structure enabling sense to be made of an *epistemic activity* - is taken up explicitly in Chapter 7.

underlying the very possibility of being *mistaken* in these respects is a basic (if defeasible) commitment, in the *explanandum* role, of the world's exhibited features of *particularity* and *quality.*[22]

Step 2: Consider the *way* in which the features of particularity and quality occur in relation to each other. There is, in a sense that is pre-theoretically clear but hard to make entirely precise, a *convergence* between the two: particularity and quality occur *together*, and not *apart*.[23] Again, this commitment - this appearance in the *explanandum* role - is defeasible. For example, on Cowling's (2014) locationist account of property possession, the loci of particularity (objects) are quite separate from the loci of quality (property-space points). I will argue in Chapter 6 that this feature of Cowling's view renders the locationist picture incoherent. However, the point for now is that it may be *conceivable* that particularity and quality should have separate loci in the world. Nevertheless, there appears to be *some* sense in which the two converge, where this convergence is, roughly, the feature of reality in virtue of which sense can be made of picking out some particular thing and saying *of it* that it is thus-and-so, or of picking out a feature and *placing* it just *here* rather than there (see Szekely 2015 on feature-placing). What I need here, in any case, is not that particularity and quality *always* go together, but rather, only that they *sometimes* do.[24] A certain kind of Platonist about universals, for example, might hold that the *forms* are examples of quality occurring separately from particularity, but in that case it is enough for me that particularity and quality occur together when objects *participate in* forms.

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[22] In the *explanandum* role, these features have the status of *appearances to be explained*. This is compatible with a fundamental metaphysical view on which reality consists only of say, relations without relata, or dispositions without categorical grounds.

[23] Armstrong (1978a:113) expresses a similar point: "Universals are nothing without Particulars. Particulars are nothing without universals."

[24] I will return to this point, and the commitment that I intend it to carry, in Section 3.1.

Step 3: Step 1 picked out two features of the world: particularity and quality. Step 2 noted that they occur *together*, at least sometimes. Step 3 focuses on these occasions - the portions of reality - where the two features occur together: we may say that they are *many* rather than *one*. The reason for this is a principle known sometimes as *determinate exclusion*, or - as I will call it in Chapter 7, following Hasok Chang, the principle of *single value*.[25] *Determinate exclusion* says that the very same thing cannot possess two determinates, of the same specificity, under the same determinable. *Single value* says that a single thing cannot have more than one value, of the same specificity, under the same magnitude.[26] It is, again, plausible to hold that reality at least *appears* to conform to these principles, and moreover, that things *do* in fact have multiple determinates of the same specificity under the same determinables (the world is *red* here and *blue* there), and multiple values of the same specificity under the same magnitudes (the world is *a gram* here and *three grams* there). Hence, the world is a *plurality,* whose *lower bound* is determined, at least partially, by the principles of *determinate exclusion* and *single value.*

Step 4: According to Step 3, the plurality of the world has a lower bound that is partially determined by *determinate exclusion* and *single value*. According to Step 4, the plurality of the world also has an *upper bound*. This is to say that while the world is a plurality, it does not admit of *arbitrary* or *indefinitely many* divisions into pluralities: there are *right* pluralities into which the world divides. While Step 3 was underwritten by a clear family of

[25] These are not obviously the same thing: one principle concerns determinates under a determinable, while the other concerns values of a magnitude. However, on the dimensionist ontology that I will be proposing, the category of *dimensions* supplies the ontological ground for both.

[26] I ignore the question of whether this principle holds universally.

principles (roughly - as we will see in Chapter 4 - those underwritten by *determination structures*), I will leave it *open* here precisely what principle might underwrite the upper bound of the plurality of the world. On the view that I will propose later in this chapter, it is the *dimensional profiles* under which objects fall that play this role. However, this is not to say that dimensional profiles are the *only* determiners of the required upper bound.[27] The point of Step 4 is simply that *something* determines such an upper bound.

The conception of objects that I am proposing can be outlined by combining these four steps. Let us say that Step 1 and Step 2 jointly capture the claim, as I shall put it, that at least some parts of reality are *thick:* particularity and quality occur *together*.[28] Steps 3 and 4 jointly capture the claim that reality, which is thick, is a thick *plurality*, not a thick *monolith.* Step 3 provides a lower bound for that plurality; Step 4 provides an upper bound. Objects, as I conceive them, are the *thick entities* standing between these lower and upper bounds.

This conception of objects is not a *theory* of objects. It is, rather, a rough conception of objects in the sense of being an adumbration of the notion of an object that is fitted for the kind of *iterative*, *structural* picture of metaphysical enquiry set out in Chapter 7. For this

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[27] Indeed, *ontological categories* are arguably closely tied to this role. This point is compatible with a *plurality* of conceptions of ontological categories, if not with a *pluralist* conception of *the* notion of an ontological category.

[28] I will, accordingly, say that reality is *thin* where particularity and quality occur apart - for example, in the supposed cases of *haecceities* and the aforementioned variety of Platonism, respectively. I do not intend this thick/thin distinction to be specific to the features *particularity* and *quality*. To illustrate: suppose you think that, in the terms of Chapter 5, *animation* and *dispositional profiles* are features that objects simply *have*: I will say, then, that objects are thick *with respect to those features* too. My terms ‘thick’ and ‘thin’ are, obviously, intended to echo Armstrong’s distinction between thick and thin particulars.

reason, the picture of objects offered here is *intended* to be defeasible in its details: it is deliberately open, at many points, to further development and correction. However, since the focus of this thesis - and the more distinctive feature of dimensionism - is not its category of objects but rather that of *dimensions*, I will not pursue the discussion of objects further (with the exception of the connection to Chapter 3 mentioned above).[29]

2.2 Ontological Form

A central resource that dimensionism draws upon is the notion of *ontological form*. This is a resource taken from Lowe (see e.g. his 2006, Ch.3). One way to understand the notion of ontological form is to contrast it with *content*. On this view, matters of ontological content are matters of *what there is* - of what Heidegger (1962) called the *ontic*. One might, for example, hold that the quality structure of the world is explained by the existence of *properties* - understood, say, as universals or some sort. This would be to treat quality structure as an ontic matter - a matter of ontological content. By contrast, matters of ontological *form* are matters of *how things stand* - in Heidegger's terms, rather confusingly, the *ontological*. For example, one might hold that *distinctness* is a matter of ontological form: for two things to be distinct is not a matter of the existence of some further relational *entity* - a distinctness relation between them, say.[30] To illustrate the distinction further: one might posit *haecceities* - individuating entities - if one thinks that *identity* or *whichness* is a

[29] In any case, the four steps, as presented above, are intended to be as uncontroversial as possible.

[30] In this case, there is a regress argument to show it: the distinctness relation would itself have to be distinct from its relata, and so on. A similar point applies to *instantiation* with regard to Bradley's regress.

matter of ontological content, while one might posit *formal ontological relationships* of *identity* if one thinks that it is not.[31]

While the notion of ontological form is closely related to a roughly Siderean notion of *structure* - a theme that I will take up and explore in Chapter 7 - I will take Siderean structure to be, at least potentially, a *broader* notion than that of ontological form. For ontological form is always the ontological form *of* entities, either distributively or collectively.[32] Thus, every matter of ontological form is a matter of structure, but not every matter of structure *need* - as far as the very notions of structure and form go - be a matter of ontological form.

This connection with structure suggests a further way to characterise the distinction between ontological form and content. Consider again the examples given above. Suppose, for illustration, that the world's *quality structure* is explained by - grounded in - the existence of *properties*. Let us suppose that properties in this case are tropes. Now, suppose that tropes bring with them a further feature to be explained: their relations (in a neutral sense of 'relations') of *identity*, *distinctness*, and *individuality*. We face a choice: are these further features a matter of ontological content, or of ontological form?

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[31] Formal ontological relationships - formal relationships for short - are relational features of reality that are a matter of ontological form rather than ontological content: they are relationships that obtain in virtue of the ontological forms of their relata. I will follow Lowe's convention, using 'relationship' for formal relational features of the world, and 'relation' to stand for relational *entities*.

[32] *Logical connectives* are an example of an element of Siderean structure with, plausibly, no correlate in ontological form.

One might treat them as a matter of content, and posit *further* entities - such as the aforementioned haecceities - to explain the features in question. Or one might treat those features as a matter of form, and hold that *no further entities* are needed, in addition to the entities that are *already* posited - in this case, tropes - to account for the target features.[33] To do this is to build into one's theory that the target features are not only a matter of ontological form, but specifically, a matter of the ontological form *of tropes*.

This further characterisation of the form/content distinction is meant to improve on an attempt to make the distinction simply by contrasting form as a matter of *how things are* with content as a matter of *what there is*. For such an approach fails to do justice to the fact that ontological form is the ontological form *of things,* even though it is in *some* sense not a matter of what there is. We may say, then, as a general slogan, that an object's ontological form - or rather, the ontological form of a certain *kind* of object - is *its contribution to the structure of the world*. (Likewise, the ontological form of *some things* will be *their* contribution to the structure of the world.) Ontological form, on my picture, stands as a *localised* correlate of structure, which is anchored in the natures of entities. The relationship between form and structure, on my view, is parallel to the relationship between *essence* and *necessity*.

2.3 Determination

One central application of the notion of ontological form in my proposed ontology - and a key resource of dimensionism - is the characteristic formal relationship obtaining between objects and dimensions, which I will call *determination*. I will say that objects *determine*

[33] There might, as noted, be an *argument* to the effect that no further entities could explain the target features anyway. This is so, for example, in the case of *distinctness*. But there is no guarantee that such an argument will *always* be available.

dimensions. By this, I mean simply that objects *fall under* dimensions - that they *are certain ways* in the relevant respect. Thus, to say that an object **O** determines a dimension **D** is just to say that **O** is *some way* (in a neutral sense of 'way') in respect of **D**. For an electron to determine *charge* is for it to have charge: it is for the electron to be *charged*. Similarly, for a hat to determine *colour* is just for it to be *coloured*. is The term 'determines' here is not intended to express any kind of *grounding* or *causing* on the part of objects: objects do not determine dimensions in the sense of *fixing* them or *bringing them about*. I am *not* using 'determines' in the same sense in which it is said that *the global mental facts are determined by the global physical facts*.

I will discuss determination in relation to relationships of ontological dependence in the next subsection. Here I will briefly note a feature of determination that will play a key role in much of this thesis: its *factored structure*. The core thought here is that determination is a formal relationship that is *twofold.* It has the following kind of duality: objects determine dimensions both *at all* and *somehow*. Consider, for example, a *musical note* (the example is from Wittgenstein): musical notes must have *some* pitch. That is to say, they must determine the dimension pitch *at all*. But it is not *only* to say this; it is also to say that a musical note must determine the dimension *pitch* in a particular way: it must have *pitch*, but it must also - by that token - have *some* pitch. Likewise, a material body that determines *shape* at all (by being *shaped*) must also determine shape *somehow* (by having a particular shape). I will say, then, that determination is a *factored formal relationship*, and that objects determine dimensions both *at-all* and *somehow*.

This duality of the determination relationship is a theme that will bear explanatory weight at various points in this thesis. I will discuss it in detail in Chapter 5, where I discuss the

factoring of determination relationships and apply the idea to the topic of *nomic governance*. Since factoring is discussed in detail there, I will not discuss it further presently.

One further point about factoring, however, does bear mentioning here. That is the connection between factored determination structures - in particular, the facet of determination that I am calling the relationship of determination-*somehow* - and relationships of *resemblance*. As I will discuss in section 3, while determination at-all ensures *comparability*, it does not ensure *resemblance:* objects may after all *differ*, as well as resemble, in some respect. It is thus not determination at-all, but relationships of determination *somehow*, that provide the right space for the situation of relationships of resemblance. These themes will be taken up later, in Chapters 3, 5, and 6. The message for now is this: resemblance relationships are anchored in *internal* relationships of determination-somehow.

2.4 Categorial Uniqueness

Since I am advancing an ontology in a Lowean mode, I must say something about how *categorial uniqueness* (Lowe 2006, 2011, 2013) is secured within the dimensionist scheme. It is a necessary condition on the adequacy of any system of ontological categories that it should give an account of categorial uniqueness: it should give an account of how the categories that it posits are *individuated:* of what settles *which category is which*.

An account of categorial uniqueness should secure an ontological theory against Ramseyan *permutation objections.* It should supply an articulation of the distinctions between its categories that does not allow for the categories to be *jumbled* relative to the distinction.

Ramsey's (1925) arguments against several articulations of the universal-particular distinction provide the archetype for this kind of permutation problem.[34] Take, for example, the claim that universals and particulars can be distinguished by the following difference: particulars occupy the *subject place* in an indicative sentence, while universals occupy the *predicate place*. The claim is that the distinction between a particular (say, Socrates) and a universal (say, wisdom) is expressed in the respective subject- and predicate-placements of 'Socrates' and 'wisdom' in the statement *Socrates is wise*. Here the Ramseyan objector will point out that the grammatical roles of Socrates and wisdom may be reversed, as in the statement *Wisdom is a characteristic of Socrates*. One will wish to say, if one believes in a particular/universal distinction at all, that in the second statement Socrates remains a particular, and wisdom remains a universal, despite the reversal of their subject-predicate roles. Thus: the subject-predicate distinction does *not* capture the particular-universal distinction: it does not secure categorial uniqueness for the categories *particular* and *universal*.

One might worry, in the case of dimensionism, whether my talk of *respects* is entirely adequate to secure categorial uniqueness. One might worry, for example, that my claim - that dimensions are not ways that objects are but *respects in which* objects are those ways - might be susceptible to Ramseyan permutation. Such a permuted object/dimension distinction would say that objects are not *ways* that fall under dimensions, but *respects* of those ways. Thus, to offer an example: Socrates would not be a *way* that falls under the dimension *posture* (some examples of such ways would be *sitting*, *standing*, and *lying down*), but rather, a *respect* of those ways: for Socrates to be sitting would be for *sitting* to

[34] See Lowe 2006 for a discussion of Fraser MacBride's (2004) extension of the Ramseyan strategy to Lowe's four-category ontology.

fall under *posture*, specifically, *in respect of Socrates*. As before, we might say that the determination relationship is factored: *sitting* falls under *posture* both *at all* (to be sitting is always to be postured), and *somehow* (in our case: *Socratically*). Arguably, the oddity of talking in this way only serves to underline that we *do* have a conception of the object/ dimension distinction which respect talk, *by itself*, does not adequately capture.

It will not do to fall back on the claim, here, that dimensions are the kinds of things that *can be determined*, whereas objects are not. For in the example above, the relationship of determination itself was reversed. This does not make it *untrue* that dimensions can be determined whereas objects cannot. But it does require that this statement be accounted for by locating some *further* source of asymmetry.[35]

Following Lowe, I will suggest that the right source of asymmetry is *ontological dependence*. In particular, the formal ontological relationship of determination *constitutes* a

[35] It is really asymmetry that is at issue here. One might defend certain ontological distinctions as *partitions,* where a partition can be *symmetric* in the sense that there is no reason, in principle, that stands against its being reversed. However, such distinctions would hardly be useful for ontologically explanatory purposes.

certain relationship of ontological dependence, and it is the asymmetry of this constituted dependence relationship that secures categorial uniqueness.[36]

With this preamble over, the account of categorial uniqueness itself is rather brief. On my proposed dimensionist ontology, objects are *rigidly existentially dependent* on the dimensions that they determine, while dimensions are *not* so dependent upon the objects that determine them. This view fits especially with the *Platonist* approach that I take to dimensions (as I will discuss in Section 2.6 of this chapter. The theme will reappear in Chapter 5, in my treatment of governance). However, it is compatible with an approach to dimensions that admits a principle of instantiation for them (a principle that only instantiated dimensions exist). For on such a conception of dimensions as immanent universals, one might still subscribe to the same relationship of *rigid* dependence of objects on dimensions, and a relationship of *non-rigid* dependence of dimensions upon objects.

2.5 Determination Profiles

Dimensionism, then, as I am presenting it, rests its treatment of categorial uniqueness upon a claim that objects depend rigidly on the dimensions that they determine. Underlying this

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[36] Lowe's four-category ontology secures categorial uniqueness in a similar way. One might wonder how fundamentally asymmetric formal relationships might constitute asymmetric dependence relationships, but this would be to misunderstand the claim: the dependence relationships are not asymmetrical extras *resting upon* an ontological basis of symmetric formal relationships; rather, they *articulate* those relationships insofar as they pertain to ontological dependence. This is to say that the relationship of *constitution* between the formal relationships in question (*instantiation* and *characterisation* for Lowe, and *determination* for me) and ontological dependence is not a relationship between *entities* but between components of the *ontological form* of entities. The category of an entity *partially articulates* its ontological form; likewise, the formal relationships *partially articulate* an entity's category, and dependence relationships partially articulate those transcategorial relationships. The notion of (partial) articulation here is intended to echo Lowe's (2008a, 2012b) notion of something's being *a part of the essence of an entity*, and indeed, the relationship of an entity's *real definition* to its *essence*.

claim is a theme that will run through the thesis, especially in Chapters 3, 4, and 5: the notion of a *determination profile* (or, as I will sometimes call it, a *dimensional profile*).

The idea is a familiar one from Wittgenstein, Johnson, Prior, and Sommers, and is related to Magidor's treatment of the infelicity of category mistakes. In each case, the point is put differently. Here is Wittgenstein, who draws on the notion of a *space* (1921/1974:7):

2.013 Each thing is, as it were, in a space of possible states of affairs. This space I can imagine empty, but I cannot imagine the thing without the space.

2.0131 A spatial object must be situated in infinite space. (A spatial point is an argument-place.)

A speck in the visual field, though it need not be red, must have some colour; it is, so to speak, surrounded by colour-space. Notes must have *some* pitch, objects of the sense of touch *some* degree of hardness, and so on.

What Wittgenstein puts in terms of spaces, Johnson (1921) puts in terms of *determinables*: a substantive is associated with a set of (highest) determinables that are present with it *from the start*; predication does not involve the *attachment* of an adjective to a substantive, but rather, the *sharpening* of a determinable, that is *already present* with the substantive, to a determinate value. The idea is taken up by Prior (1949), who, in his commentary on Johnson, offers it explicitly as an explication of the notion of a *category*. Similarly, Sommers (1963) offers essentially the same account of the difference between ontological types and mere ordinary classes, though Sommers' preferred tool is his notion of a

spanning predicate.[37] More recently, Magidor (2013) has offered a similar proposal in terms of *presuppositions*.[38]

The common element that is differently put across these accounts is the thought that for a given object, there is a range of predicates that the object stands to receive *truly or falsely*. In terms more explicitly ontological than logical, this is the thought that for a given object, there is a range of ways that that object stands to *either be or not be* in virtue of the kind of object that it is. Moreover, these are ways that the object stands *not to be* in a specific way. Consider, for example, a ripe tomato and the number three. Neither the tomato, nor the number, is green: green is a way that they both are not. But the tomato differs from the number in not-being-green *by being some other colour* - that is, *by being another way in the same respect*. By contrast, the number is not green because it is *no* way in respect of colour *at all*. I will call the set of respects (that is, dimensions) with which an object is related in this way - in such a way that though it needn't be some *specific* way in that respect, it must be *some* way - the *determination profile* (or *dimensional profile*) of the object.

I am not proposing that determination profiles stand in for *ontological categories*: if anything, that role is already taken up, on the Lowean view that I am following, by

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[37] Roughly, if F is an ordinary predicate, then the predicate |F| applies to an object *a* just in case either F*a* is true or ~F*a* is true. Sommers identifies categories - ontological types - with classes of objects *spanned* by predicates like |F| - that is, objects to which either F(*x*) or ~F(*x*) is applicable.

[38] Note, however, that the context of Magidor's proposal is quite different: she is not out to give an account of ontological categories, but to explain the *infelicity of category mistakes*. Nonetheless, her account of that phenomenon - roughly, that in category-mistake cases the introduction of a subject (say, Mozart) fails to raise a certain *presupposition* (that the category-mistaken predicate - 'is divisible by 2', for example - *applies either truly or falsely* to the subject) - bears an obvious resemblance to the views of Wittgenstein, Johnson, Prior, and Sommers.

existence and identity criteria, and buttressed by dependence relationships in the way already discussed. In truth, I am not keen on the idea that the notion of an ontological category should be rigidly demarcated: I think that there are various ways in which entities may be categorised that are ontologically perspicuous and explanatorily fruitful, and that it is to the underlying *bases* of these categories - what Peter Simons (2005/2014) has called ontological *factors* - that the question of demarcation properly applies.[39] What I am proposing, rather, is simply that determination profiles are one such factor: they are one basis for categorising entities in an ontologically perspicuous way. In particular, I am proposing that it is the determination profiles of objects that supply the *upper bound* described at what I called Step 4 in Section 2.1 above: to carve the plurality of the world up beyond this upper bound would be to cut *across* the dimensional profiles that objects have.

With this in mind, a further clarification is necessary regarding my notion of an object. I have not said anything, in my discussion of objects, about what the determination profiles of actual objects might be. If they are single dimensions, then my conception of objects will yield entities that are very much like regular *tropes*. If they are sets of dimensions that are internally mutually necessitating in a certain way, then it will yield objects that are very much like *nuclear bundles* on the trope theory proposed by Simons (1994a), though such objects will differ from Simons' nuclei in not being *bundles* of more basic entities. Throughout the thesis, I will assume that the dimensional profiles of objects are not merely single dimensions (this will be an important point in Chapters 4 and 6).

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[39] I therefore disagree with Westerhoff (2005), who holds that one may properly ask what demarcates ontological *categories* from ordinary ones. In other work, I have argued that this assumption on Westerhoff's part puts the approaches to categories that he discusses - based on generality, substitutability, and identity criteria - into a spurious mutual competition, when they are properly understood *in combination*.

2.6 Platonism

I said in Section 2.4 that objects depend rigidly on the dimensions that they determine. I also said that dimensions do *not* depend for their existence upon objects. I am, thus, adopting a broadly Platonist conception of dimensions. By 'Platonism' here I mean no more than the denial of a parallel of the principle of instantiation: it is *not* the case that only determined dimensions exist.[40]

I have no knock-down argument against a conception of dimensions that does accept a principle of instantiation (that is, determination). Such a view would leave my treatment of categorial uniqueness intact, since determination would remain an asymmetric relationship: dimensions would depend *non-rigidly* on the objects that determine them. Thus, an Aristotelian conception of dimensions is something that I will presently reject, but not *rule out*: I will simply leave the possibility of developing such a view open, for further work.

My *grounds* for Platonism will become apparent in Chapter 5, where I argue that dimensionism can offer a cogent account of (nomic) governance. There, the denial of a principle of instantiation is crucial to my account; moreover, it is the principle of instantiation that generates problems for other, similar accounts of laws (such as those of Armstrong and Lowe). If Platonism is denied, then my proposed account of governance will not work.[41] This does not entail that Platonism is *true*, but it does mean that an

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[40] Thus, in particular, my kind of Platonism does not entail that dimensions are *necessary* beings. A theist is quite free, for example, to hold that they are contingent, or at least dependent - only not dependent upon *objects that determine them*, but as (say) *divine ideas*. I will not pursue these themes further in this thesis.

[41] The argument is similar to that of Tugby (2016).

Aristotelian conception of dimensions incurs a cost that a Platonic conception does not; for this reason, it is a Platonic conception that I have chosen to pursue and develop.[42] [43]

Note, however, that my Platonism about dimensions is not as *extravagant* as it could be. For one thing, to deny that dimensions depend on their determiners is not to assert that *every* dimension that is merely *conceivable* actually exists. For example, one might think that *conatus* is a *conceivable* dimension - in the sense of being one that we can imagine to exist - but not one that is *actual:* dimensions are Platonic, not *abundant*. Moreover, Platonism about dimensions does not carry commitment to Platonism about *determinate universals*; indeed, we will see in later chapters that it allows us to do away with fundamental determinate properties altogether. Dimensionist Platonism, then, lacks the sheer *numerical* extravagance that more familiar Platonic conceptions of determinate universals arguably exhibit.

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[42] Ingram (2016a, 2016b) has recently defended a view - 'thisness presentism' - on which haecceities are thisness-universals that depend for their existence on their instantiation *at some time present or past*, but which *continue* to exist after their bearers have ceased to exist themselves. If such a view works at all, then one might, speculatively, wonder whether it might supply an Aristotelian surrogate for Platonic explanatory resources. I express some brief doubts about this strategy in Chapter 5, and will not develop the point further.

[43] Here is a further, tentative argument for Platonism. On my view, dimensions are respects of *difference* as well as respects of resemblance. Suppose that a principle of instantiation is true: dimensions exist only if they are determined. Suppose that one object, **O**, exists and determines a dimension **D**. **O** will determine **D** both at-all and somehow. But there will be a range of other ways - differing from the way in which **O** determines **D** - in which **D** may be determined ('somehow'). In my view, this range is fixed by **D** itself. But whatever fixes the range in question, it seems that **O**'s determination of **D** cannot *explain* it. However, it is not clear then why **D** *should* depend upon **O** in the first place.

3. Some Motivations for Objects and Dimensions

Our overview of my proposed dimensionist ontology is now complete. The rest of this chapter will present some motivations for that ontology. Section 3.1 will briefly offer some further clarification or the motivation for my conception of objects. Section 3.2 will present three arguments in support of dimensions. My arguments here are brief. They are not intended to establish that dimensionism is correct, but rather, to get the dimensionist proposal onto the table.

3.1 Why Objects?

One way to oppose an ontology of objects is by supporting an ontology of something else. Two candidate alternatives are *facts* and *tropes*. Dimensionism's rivalry with these alternatives will be taken up later in the thesis, in Chapters 4 and 6 respectively. Here I will limit myself to two brief points that aim to clarify the motivation for my preferred conception of objects.

First, my conception of objects as qualitatively thick particulars obviously has much in common with Armstrong's notion of a *thick particular.* Indeed, my terminology is intended to reflect this. One central part of what it means to understand objects as thick is a rejection of the idea that objects are, in some default way, *quality-less*: it is to deny that objects are *bare particulars*. More precisely, in the framework adumbrated in Chapter 7, it is to claim that bare particulars do not occupy any fundamental *explanans* role in proper metaphysical theorising. The reason for this - as I have indicated in the Introduction, and will take up in Chapter 6 - is that I find *conferral ontologies* of quality to be problematic: it is unclear how bare particulars could ever have qualities conferred upon them by other entities, either as

relata of quality-conferring relations, or as quality-conferring constituents. Since this discussion is taken up elsewhere in the thesis, I will not enter into it here.

I am, then, making a stronger commitment here than I made in Section 2.1 when I introduced my conception of objects. There, I said that particularity and quality occurred together *sometimes*, and that such *thick* portions of reality were the target of my conception of objects. Here, my defence of that conception of objects commits me to a stronger claim, that the thick portions of reality - those at which quality and particularity occur together rather than apart - are *ontologically prior* to the thin ones.[44] My conception of objects is thus similar to that of Rodriguez-Pereyra in his exposition of resemblance nominalism.[45]

A second point in favour of my conception of objects is that the fourfold conception offered in Section 2.1 is intended to be fairly uncontroversial. I have taken care to appeal only to principles that should be acceptable from the widest possible range of points of view. The idea here is to ensure that my conception of objects is *no more controversial*, as far as possible, than the claimed priority of qualitatively thick reality over qualitatively thin reality renders it. I concede that this is hardly a full *argument* for objects as I conceive them. However, it is a conception of objects that is shared by others in the debate (such as

[44] This should not conflict with my claim that *dimensions* are a fundamental category of being. For dimensions, as I conceive them, are not qualities - they are not ways of being, but respects of ways of being.

[45] But my solution to the problem of universals is not as close to his as one might think: see Chapters 3 and 6 for details.

Rodriguez-Pereyra), and moreover, it is not the most distinctive, focal feature of a dimensionist ontology.[46]

3.2 Why Dimensions?

The notion of a dimension is, unsurprisingly, dimensionism's most distinctive feature. What reasons are there to believe in dimensions? It will be a central task of the rest of this thesis to supply answers to this question.[47] My case for dimensions will centre around eight arguments. Of these, five will be take up in detail in the coming chapters. I will argue that dimensionism does good explanatory work in relation to determinables and determinates (Chapter 2), the problem of universals (Chapter 3), instantiation and predication structure (Chapter 4), and nomic governance (Chapter 5), and that it compares well against rival ontologies of property possession (Chapter 6).

The remaining three lines of argument are taken up, more briefly, here. In Section 3.2.1, I argue that dimensions make provide the best grounds of *respect structure*. Section 3.2.2 argues that dimensions stand to explain certain phenomena relating to potentialities and chance. Finally, Section 3.2.3 briefly notes that dimensions are the most reasonable ground for what Hasok Chang has called the *principle of single value*. The argument in Section 3.2.1 will be presented at some length; the remaining arguments will be presented more summarily.

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[46] Some, such as Dasgupta (2009, 2017) and various adherents of 'ontic structural realism', would of course reject objects as I have presented them here. Since my focus in this thesis is on the distinctive category of *dimensions*, it is simply beyond the scope of my discussion to engage in detail with those views. See Sider (forthcoming, Chapter 4) for a discussion of such views.

[47] I will not draw a strict line between reasons for believing specifically in *dimensions*, and reasons for believing in *dimensionism* as I am presenting it. My intention is to advance the whole ontology, with the defence the category of dimensions itself being merely a fallback position.

The arguments in this section are not intended to *establish* that there are dimensions, or to be a full and detailed defence of dimensionism. This is, as much as anything, due to constraints on space - but it is also because some of the arguments are closely related to themes that will be discussed in detail in later chapters. The arguments of this section, then, are intended instead as *plausibility arguments* to show why dimensionism might be an appealing view.[48]

3.2.1 Respect Structure

The first line of argument that I will consider is drawn from *respect structure*. I will present this discussion in three parts. First, I claim that respect structure belongs properly in an *explanandum* role. Second, I offer a kind of one-over-many argument for dimensions in the corresponding *explanans* role. Third, I consider five rival *explanans* proposals for respect structure - exclusion, resemblance, partial identity, second-order properties, and subsets of powers - and briefly argue that they fail.

I have claimed that respect structure is an appearance that any ontological theory ought to explain and preserve. One way to elucidate the notion of respect structure is to consider the groupings of ways of being to which they correspond. Consider the following ways of being: *red, square, round, blue, triangular, green.* We should wish to say that these properties *go together* in a certain way: *red, blue,* and *green* on the one hand, and *square, round,* and *triangular* on the other. Ways of being admit of grouping into respects - in this

[48] In Chapter 7, I will tie all these arguments together by setting out an iterative, coherentist framework for justification.

case *colour* and *shape* - and this appearance perseveres whatever one thinks is the *grounds* of their being so grouped.

We may say, further, that objects that *are* various ways within a respect grouping have something in common - the respect in question - and moreover, that they may both *resemble* and *differ* in that respect. Furthermore, ways of being, *at the same level of specificity* within a respect grouping, *exclude* each other: something that is thus-and-so in a given respect cannot also be so-and-thus in the same respect.[49] Finally, we may add - to anticipate a point in the discussion of Chapter 2 - that ways of being specify their respects *non-conjunctively.* Consider the property *red* and the respect *colour*, for example: the point is that to be red is not simply to be coloured *and* to possess some further property.[50]

How is such respect structure to be explained? I say it is grounded in the existence of *dimensions*, which simply *are* respects of resemblance and difference. Dimensions explain the respect groupings of ways of being: as I will discuss in Chapter 3, determinate

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[49] These points are taken from Armstrong's (1978b:116) characterisation of the distinctive features of *determinable-determinate* structure, rather than respect structure in my sense. However, I will argue in Chapter 2 that dimensionism offers the best ontological ground of determinable-determinate structure. Armstrong also mentions a further point: determinates under a determinable admit of *resemblance orderings* - for example, *red* is more similar to *orange* than either is to *blue* - whose limit is perfect resemblance or *identity*. I will postpone further discussion of this point until the end of Chapter 3, where I sketch one way in which dimensionism may treat it. However, these resemblance orderings will not be a central concern in the thesis.

[50] This last point comes with an argument. Suppose that *red* and *blue* are mere conjunctive specifications of *colour*. Let us suppose that *red* is the conjunction (colour & F), while *blue* is the conjunction (colour & G). Then there is no explanation in sight, of why a thing's being red should *exclude* its being blue. It will not do to build exclusion in 'by hand', by identifying *red* with say, (colour & F & ~G) and *blue* with (colour & G & ~F) - I omit internal brackets for convenience - or to simply fall back on brute exclusion relationships between F and G: neither strategy promises any explanatory gain.

properties are derivative entities whose basis involves the resemblance of objects under the respects that they determine. Dimensions are something that objects can have in common: red things, blue things, and green things all determine the dimension *colour* in different ways. Dimensions also explain determinate exclusion: for an object to possess different determinates at the same level of specificity under some determinable would be for it to *differ from itself* in the particular way that it determines that dimension, as I am saying, 'somehow'. Finally, the factoring of determination relationships accounts for non-conjunctive specification: determination is a single *factored* relationship, not a *pair* of relationships of the *same* nature (such as a pair of instantiation relationships).

Armstrong has argued that determinables cannot be properties that are common to their determinates (or the bearers of their determinates), since "it is impossible that things be identical and different in the very same respect" (1978b:117). It is telling, here, that Armstrong's example is *red*: a crimson thing and a scarlet thing differ precisely in respect of redness, and so redness cannot be a property that they have in common: it cannot be that they instantiate the very *same* universal, redness.

Two points should be made about Armstrong's argument. First, it is precisely *respects* under which it *is* possible for objects both to resemble and differ - at least, in my sense of 'respect'. If Armstrong is using 'respect' in the merely relativising sense mentioned in Section 1, then his conclusion is no surprise: complications of context and vagueness aside, it is indeed impossible that two objects should both agree and differ in whether they are red. But this is not *my* sense of 'respect'. Yet - secondly - Armstrong may not quite have intended the point this way. He may have meant, instead, that redness is not something that two objects can have in common precisely by instantiating *different* colour universals, say,

crimson and scarlet. In this case, however, the fault is with Armstrong's example: *red* is a *determinable way of being* - a way of being, albeit of a determinable, non-specific sort - but not a *respect of ways of being*. It is precisely in these *respects* that objects can both resemble - by being the same determinable ways - and differ, by being different determinate ways.[51]

We may see, then, that dimensions - respects of resemblance and difference - are a kind of one-over-many. However, unlike the more familiar kind of one-over-many, *universals*, dimensions are tied as much with *difference* as *resemblance*. Indeed, Johnson (1921; see Prior 1949 and Armstrong 1978b:112) appears, on one reading, to take respect groupings (classes of co-specific determinates under a determinable) to *be* groupings of mutually excluding properties.[52] So dimensions are not the kind of one-over-many that can be straightforwardly accounted for in terms of direct relationships of resemblance between objects. This makes dimensions a different kind of one-over-many from universals. While I will argue in Chapter 3 that ordinary universals are indeed best accounted for in terms of resemblance between objects, I will therefore *not* be inconsistent in arguing, here, that respects cannot be similarly accounted for.

Considered as a kind of one-over-many, dimensions may be reached in several ways. We may argue, for example, that if one thing is red and another green, then each is some way in respect of colour, and hence, there is something - colour - in respect of which each thing

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[51] I put it this way for clarity in the present context. Strictly speaking, my claim is that it is the other way round: objects share determinable ways of being *by resembling* in a certain way. I discuss this at the end of Chapter 3.

[52] I am not saying that difference straightforwardly entails exclusion: it doesn't. But co-specific difference *in a respect* does.

is some way. The point may also be put in terms of resemblance or difference. For example, we can argue that if one thing is red and another green, then they differ in some respect, and hence there is something - colour - in respect of which they differ. We might also argue that if one thing is scarlet and another crimson, then they *both resemble and differ* in respect of colour, so there is something - colour - in respect of which they both resemble and differ.

In these cases, I do not claim that the conclusion - 'there is something' - follows *logically* with any more strength than that of an 'easy' ontological claim in the sense discussed by Thomasson (2015). Nevertheless, the existence of dimensions may be the best explanation for the structures that such 'easy' ontological inferences place into an *explanandum* role.[53]

I turn now to consider five rival attempts to account for respect structure in terms of exclusion, resemblance, partial identity, second-order properties, and subsets of powers. These approaches are drawn from the literature on determinables and determinates. As I will argue in Chapter 2, determinable-determinate hierarchies are *ontologically non-uniform*: since 'determinate' and 'determinable' do not designate ontological categories, but merely two kinds of relative status between adjectives, adjectives at different strata in these hierarchies may - and indeed, do - have different ontological correlates. In particular (though roughly), I will argue that *objects* and *dimensions* are the ontological correlates of *superdeterminates* and *superdeterminables*, respectively. In arguing here that these rival

[53] I am here detaching the notion of 'easy' inference from Thomasson's further claim, that these further explanatory questions have no place in ontology. Arguably, Thomasson's own position should be committed to similar 'external' explanatory questions in relation to the notion of an *application condition* which occupies the engine room of her 'easy' metaontology. This point is in line with the general trajectory of argument in Lowe (1998, Ch.1), but it is beyond the scope of my discussion to pursue it further.

approaches do not successfully account for respect structure, I am therefore *not* arguing that they are poor accounts of determinable-determinate relations at *every* level of a determinable-determinate hierarchy. For reasons of space, I will keep my discussion brief.

First, consider the reading of Johnson mentioned above, according to which respect classes of properties are simply classes of properties that stand in mutual *exclusion* relationships. As Armstrong points out, that view leaves it unexplained *why* certain properties and not others should exclude each other. Indeed, we might add here that it seems possible to come up with classes of properties that are *gerrymandered* relative to respect structure, and which are not mutually excluding; the proposed view will tell us that those properties are gerrymandered relative to respect structure *because* they are not mutually excluding, not - as it ought - that they are mutually excluding because they are gerrymandered relative to respect structure. As Armstrong remarks (1978b:113), "Johnson's 'solution', however, if that is what it is meant to be, is simply a statement of the problem."[54]

Second, consider the claim that respects can be accounted for in terms of *resemblances between properties*. One way to cash out this claim[55] is to provide an abstraction principle for respects on properties: let us say, of four properties *FGHJ,* that *F* and *G* have the same respect as *H* and *J* just in case *F* and *G* collectively perfectly resemble *H* and *J* (collective), *and F* and *G* do not perfectly resemble each other, *and H* and *J* do not perfectly resemble each other.[56] Thus, to give an example, the principle is aimed at the following sort of case:

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[54] To be fair on Johnson, I think that Armstrong has misread him on this point. The reason is that Johnson's account of predication (1921:179-80; see Chapter 4 in this thesis for discussion) does not leave exclusion as brute as Armstrong suggests.

[55] The proposal here parallels my proposal for property abstraction in Chapter 3.

[56] The formulation is very rough: I have left out, for example, any description of the relative levels of specificity of these properties. However, it ought to suffice for the present discussion.

red and *green* have the same respect as *yellow* and *blue* just in case *red* and *green* collectively perfectly resemble *yellow* and *blue (collective).* The idea is that this collective perfect resemblance should capture what *red* and *green* taken collectively, and *yellow* and *blue* taken collectively, have in common, namely the respect *colour*.

However, the proposal is problematic. For one thing, it is too weak: the principle will admit cases in which *F* and *G*, taken collectively, perfectly resemble *H* and *J*, taken collectively, because *F* and *G* have *some* respect in common, and *H* and *J* have *some* respect in common, though *F* and *G* do not have the *same* respect in common that *H* and *J* do. For it is unclear why *having some respect in common* should not pass for collective perfect resemblance if *having the respect* colour *in common* should. Moreover, the principle will also admit cases where *F* and *G* on the one hand, and *H* and *J* on the other, do *not* share a respect. Thus, for example, it is perfectly unclear why the pairs *red* and *square,* and *5kg* and *70km*, should *not* qualify as perfectly resembling, as far as respect structure is concerned, precisely in virtue of their *not* having the same respects.[57]

It is not clear how the proposed abstraction principle might be amended to get such cases right: resemblance, in general, *presupposes* respect structure. It is not clear, either, how it might help to drop the proposed abstraction principle and account for respects in terms of *direct* resemblance relations between properties. For consider the properties *red*, *orange*, and *blue*. Consider first the properties *red* and *orange*. It will not do to capture the respect *colour* by simply saying that *red resembles orange*, because such a claim fails to distinguish the sense - if there is such a sense - in which red resembles orange *by being a*

[57] A parallel objection does not apply to my account in Chapter 3, since in my account I am able to specify independently that the relevant objects should determine the relevant dimensions *at all*.

colour, from the sense in which red resembles orange *as a colour*. One might respond here that the point is clearer in the case of *red* and *blue*, the idea being that red and blue do *not* resemble as colours, so that their resemblance can consist *only* in their resembling *by being colours*. The problem then, however, is that it is simply unclear in what sense the target relation between red and blue is one of *resemblance* at all. Indeed, I suggest that our grasp of the notion of *colour* - the respect itself - is firmer than any grasp we might have of a *resemblance* between red and blue that might account for it.

Third, consider the claim that properties and their respects stand in relationships of *partial identity*. Armstrong (1978b:120-4; 1997:48f) argues that such relations of partial identity characterise the range of determinates under a determinable. His stock example is *length*: what unifies the class of determinate length properties - what they have in common - is not a shady *respect*, but a certain interrelatedness. Specifically: any instance of *being one metre* will be equivalent to two instances of *being one half-metre*, and any instance of *being two metres* will be equivalent to two instances of *being one metre*, and so on. The class of length properties is simply *that* class of universals interrelated in this way.

But Armstrong's proposal is problematic. Consider, for example, the universals *being 50 people* and *being one person*. These are related in the same way that *being 50 metres* and *being one metre* are: an instance of *being 50 people* is equivalent to fifty instances of *being one person*. Yet the range of universals: *being one person, being two people* […] *being 50 people* do not form a *respect* in any obvious sense.[58] One might respond here that they form a group under the respect *number* (if indeed *number* is properly understood as a respect), but in that case they form a group under the very *same* respect as the universals:

[58] *Population* is an obvious suggestion, but not every instance of *being 50 people* is a population.

being one metre, being two metres […] *being 50 metres*. The problem here is not that we should then be unable to distinguish one set of universals from the other at all - but rather, that we should not be able to say why it is that one set of universals form a respect grouping *while the other does not*.

Fourth, consider the claim that respects are second-order properties - that is, properties of properties. Thus, *red* and *blue* are properties of objects, while *colour* is a property both of *red* and of *blue*. The problem with this proposal is that it does not explain why red and blue should *exclude* each other. There is nothing about second order properties *as such* that should render their bearers their *unique* bearers among the properties of a given object. The second order property proposal is simply silent on this score.

Fifth, consider the claim that the relationship between determinables and determinates can be cashed out in terms of *subsets of powers*. Roughly, the idea is that determinables - or in our case, respects - are associated with causal powers that are a *proper subset* of the causal powers associated with their determinates (or properties falling under those respects). The problem with this proposal is that even if it is true, it is too permissive. While it may be true that every respect is associated with a proper subset of the powers associated with the properties that fall under it (let us suppose that it is so), it does not follow that every proper subset of this sort that one might produce - however arbitrarily - will be a set of powers associated with a respect. The subset account *overgenerates*: it does not explain the difference: it does not tell between subsets of powers that *are* respects, and subsets of powers that are not.

In light of the preceding discussion, I suggest that respect structure provides good reason for positing dimensions. The remaining sections of this chapter will be briefer.

3.2.2 Chance

A further line of argument concerns phenomena connected with chance. I will outline two such phenomena, and suggest that dimensions stand well to explain them both.

The first is discussed by Hugh Mellor (2000) in connection with the relationship between chance - objective probability - and necessity. Roughly, the relationship under discussion is this: the chance of a given event is 0 if and only if it is impossible. The problem that Mellor discusses is that this principle is open to counterexample. To pick Mellor's most straightforward case: a spinning pointer will have an infinitely low - indeed, 0 - chance of stopping at a particular place, but it is obviously not *impossible* for it to stop there. Mellor's response - which is thematic across several examples that he considers - is to point out that any real pointer must have *some* width, so any direction in which it might stop must have an *interval value*. Thus, reality - at least in a wide range of such cases - need not be *maximally determinate*.[59] If reality is, in places, not maximally determinate, then it may be *determinable* instead. But how indeterminate should the relevant determinables be? This seems, from an ontological point of view, to be an arbitrary - indeed, empirical - matter. From an *ontological* point of view, I suggest, it is far simpler to posit *dimensions* and *resemblance* relationships under those dimensions, in a way that I will spell out in Chapter 3. My discussion in Chapter 3 will not take up this theme from Mellor directly, but it should suffice to make clear how a dimensionist treatment of that theme could go.

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[59] Wittgenstein (2017:74-5) makes a similar point. Wilson (2012) provides further reasons for thinking that fundamental reality need not be determinate.

The second phenomenon is a posit by Mumford and Anjum (2011:177): *if a is disposed to F, then it is not necessarily the case that a does F (~□Fa): the manifestation of a disposition could always be prevented.* As Vetter points out:

> […] this seems to me a case of an *ignoratio elenchi*. The earlier argument [that dispositionality fails the 'antecedent strengthening test'], which rested on the possibility of prevention, masking and finking, established that being disposed to F *does not* entail being necessitated to F (or F-ing necessarily). There is no argument, so far as I can see, for the much stronger conclusion that being disposed to F *does* entail *not* being necessitated to F (or F-ing only contingently). No such argument is forthcoming in the context where [the above posit is made], except perhaps the conjecture, implicit in the above quote, that it is something about the very nature of dispositionality which allows for finking and masking […] but I fail to see what the nature of dispositionality might be. (2015:93)

I will argue in Chapter 5 that dimensionism can supply an account of (nomic) governance in terms of internal relationships between dimensions. The account that I offer there is open to the following development. Given that some dimensions stand in a nomic functional relationship, it may be that those dimensions *plus some others* stand in further nomic relationships that *swamp* the former ones. Nomic relationships between dimensions may thus be 'non-monotonic', so to speak.

Consider an example given by Cartwright (1983:57). Newton's inverse square law fails to accurately describe the behaviour of bodies that are not only massed but *charged*. Such cases, as Cartwright points out, show up ineliminable *ceteris paribus* components of laws. These *ceteris paribus* components stand to explain what it is about dispositionality that leaves it open to finking, masking, and prevention. Moreover, I suggest, the account of

nomic governance that I offer in Chapter 5 stands to explain *why*, ontologically speaking, laws should have such a *ceteris paribus* component.

3.2.3 Single Value

My final argument of this chapter is really a promissory note. In Chapter 7, I will discuss Hasok Chang's work on *metaphysical principles* and their relation to the intelligibility of *epistemic activities*. I will discuss there what Chang calls the *principle of single value*, which is, in effect, a principle of determinate exclusion for magnitudes. My discussion in Chapter 7 does not take place in the context of an argument for dimensions, but rather, in the context of a discussion of Chang's 'active realism'. Nevertheless, one might well argue that dimensions are the best *explanans* for the *determination structures* that the principle of single value - taken separately from Chang's broadly Kantian framework - introduces to an *explanandum* role. In particular, for an object to violate the principle of single value would be for it to *differ from itself*. Since the principle of single value is discussed in Chapter 7, and since the line of argument suggested here is obvious enough, I will not pursue it further.

Chapter 2 - Determinables and Determinates

0. Intro

Chapter 1 completed the exposition of my core dimensionist ontology. In the next five chapters, I focus on building a case for that ontology. The present chapter argues that the dimensionist picture is the right ontological picture to explain determinable-determinate structure.

My aim here is to establish two claims. First, I claim that dimensions, and their ontological form, are the underlying joint of nature at which discussions of determinable-determinate structure attempt to carve. Second, it follows from the first claim that a number of widespread, core assumptions about determinables and determinates should be rejected.

These claims are, on the face of it, potentially in tension with each other: how can I claim both that dimensions capture the core notion in the debate, *and* that the debate is simply mistaken in its core assumptions? In Section 1 below, I offer a way to think about the 'determinables debate' - in terms of the notions of *explanandum* and *explanans* roles familiar from the previous chapter - which allows this difficulty to be circumvented. One consequence of my account of the debate will be that mere *logical articulations* of a determinable-determinate relation, such as Searle's (1959), fail to be a full account of that relation. If determinable-determinate structures are a feature of reality, then what is required is a *metaphysical* account of them.

In Section 2, I discuss the roots of the notion of the determinable in the work of W.E. Johnson. In Section 3, I survey some of the ways in which the literature has set out to fix

an *explanandum* structure. In Section 4, I set out some extant proposals for an *explanans* structure. In Section 5, I then explain how dimensionism fits into the picture – which will not be as straightforward as just taking determinables 'as read' from the surface form of language. Finally, in Section 6, I survey the debate once more and discuss which core assumptions should – in light of the claims of Section 5 – be accommodated, and which rejected.

1. Structure in Two Roles: *Explanandum* and *Explanans*

Discussions of metaphysics that touch on determinables, in one way or another, go back a long way. As Jessica Wilson notes,[60] determinable-esque notions can be found in Aristotle, Descartes, and Leibniz (see Wilson 2017. Similar comparisons are made elsewhere, e.g. Johnson 1921, Prior 1949, Hawthorne 2007). The terminology has roots in scholastic treatments of species and genus (Prior 1949, Wilson 2017 §1), but the *term* 'determinable' – as well as the first *direct and explicit* discussion of the theme in the analytic tradition – is found in the first volume of Johnson's *Logic* (1921). Beginning with Johnson, a whole discussion has arisen around the determinable/determinate distinction – *but what is it about?*

The answer is less obvious – or rather, the obvious answers are less adequate – than one might think. One obvious answer would be "determinables, determinates, and their relation" (Wilson 2017 §2.1). But this is not quite right. One might, for example, be an eliminativist about either determinables or determinates, or one might hold that

[60] The main arguments of this chapter were developed before I had the privilege to read a draft of Wilson (2017) during the summer of 2016. Nevertheless, I am indebted to that article (both in draft and in its published form) for the clarification and regimentation of my own thoughts. In particular, Wilson's list (her §2.1) of characteristic features of determinables and determinates features here as the core of my discussion in Section 3 of the present chapter.

determination relates determinables to some things other than determinates (or that what relates determinables and determinates is not *determination*).

Another obvious answer might be "the determinate/determinable distinction" (see e.g. Fine 2011). But again, this would not be quite right if, for example, the underlying structure were really - as I will be claiming that it *is* - a *determination* structure, understood as comprising a formal relationship holding between *dimensions* (superdeterminables, if anything – not determinables in general) and *objects* (not determinates in the normal sense).

To be sure, such cavils are not especially devastating. It is true that the mooted answers (and other, similar, possible answers) may serve to highlight and perpetuate certain operative assumptions within the debate - for example, that there is a single determinable-determinate relation that generates ontologically *uniform* determinable-determinate hierarchies - many of which, I will later argue, should be rejected. But their inadequacy – or indeed the lack of an adequate answer in their stead – should not stop the discussion from proceeding.[61]

Nevertheless, what my cavilling *does* suggest is that the determinables debate comprises the pursuit of two distinct tasks. One is the positing of explanations for a certain target phenomenon or feature in the world – call it a determinable/determinate distinction, if you will – while the other is the task of identifying and articulating what the target phenomenon

[61] I will continue talking of the 'determinables debate' in this broad sense, that leaves it an open question what the determinables debate is *about*.

is in the first place.[62]

That target phenomenon is a certain *structure*. In the case of the determinables debate,[63] that structure can be described in a way that makes reference to predicates (for example: *'...is red'* and *'...is coloured'* stand in a distinctive sort of entailment relationship), or to properties (for example: properties form natural groupings such as *red/green/yellow*, and *circular/square/triangular*), or to resemblance structure (for example: similarity is always similarity *in some respect*). Or it might be stated more directly (for example: the world exhibits a kind of *respect structure*). Each approach carries its own distinctive assumptions.[64] To cancel out these commitments, I will speak inclusively of these target-identifying articulations of structure as articulations of structure *in the explanandum role*.[65]

In carving out space for such articulations of structure *in the explanandum role*, I am assuming that such articulations may succeed in identifying an *explanandum* structure even if that structure is, in some fundamental sense, not a structure that the world *really has*. I will say more about this in Chapter 7, where I set out an account of metaphysical enquiry as enquiry that is both *iterative* and *immersive*. For now, the important points are these: the articulation of structure in an *explanans* role is committal (it involves a commitment that the world really *has* the relevant structure), while the articulation of structure in an

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[62] Of course, this is not unusual in philosophy. I am labouring the point in order to make it clear how I am regimenting my discussion.

[63] The regimentation in terms of *explanandum* and *explanans* roles applies beyond the determinables debate. I will be applying it in this wider way throughout the thesis.

[64] For example, the direct expression in terms of respect structure carries an assumption, which may be challenged, that the other ways of framing the debate are *convergent* and *indirect* ways of getting at respect structure. Thus, directness here is not *automatically* better than indirectness.

[65] 'The' here should not be taken to imply that there can be only *one* explanandum role, or only *one* realiser of it, even in the context of a single debate.

explanandum role need not be. This is, however, only to say that commitment is not required by the *explanandum* role as such: if one is committed to claiming that a certain *explanandum* structure also in turn plays an *explanans* role, then one is - obviously - committed to realism about that structure to the degree that its *explanans* role requires.

I am, then, giving *metaphysical explanation* - understood as a relationship between structures - a central burden of theoretical work. The part played by these *explanandum* and *explanans* roles is in many respects similar to that played by a notion of *fundamentality* on Ted Sider's view. My central notion here will be of an *explanans* structure *explaining* some corresponding *explanandum* structure. To be sure, we may say that such an *explanans* will be a 'more fundamental' structure than the corresponding *explanandum.* Insofar as this is all that one might mean by 'fundamental', I am happy to use that word. But fundamentality in any *other* sense bears no theoretical burden here: the work is done by form and explanation.

This demand for metaphysical explanation is, in effect, a demand that the determinables debate be settled by a *metaphysical* theory – not a conceptual, logical, or semantic one. In particular, a good theory of determinables should say *which* are the entities whose ontological form accounts for the relevant target structure, and *how* they do so.

I trust that the *explanandum* and *explanans* notions are, at this point, clear enough to use in regimenting the coming discussion. As already mentioned, the discussion in Chapter 7 will supply further context for these notions, and I will briefly note in the Conclusion of the thesis some yet further ways in which they may be clarified and developed. My present interest, however, is not so much in the full clarification of these notions as it is in their

use, so I will proceed.

2. W.E. Johnson on the Determinable

Before examining the debate on determinables more widely, I want first to discuss the account given by Johnson in the first volume of his *Logic* (1921 Ch.11). This is for two reasons. First, Johnson's discussion has a privileged, originating role in the wider literature: to a certain degree it is an *anchor* for subsequent discussion. Second, Johnson's discussion (and Prior's 1949 commentary on it) comes close, in a way worth exploring, to the view that I will be defending in Section 5.

Johnson's discussion is focused on what he calls determinable *adjectives*.[66] This places his discussion in the territory of logic, but in a way that invites further metaphysical explanation:

> The scope of logic has tended to expand in two directions – backwards into the domain of metaphysics, and forwards into that of science. These tendencies show that no rigid distinction need be drawn on the one side between logic and metaphysics, nor on the other between logic and science. […] It is, I hold, of less importance to determine the line of demarcation between logic and philosophy than that between logic and science; so that my treatment of logic might be called philosophical in comparison with that of those who implicitly or explicitly separate their criticism and analysis [of subjects discussed under the head of logic] from what in their view should be relegated to epistemology and ontology. (1921:xiii)

Johnson introduces determinables through a *distinction* between determinable and determinate adjectives in the following way. Consider the division of a class of substantives – roughly, *objects* (or object *terms*) – into non-arbitrary, natural sub-classes

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[66] Not quite the same thing as a predicate. The difference will emerge in Chapter 4, where I examine Johnson's distinctive treatment of predication.

that are mutually exclusive and collectively exhaustive of the class to be divided. Such a division must proceed according to what Johnson calls some one *fundamentum disvionis*. Moreover, this *fundamentum divisionis* is not a purely formal notion: it is grasped ("perhaps readily understood by the learner") not on the basis of "its connection with, or its bearing upon, ideas which have entered into the previous logical exposition".[67] To illustrate:

> […] when a class of things is to be divided according to colour, or to size, or to some other aspect in which they can be compared, then the colour, size, or other aspect contsitutes the fundamentum divisionis. Now, although, grammatically speaking, words like colour and size are substantival, they are in fact abstract names which stand for adjectives; so that the fundamentum divisionis is, in the first place, an adjective, and in the second, an adjective of the particular kind illustrated by 'colour' when considered in its relation to red, blue, green, etc. (1921:173-4)[68]

What is in focus, then, is a distinctive structure which relates certain adjectives to each other. Moreover, the adjectives in question are, on the one hand, those that constitute the bases for categorising objects into classes, and on the other hand, those that constitute the basis for dividing them one way rather than another *according to* the first sort of basis – that is, *given* the *fundamentum divisionis*. Hence, the structure in question is both "a certain characteristic of the adjective as such, which perhaps throws the strongest light upon the

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[67] This is all in good keeping with my remarks in Chapter 7 about grasp and immersive enquiry. Of course, that something may be grasped without an explicit formal account of it does not entail that no formal account of that thing may be given. Nevertheless, Johnson's own account of the distinction is *not* given in formal terms: rather, it is given by example and by reference to a 'special kind of difference' between co-specific adjectives under the same determinable. Indeed, some of Johnson's formal remarks – especially about the logical form of predication (the copula) – are *based on* his non-formal remarks about the determinable.

[68] Note here the dual use of 'adjective' that designates both a grammatical category and also – arguably – a category of being.

antithesis between it and the substantive" (1921:173) – that is to say, intimately tied to the distinction between substantives and adjectives – and also intimately tied to the categorisation of objects.[69] Johnson goes on to say more about the features of this target structure, but it is significant that he *begins* his discussion by tying the structure down to his basic categories of being: *substantives* and *adjectives*. In my terms: he begins by identifying the categories of being whose natures give rise to the *explanandum* structure.

What is distinctive about this target structure? Its similarity to, and difference from, *class membership*. Here is Johnson:

> Superficially this relation appears to be the same as that of a single object to some class of which it is a member: thus two such propositions as 'Red is a colour' and 'Plato is a man' appear to be identical in form […] Our immediate purpose is to admit the analogy, but to emphasise the differences between these two kinds of propositions, in which common logic would have said we refer a certain object to a class. (1921:174)

With his subject-matter set up, Johnson proceeds to characterise the distinctive *relationship* that his discussion targets. Most of Johnson's core points are summarised by Wilson (2017). My discussion here will naturally overlap with Wilson's to a great degree. I will, however, have some points to add to Wilson's reading of Johnson – and some points of disagreement.

Wilson first notes that determinates stand to determinables in a *specification* relationship: determinable predicates characterise objects *less determinately* than determinate predicates (Johnson 1921:174). Moreover, the specification relation in question differs from the

[69] Both of these points are respected in my ontology by *dimensions* and *determination*, which act as surrogates for Johnson's (super)determinables and their relationship to determinates. I say more about this in Section 5.

species-genus relation in being *non-conjunctive*: determinate adjectives are not obtained from determinables by "that process of increased determination which conjunctively introduces foreign adjectives" (1921:178). Same-level determinate adjectives (under the same determinable) are mutually *exclusive*: they cannot characterise the same object simultaneously (1921:181). They are also "opponent […] besides being related as non-identical, [they] have a relation which can be properly called a relation of difference, where difference means more than mere otherness […]" (1921:175-6). Moreover, determinables are not only the aspects under which objects are categorised into classes (as already seen), but also the aspects under which objects may be *compared*:

> Further, what have been assumed to be determinables – e.g. colour, pitch, etc. - are ultimately *different*, in the important sense that they cannot be subsumed under some one higher determinable, with the result that they are incomparable with one another; while it is the essential nature of determinates under any one determinable to be comparable with one another. The familiar phrase 'incomparable' is thus synonymous with 'belonging to different determinables', and 'comparable' with 'belonging to the same determinable' […] enquiry into the reason for the comparability or incomparability of two qualities will elicit the fact that they belong to the same or to different determinables. (1921:175)[70]

Moreover, determinables stand in certain subsumption relations to *each other*, distinct from their relationships to determinates. Specifically, determinables may be of higher or lower *dimension*:

> […] a colour may vary according to its hue, brightness, and saturation; so the precise determination of a colour requires us to define three variables which are more or less independent of one another in their capacity of co-variation; but in one important sense they are not independent of one another, since they could not be manifested in separation. The

[70] Note again the notion of metaphysical explanation at work: determinable-determinate structure *explains* the possibility and impossibility of comparison.

> determinable colour is therefore *single*, though complex, in the sense that the several constituent characters upon whose variations its variability depends are inseparable. (1921:183)

This subsumption structure, whereby a determinable's value ranges vary along distinct *determination dimensions*, is of course a central theme picked up by Funkhouser's (2006, 2014) account of the difference between determination and (multiple) realization.

Up to this point, I am in agreement with the exposition of Johnson by Wilson (2017). However, two further points made by Wilson seem to me to need qualification.

First, Wilson notes that for Johnson, while we may characterise objects more or less determinately, the objects themselves are completely determinate. As Johnson says:

> Furthermore, determinateness in either case is only approximately attainable, whether we rely upon the immediate judgments of perception or are able to utilize instruments of measurement. The practical impossibility of literally determinate characterisation must be contrasted with the universally adopted postulate that the characters of things which we can only characterise more or less indeterminately, are, in actual fact, absolutely determinate. (1921:185)

Wilson observes:

> The assumption that determinable characterization reflects (mere) epistemic, perceptual, or representational limits remains common, and pushes towards giving one or other deflationary account of determinables. (2017 §1.3)

While I concede that 'pushes towards' is not a precise or committal expression, I do not think that Wilson is correct here *if* she takes Johnson to be advocating a deflationary

account of determinables.[71] For what Johnson says is about the characters of the *objects* that may be indeterminately characterised – not the adjectives that may indeterminately characterise them – and it is quite possible to hold that objects have fully determinate characters, without holding deflationary views about determinable adjectives. Indeed, the view that I defend here is precisely such a view. To pursue the point further, consider the following points in Johnson's discussion, not mentioned by Wilson. Immediately after noting that determinables characterise objects less determinately than determinates, Johnson adds:

> But, to supplement this negative account of the determinable, we may point out that any one determinable such as colour is distinctly other than such a determinable as shape or tone; i.e. colour is not adequately described as indeterminate, since it is, metaphorically speaking, that from which the specific determinates, red, yellow, green, etc., emanate; while from shape emanate another completely different series of determinates […] Thus our idea of this or that determinable has a *distinctly positive content* which would be quite inadequately represented by the word 'indeterminate'. (1921:174-5, my emphasis)

Also:

> To illustrate more precisely what is meant by 'generates'; let us take the determinable 'less than 4'; then 'less than 4' generates '3', '2' and '1' in the sense that the understanding of the meaning of the former carries with it the notion of the latter. Now no substantive class-name generates its members in this way; take, for instance, 'the apostles of Jesus', the understanding of this class-name carries with it the notion of 'men summoned

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[71] This is not to say that I am in agreement with Johnson's statement in its entirety. Specifically, we will see later (in my discussion of the problem of universals) that I may be in some disagreement with what Johnson may be saying here about *determinates*. For now, let me note that 'absolutely determinate' is ambiguous: something may be absolutely determinate in the sense that nothing *is* more determinate than it, or in the sense that nothing *could* be. I hold that the qualitative characters of objects are absolutely determinate in the first sense, but not in the second sense.

> by Jesus to follow him', but it does not generate 'Peter and John and James and Matthew etc.' […] (1921:177-8)

The point here is not essentially epistemic: it is that *what it is to be* less than 4 *is* to be 3, or 2, or 1, while *what it is to be* an apostle of Jesus is *not* simply to be Peter or John or James (etc.). Finally:

> A second characteristic of many determinates under the same determinable is that the differences between different pairs of determinates can be compared with one another […] In this case the several determinates are to be conceived as necessarily assuming a certain serial order […] (1921:182)

Thus, Johnson's 'distinctly positive content' is at least a threefold affair: the determinable *generates* its determinates (its value-range), it generates a *distinct* value range from the value ranges of other determinables, and it generates a value range whose determinates may be *ordered* in a particular way. All this by way of cashing out a "certain characteristic of the adjective as such", and the sort of adjective which – recall – is an adjective *despite* appearing grammatically as a substantive term. It seems clear from these passages that, *contra* Wilson, Johnson is committed to a non-deflationary conception of determinables, one which is integral to his account of the nature of properties.

Secondly, Wilson notes that Johnson:

> […] denies that determinables are in any sense shared by determinates: "the ground for grouping determinates under one and the same determinable is not any partial agreement between them" but rather "the special kind of difference" (1921:I,xi,1) distinguishing opposing determinates. (2017 §1.3)

In a note, Wilson adds that Johnson is here relying on an assumption that "the sharing of determinables would be like the sharing of parts". To see this, consider the context of Johnson's own discussion, where he is concerned to reject the idea that determinables are shared by determinates as a *second-level property*: "is there any (secondary) adjective *which analysis would reveal* as characterising all these different (primary) adjectives?" (1921:176, my emphasis). The view being rejected, then, is that determinables are (analytical) components of determinates: its rejection is simply a consequence of the non-conjunctive nature of the determinable-determinate relationship. However, this is only to say that determinables are not shared by determinates *as conjuncts*. It falls a long way short of the stronger claim that determinables are not shared by determinates *in any way.*

Contra Wilson again, I claim that Johnson *does* hold that determinables are shared by determinates. This is seen in the way in which determinables are integral to Johnson's conception of *objects*. Here we touch on issues to which we will return again when I discuss the structure of predication in Chapter 4. Remarking on the ascription of a (determinate) predicate to an object, Johnson notes:

> In fact, the foreign adjective which appears to be added on in the conjunctive process is really not introduced from the outside, but is itself a determinate under another determinable, present from the start, though suppressed in the explicit connotation of the genus. We propose to use a capital letter to stand for a determinable, and the corresponding small letter […] to stand for its determinates. Thus, in passing from the genus *p* to the species *pq*, we are really passing from *pQ* to *pq*; or again the apparent increase of intension from *p* to *pq* to *pqr* is more correctly symbolised as a passing from *pQR* to *pqR* to *pqr*. […] The summum genus ought to be represented by a conjunction of determinables […] In this way we represent from the outset the nature of the ultimate individuals under the summum genus […] (1921:178-9)

For Johnson, determinate predication is not a matter of conjoining one thing to another –

an adjective to a substantive – but rather, a matter of moving from a determinable that is *present from the start* to a determinate value or characterisation.[72] 'Present from the start' here means that a certain conjunction of determinables – corresponding (as I will discuss later) to the *dimensional profiles* that mark out an object's ontological category – will be associated with an object *by virtue of the kind of object that it is.* In this sense Johnson is clearly committed to determinables being shared by objects. It is true that Johnson does not think such sharing is *reducible* to the sharing of *determinates* – because the determinable-determinate relation is non-conjunctive – but that does not rule out his clear commitment to the sharing of determinables.

Does this reading of Johnson conflict with his claim, cited above, that the characters of objects are completely determinate? No. For Johnson's remark applies to the character of an object *insofar as it is characterised by more or less (in)determinate adjectives*. Now for Johnson, objects and properties are related by a *characterising tie*, which is blended in natural English with a distinct *assertive tie* (1921:10-12). While all determinables are adjectives, not all adjectives are determinables – and it is significant that Johnson does *not* recognise a distinctive kind of *tie* between objects and determinables. This is for two interrelated reasons. First, because *most* determinables are also determinates: 'determinable' and 'determinate' are both relative terms. Hence, to characterise an object less-than-fully determinately is still to characterise it determinately *relative to* the determinable profile corresponding to the 'summum genus' to which the object belongs. Second, where the highest determinables are concerned – those directly constitutive of the 'summum genus' –

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[72] This notion of *movement* from one thing to another underlying Johnson's account of predication is tied with my discussion in Chapter 7 where I discuss the *operations* involved in joint-carving. They should also ring a Fregean bell – specifically, that of the significance of Frege's *assertion stroke* (and his distinction between a *wff* and a name of a truth value). Johnson himself touches on these themes at the end of his discussion of determinables (as I will mention soon), and throughout volumes 2 and 3 of his *Logic*.

there is *no logical gap* to be bridged by any kind of tie. The determinable profiles countenanced by Johnson are simply built in to the very natures of the objects whose profiles they are: they partially constitute an object's ontological form. If N is a name *for* an entity of category C (as opposed to being merely a name *of* a C-entity, in Geach's (1980) sense), then any highest determinable will either be 'present from the start' already coupled to C, or *incompatible* with C in such a way that ascribing that determinable to a C-entity will merely be a category mistake.[73]

Before ending my present discussion of Johnson, two further points bear noting.

The first is that on Johnson's view, objects carry highest-determinable profiles in virtue of their natures – and the characterisation (or *determination*, 1921:10) of objects by means of adjectives is *always* the sharpening of some determinable from the corresponding profile to a more determinate value. The characters of objects are, to be sure, 'absolutely determinate' – but as noted, this need mean only that they are *as determinate as anything is* – not as determinate as anything *could* be.[74] This is because 'determinate' designates a *relative* status: while the hierarchy of determinables and determinates is fixed at the *top* in a modally strong sense ("Further, what have been assumed to be determinables – e.g. colour, pitch, etc. - are ultimately *different*, in the important sense that they cannot be subsumed under some one higher determinable" (1921:175)), it need not follow that it is fixed in the same way at the *bottom*.

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[73] Johnson's treatment of determinables thus supplies an account of category which serves as a good basis for an account of category mistakes such as that of Magidor (2013), as I discuss in Chapter 4.

[74] An example to illustrate. Suppose that some magnitude has a smallest unit – suppose for argument's sake that there is such a thing as *unit charge*. It will follow that nothing *has* a charge whose value is finer-grained than that, but not – at least, not clearly – that nothing *could* do. I will discuss this point again in Chapter 3.

What emerges, then, is a picture according to which *objects* and *highest determinables*[75] are privileged, and indeed, intimately related: highest determinables constitute the ontological form of objects, and are irreducible because they contribute 'distinctly positive content' to the world's structure. While entailment traces the determinable-determinate hierarchy from the bottom up (determinates entail determinables), predication traces it *from the top down*. Two observations follow from this. One is that if Johnson's account of determinables leaves a question mark over the ontological status of anything, it is over the category of *absolutely determinate properties*, where absolute determinateness is understood in a non-relative sense – not over determinables. The other is that there is, underlying Johnson's account, an implied ontological distinctiveness attached to *highest* determinables which does *not* attach to determinable adjectives 'lower down': *not all determinables are equal*. To put it another way: the determinable-determinate hierarchy is not *ontologically uniform*.[76]

The second, much briefer, thing to note is Johnson's mention, at the end of his discussion, of connections that determinables bear to the topics of *measurement* and *sense perception*. Discussion of the metaphysics of measurement has, of course, been a theme of growing interest over the last century; more recently, geometrical models of cognition and sense-perception have also arisen which raise intriguing possibilities for integration (see e.g. Gärdenfors 2000). These connections are significant: it is plausible to suggest that it is a virtue of a dimensional ontology that it offers – especially in conjunction with the

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[75] I am careful with the term 'superdeterminable' when discussing Johnson. 'Superdeterminable' is often used as interchangeable with 'highest determinable', but Johnson (1921:177) uses it as a relative term to 'sub-determinate'.

[76] This should not be too surprising, since determinate-determinable hierarchies are *non-constructive.*

metametaphysical picture offered in Chapter 7 – a powerful, unitary metaphysical treatment of them.

3. Characterising the *Explanandum*: Core Features in the Contemporary Debate

Having given an exposition of Johnson in some detail, I turn now to a more general overview of the wider – and more recent – debate. In this section I focus on the broad consensus over core features of the structure that occupies the *explanandum* role in the debate. Since this chapter is not a literature review on determinables, I will not survey the literature through a piecemeal exposition of individual authors, exhaustively or not. Rather, I follow Wilson's (2017) distilled list of core features that are "commonly taken to characterize determinables, determinates, and their relation". Wilson frames her list with the following qualifications:

> […] the presentation is in terms of properties, and may require adjustment to apply to entities of other categories. This is not a minimal or axiomatic set: some features follow from others; moreover, there are cases to be made that some of these features do not hold in full generality. In addition, how to metaphysically understand these features varies […] Motivated as they are by a limited range of paradigm cases, not all of these features may be characteristic of determination in the strong sense of being required for the holding of that relation, as opposed to being typically or generally true of some or most instances of the relation (or its relata). (2017 §2.1)

Agreed. With these qualifications in place, I turn to Wilson's list. I will not consider the question of whether it is an *exhaustive* list, because the notion of exhaustiveness here is unclear: specifically, it is not always clear at what point a given feature ceases to belong to the core *explanandum* structure, and should be considered part of an *explanans* instead.

Wilson's list contains fourteen elements. The first is *increased specificity*: if *p* is a determinate of *P*, then *p* is more specific than *P*; in particular, to be *p* is to be *P* in a more specific way. There is, I add, some variation in exactly what force the expression 'in a more specific way' is supposed to have – specifically, over whether it is intended to capture something *ontologically* distinctive. It seems best, for present purposes, to take this point in the weakest available sense.[77]

The second listed feature is that the determinable-determinate relation is *irreflexive, asymmetric and transitive*. As Wilson notes, these features are "characteristic of strict partial orderings", and are entailed by the increased specificity feature.[78] Intuitively: nothing is either a determinate or a determinable of (relative to) itself, nothing is a determinate or a determinable of anything that is in turn (respectively) a determinate or a determinable of it, and determinables of determinables (and determinates of determinates) of a property are determinables (determinates) of that property.

The third feature comprises two distinct points: determination is *levelled*, and it is *relative*. It is levelled in the sense that things are not just determinate or determinable, but determinate or determinate *to some degree*: they may be *more* or *less* determinate than each other. It is *relative* in the sense that occupants of these determinable and determinate levels relate to each other as determinables and determinates *of* each other, and moreover, in the sense that to be determinate or determinable just *is* to be a determinate or determinable *of*

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[77] Note that this feature favours the kind of view that I have attributed to Johnson, according to which *highest determinable* is absolute and non-relative, while *lowest determinate* need not be. For it is plausible that *decreasing* specificity may reach an in-principle limit, while *increasing* specificity may not.

[78] Why, then, list these features separately? Because they are no less relevant than increased specificity for *identifying the explanandum role* in question. Moreover, however unlikely it is in this context, a candidate structure might satisfy the second feature *without* satisfying increased specificity.

(that is, relative to) something else in this way.[79] These points are mutually independent. Determinable-determinate structures may be levelled without being relative, and they may be relative without being levelled – at least if one drops the strict ordering requirement mentioned above.

The fourth feature is what I will call simply the '*in respect of*' feature: determinates are, in some sense, arrayed *in respect of* their determinables. Wilson puts the point in terms of specification: determinates are more specific than their determinables *in respect of* their determinables. But this seems to *presuppose* the very point being targeted: it is because determinates are arrayed *in respect of* their determinables that they *can* be more specific than them – and *a fortiori*, more specific *in respect of* them – at all. Moreover, it seems too narrow, since we may also say for example that determinates *resemble*, or *differ*, or *are comparable*, only *in respect of* their determinables. For these reasons, I will just call this point the 'in respect of' feature, that determinates – a little gnomically – *are in respect of their determinables.* Note also that while determinables (at least, excluding highest determinables) and determinates are arrayed *in the same respects*, the *in respect of* relation is a little more finicky to get right. For one thing, it is asymmetric: determinates may be arrayed in respect of their determinables, but determinables are not arrayed in respect of their determinates. Moreover, there is a certain oddness to the 'in respect of' locution as applied to *mid-level* (i.e. not highest) determinables. For example, while it is natural to say that crimson and scarlet *differ* in respect of redness, it is very odd to say that either crimson or scarlet is *more specific* than red *in respect of* redness. It is *not* so odd, however, to say that either crimson or scarlet is more specific than red in respect of their shared highest determinable, *colour*. This claimed tendency for in-respect-of locutions to prefer highest

[79] I use 'thing' in this context because I do not want to commit to using 'property'.

determinables – fits well with what I will claim later: that the determinable-determinate hierarchy is *ontologically non-uniform*, and that *specification* and *determination* are in this context distinct relationships (in particular, that determination is *not* a kind of specification).[80]

The fifth feature is *determinate comparability and similarity*. We have already seen a version of this point in the discussion of Johnson above. Wilson puts it like this: "if *P* and *R*[81] are different same-level determinates of the determinable *Q*, then *P* and *R* are similar, and moreover comparable, in respect of *Q*." The same-level requirement here may seem a little odd. After all, if crimson is more specific than red in respect of colour, does this not mean that crimson and red are comparable in respect of colour? Yet crimson and red are *not* same-level determinates of colour. Adopting a different idiom, we might say that the region of (colour) property space associated with crimson is a proper subregion of that associated with red – which seems, at least *prima facie*, like a legitimate sort of comparison to make. Once again, then, we find that the details are finicky, though it is clear that determinables are in *some* way closely tied to comparability and similarity. For the sake of exposition here, I leave open the question of exactly what form this close connection should take; indeed, that is something for the proper *explanans* to deal with.

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[80] 'In respect of' expressions are rather hard to pin down. For example, they also admit of *identification*: we may say that colour *is the respect in which* red and crimson differ in specificity – or indeed, that *specificity* is the respect in which red and crimson differ as determinates of colour. These nuances make it difficult to base any argument on the *specifics* of respect-talk. Nevertheless, I will be arguing throughout this thesis that the basis of respect-talk in *general* – the appearance of a certain respect-*structure* in an *explanandum* role – is a central target for metaphysical explanation. Indeed, one merit of my ontology is that it provides a well-motivated regimentation of this somewhat untamed talk of respects.

[81] My own preference, in this context, is to preserve Johnson's convention of using lower-case letters for determinates and corresponding upper-case letters for the corresponding determinables. However, where I cite Wilson, I follow her convention of using upper-case letters for both. I have not adopted a uniform notation, in order to more clearly mark out which statements are taken from Wilson, and which are not.

The sixth feature is *non-conjunctive specification*. Again, this is a feature that we met in our discussion of Johnson. As Wilson says: "if *P* determines *Q*, then *P* is not identical with any conjunctive property conjoining *Q* with any property or properties independent of *Q*." The move from a determinable quality (here, *Q*) to one of its determinates is not a move from *Q* to some conjunction (*Q* ^ *R*) where *R* is a property (or some properties) independent of *Q*. Note that strictly speaking, we should distinguish this version of non-conjunctive specification, where the second conjunct is taken to be a property or some properties, from a wider class of non-conjunctive specification conditions which reject *any* sort of second conjunct. An example of a second conjunct not consisting of a property or some properties would be a condition of something's standing in some *formal relationship* or other. While I am in agreement with non-conjunctive specification in its restricted form, we will see in a later chapter (on the problem of universals) that I am *not* in agreement with its wider construal.

The seventh feature is *non-disjunctive specification*. Just as *non-conjunctive specification* demands that movement from determinable to determinate should not consist in movement to a conjunction, so *non-disjunctive specification* demands that the movement from determinate to determinable should not consist in movement to a *disjunction*. Determinables are not disjunctions of their determinates, either alone or in combination with any further properties independent from them.[82]

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[82] Curiously, there is no move with disjunctions that parallels the two versions of non-conjunctive specification given above. One might conceive of some options on which the additional disjuncts in a move from determinate to determinable consist not in further properties but in elements of ontological form, but such options are irredeemably obscure. For example, given some totality *T* of ontological categories whose determinable profiles include the highest determinable *P*, and given some determinate *p* of *P,* one might characterise the move from *p* to *P* as a move from *p* to a disjunction *either p, or both belonging to some category in T and not-p*. But who would want to defend that?

The eighth feature is *determinable inheritance*: possession of determinate qualities entails possession of all corresponding determinables. We have seen this point in Johnson's remark that the highest determinables are 'present from the start' in the generic nature of an object. However, *determinable inheritance* may be satisfied even if Johnson is wrong about that. It might be, for example, that a certain sort of trope bundle theory is correct and objects simply are bundles of maximally determinate property-instances. In that case there is no room to hold that determinables are 'present from the start' in the natures of objects: they must be generated from the bottom up. Yet it would still remain the case that possession of determinates *entails* possession of corresponding determinables.

The ninth feature is *requisite determination*. Here is how Wilson puts it: "if *x* has *Q* at time *t*, then for every level *L* of determination of *Q*: *x* must have some *L*-level determinate *P* of *Q* at *t*." In short: possession of a determinable entails possession of some determinate of that determinable at each level of determination. Interestingly, Wilson offers the intuitive paraphrase: "objects must have a determinate of every determinable they have". This seems correct, though it is a weaker claim than the earlier formulation, since it does not entail *on its own* (i.e. without the aid of *determinable inheritance*) possession of determinates *at every level* under a determinable.

The tenth feature is a requirement of *multiple determinates*: for any determinate *p* of *P*, there is at the same level of determination as *p* another determinate *p′* of *P,* distinct from *p*. The thought here is that, as Wilson says, "with determinate specificity comes multiplicity or diversity". It is not clear, however, why this should be *necessarily* true. Thinking of specification as a kind of *division* may get us there, since then the multiple determinate

requirement plays a similar role to a kind of supplementation axiom. But *is* specification a kind of division? If it seems to be, we should be sure that it does not seem to be so on the wrong sorts of grounds – grounds that are incompatible with the non-conjunctive and non-disjunctive constraints on specification. Indeed, it might seem that determinables that are essentially *uniquely possessed* – if there are any – might be counterexamples to the multiple determinate requirement.[83] I leave this as an open question here.

The eleventh feature is *determinate exclusion*: same-level determinates under a common determinable exclude each other. Put another way: if *x* has a determinate *P* of *Q* at time *t,* then *x* cannot have, at *t*, any other determinate *R* of *Q* at the same level of specificity as *P*. This point, too, has been seen in our discussion of Johnson. I have also appealed to it myself, as a premise in my discussion of *thick entities* in an earlier chapter. Of all the features of determinables and determinates, this is among the least disputed – the only real debate being over how metaphysically fundamental determinate exclusion is.[84] The point also bears a close relationship to the question of the relative priority of contrary (polar) and contradictory opposition (see Horn 1989), a relationship marked *inter alia* by Johnson's talk of determinates being 'opponent' under a determinable.

The twelfth feature is *unique determination*: for any object *x,* time *t* and determinable *P*, and any level of specificity *L*, if *x* has *P* at *t,* then *x* has only one determinate *p* of *P* at *L* at *t*. As Wilson notes, this follows from *requisite determination* and *determinate exclusion*, so I will not say more about it.

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[83] *God* might be a plausible candidate to uniquely possess such determinables. Such cases may be driven by their connection with property spaces that have an *archetype* structure. In any case, the pursuit of such a topic is beyond the scope of my present discussion.

[84] Dimensionism is, of course, able to offer an explanation of this, at least in some cases, in terms of the reflexivity of resemblance.

The thirteenth feature is *asymmetric modal dependence*. As Wilson puts it: "if *P* is a determinate of *Q*, then if *x* has *P* then *x* must have *Q*, but for some *y*, *y* might have *Q* without having *P*." This feature is entailed, as Wilson notes, by *determinable inheritance*, *requisite determination,* and *multiple determinates*, so I will say nothing further about it here.

The fourteenth and final listed feature is *causal compatibility*: determinates and their determinables do not causally compete – that is, they do not exclude each other as causes of some common effect. Thus, the classic example offered by Wilson: "if a given patch is both *red* and *scarlet*, there is no in-principle difficulty with both *red* and *scarlet* being causally efficacious *vis-á-vis* the pecking of a pigeon trained to peck at any red patch." This point has been brought to bear on discussions in the philosophy of mind (see e.g. Yablo 1992), in defence of the causal efficacy of mental states. For our present purposes, I note that *causal compatibility* sits somewhere between being a core feature of accounts of determination (such as the so-called 'subset view'), and being a core part of the *theoretical utility* of an account of determination.

These, then, are the elements of Wilson's list: increased specificity, irreflexivity, asymmetry and transitivity, leveled and relative determination, the 'in respect of' feature, determinate comparability and similarity, non-conjunctive specification, non-disjunctive specification, determinable inheritance, requisite determination, multiple determinates, determinable exclusion, unique determination, asymmetric modal dependence, and causal compatibility. Together they form the core – or a plausible enough core, at any rate – of the target *explanandum* structure in the determinables debate.

One might note that a great number of these listed features are open to controversy, both in their details and at a broader, more gestural level. This raises a sharp question mark over the *unity of the explanandum*, in at least two ways. First: is there some one (or core plurality of) genuine target structure in the vicinity of the *explanandum* profile outlined by Wilson's summary list? And second: if so, to what extent do the listed features, or at least some majority of them, belong to that structure (or those structures)? How, in either case, would we know?

While conceding that *knowledge* here is difficult to come by – we are after all, as I argue in Chapter 7, here in the business of making *fallible* posits – I say again that we should seek progress on these questions by pursuing an ontology – an *explanans* structure – that will offer a good metaphysical explanation of whatever natural core structure the *explanandum* profile might be capturing.

It bears noting that a good *explanans* structure may turn out to be one which shows a significant number of *explanandum* features to be mistaken. This is partly because many of the *explanandum* features are driven by a narrow set of paradigm examples, and also simply by dint of the fact that the listed features are occurring in an *explanandum* role. Indeed, this will be an especially salient possibility if – as I will argue – the *explanandum* features are getting at *more than one explanans structure*.

Before moving on, a few points are worth mentioning which do not entirely fit within the *explanans* side of the discussion, but do not quite belong to the *explanandum* side either. These are best characterised as emerging *choice points* within the debate – points which are

in *transition* from being (arguably) core features of the *explanandum* to being somewhat more peripheral and optional.

One such choice point is the question of whether determinates are metaphysically prior to determinables. On this, the majority view was and remains affirmative. However, Wilson (2012) has argued in defence of fundamental determinables – that is, determinables that are neither reducible nor eliminable. I raise this here to note that the view I will be defending here offers a novel way to articulate and defend what remains very much a minority view, that *some* determinables are metaphysically prior to their determinate values (but *not* to the entities that determine them).

Another choice point concerns the categories to which the modifiers 'determinable' and 'determinate' properly apply. We have seen that Johnson applies the distinction to *adjectives*, understood roughly as either *qualities* or quality *terms* – and the majority view has indeed been that determinables and determinates are determinable and determinate *properties*. But this is not the only view. Various authors in the philosophy of mind, for example, have taken *mental states* to be examples of determinables – or at least, to stand as the determinable relatum in *determination* relations (see Funkhouser 2014 for a survey and critique of this idea). Jones (2016) has also recently suggested treating the notion of an *individual object* as a determinable. The range of options here will continue growing as new applications of the determinate/determinable distinction are explored. Nevertheless, there is something odd about the very question of what sort of thing determinables and determinates are. For *determinable* and *determinate* are – according to the common conception – terms that designate *relative status*, not categories of being. One might think that *specification* should impose categorial unity on the distinction: perhaps it is only

entities of some common sort that may be compared in respect of specificity, or *have* any degree of specificity at all. However, this is to assume that specification *is* central to the determinable-determinate relation, and this is an assumption which I will later deny.

This brings me to a third point, which – unlike the previous two – remains at present a universal assumption in the literature, rather than a point of choice. It is the assumption that the hierarchy of determinables and determinates is *ontologically uniform*.[85] I deny this assumption, and this denial is what enables me also to deny that *specification* is involved in every core structure underlying the *explanandum* (*explananda?*) of the determinables debate.

Finally, there is a choice point which concerns how *maximal* determinables and determinates should be understood. Since *determinable* and *determinate* are terms of relative status which generate – as mentioned – strict partial orderings, it is natural to regard highest determinables and lowest determinates as simply the terminal entities in such orderings – that is, to conceive of them in a relative way. However, this is by no means required: one may also conceive of either terminus of a determinable/determinate hierarchy in a non-relative way. As mentioned in my discussion of Johnson, it is plausible that the very existence of many upper termini would suggest that such termini are not a merely relative affair: their occupants do not merely *happen* to be the highest determinables, but rather, there *could not be* any higher. But it is not clear that parallel reasoning applies to *lower* termini: one might quite coherently conceive of upper termini

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[85] This differs a little, as we will see, from the claim that the *class of determinable predicates* has an ontologically uniform value-range. It is also compatible with the claim that there are *multiple* determinable-determinate hierarchies that are *individually* ontologically uniform but *collectively* ontologically diverse.

non-relatively, and lower termini in a relative way.

4. Some Extant Proposals

I have examined both Johnson and the target *explanandum* structure at some length. In the next section I will argue that a dimensional ontology provides the best *explanans* structure for the *explanandum*, as well as the best ontology to complement Johnson's treatment of the determinable. Presently, however, I take a break to survey – in a relatively brief way – some other extant accounts of determinables. I will attempt no semblance of an exhaustive survey here. Rather, I focus on two accounts: Armstrong's *partial identity* view, and Funkhouser's trope realist approach in terms of theoretical constructs and *levels of abstraction*. In each case a moral will be drawn for later discussion. My discussion here overlaps substantially in focus with my discussion of respect structure in Chapter 1. However, these discussions are set in rather different contexts, so I have chosen to keep them separate.

Armstrong's treatment of determinables – here I stick with the discussion in his 1997 book – is motivated by the theoretical utility of determinable structures in regimenting resemblances between determinate universals (1997:48). Determinates, being universals, are types of states of affairs, conceived as unsaturated, abstracted entities. Armstrong considers a set of determinates united under a common determinable:

> Since different such classes of determinates do not intersect, it is likely that what we have here is an equivalence class, falling under some particular equivalence relation. Without trying to specify this relation directly (it may differ from determinate to determinate), my proposal is that it is a complex relation involving partial identities, ones which hold either directly or recursively between any two members of the one equivalence class. In the best sort of case, found in one

> dimensional quantities such as duration and mass, each member stands directly in a partial identity relation to every other member of the class. Probably this is not a necessary condition for all classes of determinates. (1997:51)

For Armstrong, then, there are determinates – type states of affairs – and there are classes of determinates. Determinables are reducible to these classes of determinates, which in turn are obtained by abstraction – non-mereological decomposition – from states of affairs. Determinables thus figure a long way off the ground, if they figure at all. The classes in question are equivalence classes of a certain sort – those generated by complex networks of partial identities:

> The partial identity here is the sort of partial identity that can hold between universals. To take simple cases, it is the sort of partial identity that holds between the conjunctive universal P&Q and P, or between P&Q and Q&R. The claim is that every class of determinates falling under a determinable is held together by partial identities. I am not claiming that this proposition is convertible. There may well be classes of universals where the members are linked by partial identity but it is not the case that the class-members fall under a common determinable. (1997:51-2)

One might well be puzzled by these remarks. Isn't Armstrong here endorsing precisely the kind of view that our *explanandum* list rules out – one which relies on conjunctive specification? This would not mean curtains for Armstrong in any case, since *non-conjunctive specification*, while rather central, is not sacrosanct among our listed *explanandum* features. But things are not so simple. For Armstrong continues:

> Furthermore, as already noted, it remains possible that *some* of these classes are unified in a more direct manner. It is possible for some of these classes that to the determinable *predicate* there corresponds a property, a determinable universal. (1997:52)[86]

[86] This is, of course, a change from his 1978b view.

And many chapters later:

> It will at this point be useful to distinguish between *logical* and *real* determinables. All real determinables are logical determinables, but not all logical determinables are real ones. Logical determinables are W.E. Johnson's determinables. They are whatever obey the logical laws that Johnson laid down for determinables. […] Unlike logical determinables, which are properties of particulars, the real [or ontological] determinables are genuine, and non-relational, properties of determinate properties, properties providing a universal to unify suitable classes of determinates. (1997:246)

Armstrong points out that such real determinables – now conceived as second-level properties, genuine types on types of states of affairs – are needed to supply the universals that feature in *functional* or *determinable* laws of nature. I will postpone a discussion of the relationship between determinables (or for me: dimensions) and functional laws until Chapter 5. It is not my aim here, either, to assess the plausibility of Armstrong's conception of real determinables: for space, I cannot engage at close quarters on this point. (For a different account along broadly similar lines, see Bigelow and Pargetter 1990.) My point is rather to draw out the *duality* of Armstrong's (1997) discussion of determinables. On the one hand, determinables are treated as forming a certain inclusive class – that of *logical* determinables – while on the other hand, a certain sub-class of logical determinables – the *real* determinables – are given an ontologically distinctive treatment quite apart from Armstrong's treatment of *merely* logical determinables. Thus, Armstrong – at any rate, Armstrong-during-1997 – seems to be in agreement with two of my present claims. First, that there is a certain *explanandum* structure which exhibits enough unity to be identified as such – namely, that of logical determinables; Armstrong (1997:48-9) employs a list of features to capture that structure, which is similar to but less wide-ranging than the one presented above. And second, that the class of logical determinables is nonetheless

metaphysically bifurcated. Thus, his treatment of the class of logical determinables is unitary; the duality of his view emerges at the level of the metaphysical *bases* for particular logical determinables.[87]

Turning away from Armstrong, consider now the position defended by Funkhouser (2006, 2014). I concede straight away that Funkhouser's work – especially the extended discussion in his 2014 book – is explicitly intended to focus on the *logical structure* of kinds, and to stay somewhat light on metaphysical commitments. However, Funkhouser does make *some* commitments. One such commitment is to property realism, and in particular trope realism, as an ontological backdrop for his discussion. Properties are held to be basic, and to be *instances of kinds*. Funkhouser then argues that kinds may stand in two distinct sorts of asymmetric necessitation relation to other kinds: *determination* and *realisation*. Determination occurs when the necessitating kinds vary along the same *dimensions of determination* as the necessitated kind;[88] realisation occurs when the necessitating kinds do *not* share the determination dimensions of the necessitated kind.

This is all very well, but – I suggest – not very satisfying if one hopes for an explanatory *metaphysics* of determinable structure. For Funkhouser holds that the nature of kinds is exhausted by their dimensions of determination (and non-determinable necessities), while dimensions of determination are *theoretical constructs*. Hence, sameness of determination dimensions is described at various points as sameness of *level of abstraction.*

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[87] In this way, Armstrong holds that the class of (*explanandum; logical*) determinables is not ontologically uniform – but in a way that is distinct from holding that the *hierarchy* of determinables and determinates is not ontologically uniform.

[88] This is simplified for exposition. I have omitted, for example, Funkhouser's discussion of 'non-determinable necessities' – roughly, the determinate values of determinables with which particular kinds are associated.

Now granted, Funkhouser does not offer a developed ontology – nor does he claim to. There is nothing wrong with theoretical constructs; indeed, on the view defended in Chapter 7, it is plausible that theoretical constructs are by no means unsuited to substantive ontological work. But, nevertheless, in lieu of such a developed ontological account from Funkhouser, it is unclear exactly how treating dimensions of determination *themselves* as theoretical constructs – putting the notion of a theoretical construct to work in the first-order metaphysical account as opposed to the metametaphysics – is supposed to help account for determinable- or respect-structure in the world.[89]

Let me take stock. I have now surveyed the state of the determinables debate in relevant respects. I have considered the views of Johnson and Funkhouser, with which my own position has the greatest affinity – and I have suggested that both Johnson and Armstrong make, in their own ways, parallel manoeuvres to some of my main moves in this chapter. I have also set up the determinables debate as the task of articulating and explaining a certain target structure, and I have articulated that target structure. In the next section, I present my own dimensional account of the determinable.

5. Dimensions and Determinables

The core of my view is easy to state: I identify, as the ontological correlates of Johnson's *highest determinables,* what I have been calling *dimensions*. Anything that is, for Johnson,

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[89] One route open to Funkhouser would be to make *more* of theoretical construction and abstraction, perhaps pursuing a connection with recent work on geometrical models of cognition and conceptual spaces by Gärdenfors (2000, 2014). Precisely where such a route leads, however, is open to debate. I am not claiming, in any case, that Funkhouser himself claims that dimensions of determination are theoretical constructs. As I have noted in Chapter 1, he appears to take them to be mind-independent features of reality.

a highest determinable, belongs on my view to the fundamental ontological category of *dimensions*. I take this to mean that the *whole* class of Armstrong's 'logical' determinables – whether 'real' or 'logical' – qualify as dimensions in my sense. This is because the category of *dimensions*, on my view, is individuated by the occurrence of its members as relata in the *determination* relationship (they determine *nothing*, but are themselves determined *by* objects) and moreover, because the category is fundamental in virtue of the non-derivative nature of the existence and identity criteria of its members. All this leaves the members of the category – dimensions – free to be non-fundamental in *other* senses of 'fundamental', and hence free to be (among other things) *mind-dependent*.

Dimensions are, recall, *respects* in which objects are the ways that they are. They stand in a relationship that I am calling *determination* – but this is not the relation that is commonly held to obtain between determinable and determinate properties. It is, rather, simply the distinctive formal relationship that holds between *dimensions* and *objects*.

Objects, recall, are conceived as *thick* – very much in line with Johnson's conception of substantives which carry their determinable profiles 'from the start'. Insofar as Johnson's determinable profiles are profiles of *highest* determinables, they correspond exactly with the *dimensional profiles* which, as I have argued in the previous chapter, are individuating markers of ontological categories.

In short, I hold that *dimensions, objects*, and their associated ontological form – the ontology defended in the previous chapter – constitute the *explanans* structure underlying the *explanandum* features offered above.

That, at least, is one half of my view. The other half concerns the remaining *explanandum* features that are *left over*. For I have stated already that my dimensions are identical only with the *highest* determinables in Johnson's picture. So: what about the rest - the *other* terms in determinable-determinate hierarchies that *also* exhibit the relevant *explanandum* features? Here I must briefly anticipate the discussion of Chapter 3 by pre-empting certain aspects of the solution that I will defend to the problem of universals.

The problem of universals admits of a treatment similar to the present debate about determinables: it is a twofold task of articulating an *explanandum* structure, and providing an *explanans*. The *explanandum* structure is significantly easier to articulate there than in the case of the determinables debate. Precisely how this is best done I will discuss in Chapter 3, but roughly, the target structure is that exhibited by – speaking non-committally – an object possessing a determinate property (under some determinable). Now, we have seen already that a certain part of this structure – that comprising the object and its associated highest determinables – is explained on my view by the existence of objects and dimensions. This leaves a structural remainder – the determinate property – still to be explained.

Postponing details to Chapter 3, my claim is that *no further entities* are needed to explain this structural remainder. Determinate properties are not admitted as further entities; instead, statements purporting to ascribe determinate properties to objects are explained as statements ascribing *resemblance* relationships to objects and properties in a specific way

to be adumbrated in Chapter 3.[90] Determinate property terms thus emerge as *incomplete symbols* in Russell's (1918) sense: symbols which disappear on the most ontologically perspicuous analysis.

So: what about the other determinables – the ones that are not highest in determinable-determinate hierarchies? My answer trades on the fact that such determinables differ from highest determinables in that they are also *determinate* relative to those highest determinables. My account of them therefore does not differ, in essence, from my account of absolutely determinate properties in terms of objects, dimensions, and resemblance (again, details are postponed until Chapter 3).

(Note here that there is a certain parallelism between my approach and the standard one which treats determinates as prior to determinables. In both cases, where *resemblance* is relied on to construct the determinable-determinate hierarchy – whether bottom-up or top-down – it is the relativity of the determinable-determinate distinction, and the resulting 'dual status' that all except the highest and lowest terms in the hierarchies have, which allows resemblance[91] to do its constructive work in the way discussed in Chapter 3.)

6. Some Assumptions Revised

With the dimensional treatment of determinables sketched, we may turn at least to re-

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[90] In a Chapter 4, I will discuss the implications of this – already touched on – for the structure of predication and instantiation, and hence, for the notion of a *fact*. It should also be clear that such a take on the problem of universals – coupled with the operation-based conception of joint-carving defended in chapter 1 – renders the relevant joints of reality into a form that is, I suggest, fit for carving by the operations involved in *measurement*. These connections, too, will get a chapter of their own.

[91] This point applies a bit differently in the cases of theories that appeal to resemblance *all the way up*, such as Gonzalo Rodriguez-Pereyra's (2002) resemblance nominalism.

examine the determinables debate and draw out some implications. Which assumptions in that debate are preserved, and which rejected, on my view?

My view is, first of all, in broad agreement with that of Johnson as I interpret him. While I do not hold, as Johnson seems to, that there are such things as determinate qualities,[92] my account holds – just as Johnson's does – that the determinable-determinate relation, understood as that relationship which runs *all the way through* determinable-determinate hierarchies, is a relationship that is between, and distinctive of, adjectives (or something close enough to them). Moreover, my account agrees with Johnson that this distinctive mark of adjectives is generated by the *ontological* form of a specific class of adjectives, namely the highest determinables. It is these highest determinable terms – the dimensions – that arrange determinates into distinct and ordered arrays.[93]

I *cannot* agree with Johnson, however, that the relationship of determinates to determinables is always a specification relationship. In particular, I cannot agree that the relationship of a (relative) determinate to a *highest* determinable is a specification relationship. This is due to my identification of highest determinables with *dimensions,* and hence in turn with *respects.* Accordingly, highest determinables are not the least specific terms in a series of *properties* or *ways of being*, but rather, the very respects under which the other terms in that series differ in specificity.

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[92] At least, in any non-derivative sense. My account is flexible on this choice point: I may say either that determinate properties do not exist, or that they exist and are derivative. In general I have chosen the former course for simplicity, as I explain in Chapter 3.

[93] This 'arranging' work sits well with the claim that determinates are ontologically derivative from determinables.

I *can* agree, however, that same-level determinates under a common determinable exclude each other. Indeed, on my account we can even explain why this is. For the possession of determinate qualities, on my account, boils down to *resemblance*, and resemblance is – one might well suppose – a reflexive relationship. For one and the same thing to be simultaneously two ways, at the same level of specificity, in the same respect, would therefore be for that thing to *both resemble and not-resemble*[94] *itself in that respect*.

I can agree with Johnson, moreover, that highest determinables have a distinctive 'positive content' in virtue of which they may differ from each other: it is a basic tenet of my view that dimensions, being members of a fundamental category, have identity criteria that are not derivative from any other category.

Finally, I can agree with Johnson that highest determinables are *shared* by objects, and even shared in a particular way, namely, through their figuring in the determinable (dimensional) profiles that mark the natures of objects and their partition into categories.

Moving on from Johnson, how does my view relate to Wilson's list of *explanandum* features? I have already said that my view does not accommodate a conception of the relationship of determinates to highest determinables as one of increased specificity, though it *is* compatible with such an account of the relationship between determinates and *non*-maximal determinables.

What about irreflexivity, asymmetry and transitivity? On my view, the *determination*

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[94] This term admits of two readings, as either the polar or the contradictory opposite of 'resemble'. I intend both here.

relationship is indeed irreflexive and asymmetric (to deny either would be a category error), but it is *not* transitive except in the vacuous sense that *nothing* which determines anything is itself determined by anything, and so any conditional whose antecedent requires such a thing would be trivially true. However, my account leaves it open whether the relation between determinates and non-maximal determinables might be transitive.

Levelled and relative determination are both accommodated, again, in relation to non-maximal determinables.

The 'in respect of' feature is accommodated on my view, though by way of concession: *respects* are simply admitted as basic, and a basic category of being at that. I have defended this admission in Chapter 1, so I will not discuss it further here.

Determinate comparability and similarity are accommodated and *explained* on my account, which treats determinates as constructed through, and hence essentially dependent on, objects, dimensions, and *resemblance*. Hence as far as determinates are concerned, resemblance is involved from the start.

Non-conjunctive specification has already been remarked on. Non-disjunctive specification is accommodated, again, by the construction of determinates from determinables and resemblance: disjunctions are essentially composed of, and depend on, their disjuncts – but determinables are not essentially composed of or dependent on their determinable values. The derivative nature of determinates also serves to accommodate *determinable inheritance*.

Requisite determination is accommodated in the following way. It is accommodated first of all in the case of highest determinables: any object that determines such a determinable also perfectly resembles itself under that determinable (once again, I postpone the details), and so also possesses a determinate under that determinable. The determinate in question will also – according to my account – be *maximally* determinate,[95] and so *requisite determination* follows for the case of non-maximal determinables also.

The requirement of multiple determinates is met on my account insofar as it *should* be met on *any* account. For on my view, the posession of a determinate property is a matter of resemblance under a determinable – and a certain object which falls under a given determinable may resemble such-and-such things under that determinable without *thereby ruling out* another object's resembling *different* things under the same determinable. This is not to say that further factors could not rule it out – for example, it might be (to use Funkhouser's terminology) that a certain determinable is possessed only in cases where the associated non-determinable necessities prevent the *multiple determinates* requirement from being met. But quite apart from the question of whether there *are* any such cases, we may observe that this kind of case falls quite outside of the remit of an account of determinables to rule out (or indeed, to rule in).

Determinate exclusion has been remarked on already, so I will not discuss it further. Very similar considerations serve to explain *unique determination*. *Asymmetric modal dependence* is entailed by *determinable inheritance*, *requisite determination*, and *multiple determinates*.

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[95] That is, in the terms that I will introduce in Chapter 3, maximally determinate *in fact* but not necessarily *in principle*.

Finally, causal compatibility left a rather open question on my account, pending details – by no means foreclosed by the account of determinables itself – of exactly *how* determinables and determinates feature in causal relations. It does not seem clear, though, why determinables and determinates *should* turn out to causally compete on my account, regardless of how those questions pan out. Indeed, the causal roles of determinables and determinates should, on my view, turn out to be *complementary* to a large degree, especially in cases that concern nomic *governance*. (I discuss governance in Chapter 5.)

It seems then, on this brief survey, that just about *all* of the listed features can be accommodated on my view. Some of them are accommodated by the category of *dimensions* directly; others by the bifurcation of my suggested treatment of the *explanans* structure. Still others are accommodated by the specific use of *resemblance* for the derivation of determinate qualities. I take it to be a benefit of my view that a number of the listed features may be not only accommodated, but *explained* by these means.

My account, then, involves several reversals of majority opinion regarding determinables. Most prominently, it entails that highest determinables are metaphysically prior to their determinates, though non-maximal determinables are not. The most heterodox part of this reversal, as I have noted, is the *bifurcated* treatment of determinables. While this is a move that is also made, as I have shown, by Johnson and by Armstrong, it is not a *normal* move in the debate, and Johnson and Armstrong realize it in very different ways. My way is closer to Johnson's, insofar as I deny the uniformity of determinable-determinate hierarchies rather than merely the unity of the class of 'logical' determinables as such.

This sort of bifurcated explanation allows for what I have called *respect structure* to be

posited separately from determinable-determinate structure (that is, the *explanandum* structure(s) in the present debate), in such a way as to stand as an underlying *explanans* of it. The chapter's target structure, then, is explained at three levels: it is shown to centre around two *explanans* structures rather than one,[96] it is explained in terms of positive accounts of those two *explanans* structures, and moreover, one of those *explanans* structures stands in turn as *explanans* to the other.

[96] This might not seem like the most obvious move. I am claiming a certain duality in the *explanandum* structure, but I do not claim that my *dimensions* stand in the same relationship that determinables stand in with respect to determinates (the term 'determination' notwithstanding). Why then claim that my dimensions *are* ontological correlates of highest determinables at all? Why not conclude instead that we were simply *mistaken* in what we took to be actual examples of highest determinables, all along? Why not, in other words, *remove* such adjectives as *colour, shape* and *mass* from the determinable-determinate hierarchy altogether, and shift the status of 'highest-determinable' one rung down? The answer – besides inconvenience – is partly that this would not easily accommodate Johnson's discussion, and partly that the issue seems, to a large degree, merely a verbal one.

Chapter 3 - Determinate Structure: the Problem of Universals

0. Intro

In Chapter 1 I argued that *respect structure* in the world is underwritten by a fundamental ontology of *objects* and *dimensions*. Chapter 2 applied the proposed ontology to the determinate-determinable relationships between adjectives. I argued there that dimensions are the ontological correlates are *highest* determinables – those not determinate relative to any other adjectives. Thus, on my view, determinable-determinate hierarchies are not ontologically uniform: highest determinables are singled out for their own treatment. The present chapter continues our focus on adjectives.

The present chapter supplies an account that is complementary to that of Chapter 2. Here I argue that objects, and their resemblance relationships, are the ontological correlates of *determinate* adjectives, in a way to be explained. In particular, I will offer an account on which it is objects and their resemblances, *rather than determinate properties*, that play this role. My position is thus a variety of property nominalism comparable, in limited respects, to the resemblance nominalism of Rodriguez-Pereyra (2002), as I discuss in Chapter 6.

The majority of my discussion in this chapter will be targeted at *maximal* determinates: determinates that are not in turn determinable in relation to further ways of being. I will be arguing that objects and their resemblances can account, in the first place, for the *maximally determinate* properties that they share. The grounding of *mid-level* determinates - determinates that are in turn determinable - will not be a focal target for explanation in this chapter. I will offer a *sketch* of a dimensionist treatment of mid-level determinates in

the last section of this chapter, but it will not be developed in detail.

I am, then, dividing determinable-determinate hierarchies in a threefold way, corresponding to three sorts of structure at the ontological level. *Highest determinables* are accounted for in terms of dimensions, *maximal determinates* in terms of objects and their resemblances, and *mid-level determinates* in terms of an *extension* of my proposed treatment of maximal determinates. I have argued in previous chapters for the first of these divisions: the separate treatment of highest determinables. I take the second division - the separate treatment of maximal determinates - to be rendered plausible by the widespread assumption that there is *some* distinction in ontological status between determinates (or at any rate, maximal determinates), and their related determinables.

In Section 1, I set up the task of explaining determinate structure in terms of the *explanandum-explanans* framework familiar from previous chapters. I discuss the relation of this task to the *problem of universals*: my proposed account, if correct, will offer a solution to that problem. In Section 2, I set out my treatment of determinate structure in terms of resemblance structures on objects and dimensions. I introduce a Fregean-style abstraction principle, which captures how these elements hang together to do this explanatory work, and discuss the intended interpretation of that principle. In Section 3, I argue that the Julius Caesar problem, which besets abstraction principles in the context of neo-Fregean approaches to mathematics, does not transfer to the abstraction principle that I am advancing here. Finally, in Section 4, I discuss the application of the abstraction principle in explaining determinate structure, focusing on the treatment of mid-level determinates.

1. The *Explanandum*, and the Problem of Universals

I have already defended the claim that determinable-determinate hierarchies are not ontologically uniform: highest determinable adjectives stand for dimensions, in contrast with adjectives that are determinate at any level. This means that highest determinables for me are excluded from the present *explanandum*, and included as an explanatory resource upon which the present *explanans* may draw. Indeed, my position in this chapter will rest upon the use to which dimensions are put in the *explanans* role. In contrast to this, on the standard view (see Wilson 2017, and Chapter 2 of this thesis, for discussion) that determinables – including highest determinables – are *all* dependent on their determinates (because entailed by them), determinables are *not* available as a resource for explaining determinate structure. While my view and the standard view conflict over the relative explanatory priority of determinates and highest determinables, there is convergence over a shared commitment to *maximal determinates* appearing in *some* explanandum role. The standard view has it that these lowest determinates, once explained, will in turn provide an explanatory account of highest determinables. On my view, the reverse is true: lowest determinates are accounted for *by* highest determinables, along with objects and their resemblances. But it is agreed on both sides that lowest determinates need accounting for, one way or another. I therefore take my present focus on the explanation of lowest determinates to be justified.

An explanatory account of lowest determinates will not *automatically* furnish us with an explanatory account of determinables, highest or not, even if it is assumed that an object's possession of a (relative) determinate quality entails its possession of its related determinables. For what is needed is an account of *how* determinables are related to determinates *so as to be* entailed by them. Highest determinables are, of course, exempted

here on account of the arguments of the previous chapters. But all the other determinables – all those *between* highest determinables and lowest determinates, which I am calling *mid-level* determinates[97] – are not. I will treat this mid-level structure as a further, albeit subsidiary, part of the present *explanandum*, alongside and distinct from *maximal*-determinate structure.

I am, to be clear, treating the explanation of determinate structure as a two-stage process, consisting *first* of the explanation of lowest-determinate structure, and *then* of the explanation of mid-level determinable structure. The staging matters because it may, in principle, be important to be able to offer an account of the latter that is in some sense an *extension* of an account of the former.

The explanatory task of this chapter, then, is closely related to the *problem of universals*. It is not exactly the *same*: for one thing, the problem of universals should be articulable in a general way that does not come already committed to my view that highest determinables stand apart from the rest of the determinable-determinate hierarchy. But this is not to say that a solution to my explanatory task could not *also* be a solution to the problem of universals – indeed, I will be arguing that it *is*. In view of this prospect, let me now also set up the problem of universals.

The problem of universals is multiply and disparately characterised. Galluzzo and Loux (2015:1) characterise it most broadly as the question of whether everything is *particular* – or supposedly equivalently, whether anything is *universal* – that is, whether anything is

[97] Since these properties occupy the middle rungs of determinable-determinate ladders, they will all be both determinable and determinate relative to different properties. Thus, 'mid-level determinate' and 'mid-level determinable' are interchangeable.

repeatable. This characterisation of the problem remains ambiguous: it may be either a question about *entities* of a specific sort (or family of sorts), or a question about *structures.* In the former case, it is the question of whether any *universals* exist – entities that are, in some sense, said to be wholly co-located with each of their instances (whatever that means). In the latter case, it is the question of whether reality has a structure - or at any rate, a quality structure - which is *repeated* (whatever that means), and if so, in what such patterns of repetition consist.

The problem is sometimes posed directly in terms of the categories *object* and *property*: what is it for an object to possess a property? To put the issue this way is odd, at first sight – objects and properties might be thought to belong properly to the *explanans* rather than the *explanandum*. Two options therefore arise. One is to keep objects and properties as given commitments, in which case the question's emphasis falls on *possession*: the issue becomes one about the nature of instantiation. I will discuss instantiation structures directly in Chapter 4, so I will not take up that theme here.[98] The other option is to treat this particular way that the problem of universals is posed – what is it for objects to possess properties? – as non-committal. Such a non-committal construal of the question is, of course, not in tension with my position (*modulo* my exemption of highest determinables from the *explanandum* here), but it also leaves the problem of universals open to, and indeed requiring, some further elucidation.

One might, then, also set up the issue in terms of a how-possible question: *how is it possible for distinct objects (particulars) to have the very same properties in common?* The

[98] A further reason for not treating it as central here is that, put this way, it *presupposes* that there are objects and properties.

explanandum[99] here is the sort of thing that is going on - the sort of structure that reality exhibits - when sunsets and British post boxes are *both* red, and the apparent obstacle that generates the how-possible puzzle is the appearance, in some sense or other, of a 'one over many', a 'oneness in multiplicity' (Rodriguez-Pereyra 2002:19). Precisely what the in-principle problem with ones-over-manies is, however, rather unclear. That the world *appears* to have a repeating (qualitative) structure is plausibly a Moorean, or near-Moorean, fact; the only purported obstacle to the very possibility of qualitative repetition, I suggest, arises merely as a consequence of privileging a kind of dud view on which the explanation of qualitative repetition modelled on the repeated occurrence of *particulars*. We might, then, make more of this way of presenting the problem of universals, by ditching the notion of an obstacle: the world *does* seem to contain ones-over-manies, and whatever it is that accounts for them (there being no even *apparent* in-principle obstacle to that), it cannot be merely more particulars. The task, according to this line of thought, is to identify the *additional* structure, beyond the mere existence of particulars, which accounts for qualitative ones-over-manies.

One might also put the question in terms of resemblance: how do distinct particulars qualitatively resemble each other? Rodriguez-Pereyra remarks that the 'Moorean fact' that particulars resemble each other should not be puzzling *unless* it is assumed that resemblance consists in some more fundamental *identity* – that is, that two objects resemble only in virtue of their having some property that is the very same between them – in which case we are back to ones-over-manies again. Hence: '[r]ephrasing the Problem of

[99] In the context of how-possible questions, the notion of an *explanandum* is different from that appearing in my notion of an explanandum *role*. For explanation, in how-possible contexts, is tied with *obstacles* – specifically, with their acceptance, denial, or defeat. See Cassam (2007) for a general discussion of how-possible questions.

Universals in this way makes no real difference' (2002:21). But it is doubtful whether resemblance *should* have the status of an un-puzzling, Moorean fact. While I will later argue that exact resemblance *is* a fundamental relationship, it does not follow that such a relationship does not stand for explanation. Indeed, there remains a question over *which* are the entities in whose ontological form resemblance relationships might be anchored. Moreover, even if exact resemblance were both fundamental and given in a Moorean way, it would not follow that *inexact* resemblance should be the same. I reject, therefore, Rodriguez-Pereyra's view that resemblances in the *explanandum* role are either un-puzzling or not really different from ones-over-manies.

Finally, one might also pose the problem in terms of a search for the truthmakers of a certain sort of truth. Rodriguez-Pereyra (2002:40-1) points out that supplying truthmakers for statements of the forms '*a* is **F**' and '*a* has the property **F**'. Are these the right target statements? Perhaps, *if* it is assumed that determinable predicates are in some sense merely derivative from their determinates. Indeed, Rodriguez-Pereyra himself holds (2002:48-50) that determinables are simply disjunctions of their determinates – a view that I have rejected already. On the view that determinables are *not* so reducible, however, things are different: we may introduce two further target forms in parallel to those suggested by Rodriguez-Pereyra: '*a* is **F** in respect of **D**', and 'the property of *a* in respect of **D** is **F**', where **D** stands for a dimension term. Thus, not 'the tomato is red', but 'the property of the tomato in respect of colour is red' – or more naturally, 'the colour of the tomato is red', and

'the tomato is red in respect of colour'.[100]

The problem of universals is, then, a problem with many faces: we may identify problems concerning *repeatability*, *property possession*, *property sharing*, *resemblance*, and *truthmakers*. Faced with such a spread of approaches, I see no need to decide between them: they are tessellating aspects of a single explanatory task, admitting of a common solution. For my part, I will continue to talk in terms of the explanation of *determinate structure* – but with an eye kept on this wider, extended family of *explananda* connected with the problem of universals.

Two final points of clarification are due relating to the *explanandum* of the present chapter. First, the problem of universals has often been divided into *two* explanatory tasks: on the one hand, tasks relating to truths such as '*a* is F', and '*a* has the property of being F', and on the other hand, tasks relating to truths such as '*a* and *b* are both F', and '*a* and *b* share the property of being F'. It is commonplace to point out (see e.g. Oliver 1996:49) this distinction. Let me clarify how these two tasks are related, on my view. I said in Chapter 1 that objects were *thick particulars*, needing no further entities to confer qualities upon them. In keeping with this, I will treat the question of how *a* and *b* may *both* be F - what Campbell (1990:29) calls the B-question - as prior. An answer to the B-question will tell us what it is for some objects to *share* a property. I will treat the A-question, *what is it for an*

[100] The occurrence of **F** in the target forms, as an individual term standing for a determinate property, introduces further complications. On my view, as we will see, the notion of a determinate quality is introduced (in a sense to be explained) by an abstraction principle, which introduces them via identity statements of the form 'the property of *a* in respect of **D** = the property of *b* in respect of **D**'. Further provisions have to be made for statements of the form 'the property of *a* in respect of **D** = **F**'. This issue – which parallels the Julius Caesar problem raised by Frege against the introduction of number via 'Hume's Principle' – is not difficult to resolve in the present context, but my point is that we are brought a rather long way from Rodriguez-Pereyra's target form '*a* is **F**'.

object to have the property F? not as a question about how an otherwise qualitatively bare object should have F-ness conferred upon it, but rather, as the question of how it may have *the property F that it shares with other objects*. Thus, an answer to the A-problem - insofar as my position poses any A-question - will drop straight out of an answer to the B-question.

Second, in light of this relationship between the A- and B- questions on my view, we may briefly relate the discussion of the present chapter to the fourfold conception of objects given in Chapter 1. The relationship is simple: the A- and B- questions are further features that may be added to my fourfold characterisation of objects. Objects *have properties in common*, in some sense, and moreover, where they do so, they *each* have the properties that they have in common.[101]

2. The Abstraction of Determinate Properties

With the chapter's *explananda* in place, we turn to my proposed *explanans*. Section 2.1 sets the scene, Section 2.2 presents the principle for property abstraction that is central to my account, and Section 2.3 discusses its intended interpretation.

2.1 Preliminaries

My claim is that determinate property structure is, at bottom, a resemblance structure. More specifically, it is a resemblance structure over *tuples of objects and dimensions*. While the core of my treatment of determinates is given by an abstraction principle, which I will present shortly, the motivation for my broader approach in terms of objects, dimensions, and resemblance may be presented in three points.

[101] By 'have in comnmon' here, I obviously do not mean merely that objects are relata of *relations*.

First, and most generally, there is a respectable tradition of treating qualitative sameness in terms of resemblance – of which the most prominent recent example is Rodriguez-Pereyra's (2002) resemblance nominalism. This is especially so for ontological outlooks that treat objects as fundamental and qualitatively thick, and properties as *derivative* entities. As far as the problem of universals is concerned, my solution may be seen as an improved version of that view, as we will see (but see Chapter 6 which discusses the limits of this comparison).

Second, dimensions and resemblance are integrally related. On one understanding of the relationship between them, dimensions are explained by resemblances between determinates. However, on my view, as I have discussed in Chapter 1, explanation runs the other way round: dimensions are not explained, but rather presupposed, by determinate-level resemblances.

Third, determinate *properties* plausibly give way, explanatorily, to *objects* that are determinate in character. The terms 'determinable' and 'determinate' do not – recall – stand as terms corresponding to ontological categories, but rather, stand for two sides of a distinction of relative status between adjectives: determinable-determinate structures are non-constructive. I have argued that highest determinables belong to an ontological class of their own – they stand for dimensions – and a similar point may be made about lowest determinates. So: which entities are maximally, or absolutely, determinate? One might think that they are *properties* – by which is usually meant *type* properties – but this default response cannot be based on the (rejected) assumption that that determinables and determinates simply *are* determinable and determinate properties. That properties should receive the status of absolute determinates – if indeed they should – cannot be simply read

off the determinable-determinate distinction itself. Indeed, given that highest determinable status is possessed by dimensions, which are – I claim – determined by objects – it would seem that absolute determinate status should be given not to type properties, but to either *modes* of objects (in Lowe's sense), or to objects themselves.

I will argue in Chapter 6 – when I consider rival theories – that modes should not be the bearers of absolute determinate status. To summarise: the reason has, roughly, the form of a dilemma: either modes are simply tropes, or not. If they are, then they fail to play the role of *instances* of determinables, in a sense to be explained in Chapter 6. If they are not, then it is unclear – so goes the argument – what sense is to be made of their being entities distinct from, and inhering in, objects *in such a way* as to confer upon those objects the 'ways of being' that are associated with modes. Moreover, given commitment to objects and dimensions, *type* properties would merely be an unparsimonious additional commitment, supposing that commitment to them *can* be avoided (as I argue in the present chapter). My case against properties taking absolute determinate status thus involves a threefold case against tropes, modes, and type properties (universals).

The view that I defend, then, is that *objects* are the ontological correlates of maximal determinates. Strictly speaking, what is absolutely determinate – as opposed to *an* absolute determinate – is an object's *qualitative character* (Johnson 1921:185)[102] What, then, is meant by 'absolutely determinate'? It would seem, on my view, that *how* determinate something has to be to qualify as absolutely determinate is not necessarily – so to speak –

[102] I use this term in a way that is not intended to incur commitment to *reified* qualitative characteristics. This usage should run parallel to, for example, the use of 'phenomenal character' to describe an aspect of a representational state without thereby incurring commitment to *qualia*. What is the point of this regimentation? Really, it may just be uniformity: we may say, given the regimentation, than an object is determinate *in respect of* its qualitative character.

an absolute affair, but rather, hostage to the qualitative characters of such objects as there actually are. The point is made by Wittgenstein:

> It seems that you can go on giving more and more specific determinations or descriptions of the colour of an object. Need the process of more and more exact specification stop anywhere? In the similar case of more and more exact specification of the length of a rod, say, the process comes to an end when our instruments have given us as exact a specification as they can. (2017:75)

We should, then, keep distinct two senses of 'maximal determinate'. In one sense, maximal determinateness is maximal *actual* determinateness. Recall the point made by Mellor, raised briefly in Chapter 1, that a spinning pointer must have *some* width, so the direction in which it points will always have an *interval value*. In such a case, the interval-valued direction is maximally determinate in the sense of being *as determinate as it gets*: there is no sense in asking in what *more* determinate direction the pointer is pointing. In another sense, maximal determinateness is maximal determinateness *in principle*. Continuing with the pointer example, we may imagine *imposing* on the pointer a direction that is more determinate than the interval-valued direction that Mellor suggests. We might, for example, draw a line down the middle of the pointer and take *its* direction as the direction of the pointer. This, in turn, could be made yet more determinate by supposing that the pointer is perfectly symmetrical (so that such a line may be precisely drawn), and so on. There may be, in principle, no end to the idealisations that might drive such a pursuit of determinateness - but this is an *idealised* kind of maximal determinateness, not - in an ontological sense - the real thing. I will call these two kinds of maximal determinateness maximal determinateness *in fact* and maximal determinateness *in principle*.

2.2 The Principle **PA**

My account of determinate structure relies on an abstraction principle not unlike Hume's Principle, which was discussed by Frege (1884), and rejected as a means for the introduction of number. Given a domain **D**, a binary relation **R** on **D**, and a term-forming operator **T**(x) for $x \in$ **D**, an abstraction principle takes the form of an equivalence:

$$(1)\ \mathbf{T}(x) = \mathbf{T}(y) \leftrightarrow x\ \mathbf{R}\ y$$

We will say that **T**(x) and **T**(y) are **R**-*abstracts* of x and y respectively. An abstraction principle thus states an equivalence between the **R**-relatedness of members of **D**, and whatever is expressed on the left hand side by '**T**(x) = **T**(y)'. What *is* expressed by this is a matter of some controversy: it is not clear that the left hand side of the equivalence should be interpreted as expressing an identity between two further entities **T**(x) and **T**(y).[103] I will discuss this issue later.

Clearly, **R** is required to be an equivalence relation, because *identity* is an equivalence relation. Suppose, for example, that **R** were not transitive. Then for some x, some y and some z, **R**xy, **R**yz, and ~**R**xz. Hence **T**(x) = **T**(y), and **T**(y) = **T**(z) (by the abstraction principle), from which follows that **T**(x) = **T**(z) (by the transitivity of identity). But then **R**xz (by the abstraction principle again): contradiction. The 'proofs' for symmetry and reflexivity are equally straightforward.

[103] Hence, while an abstraction principle *might* be interpretable as an identity criterion for the abstracts that it introduces, this is not *automatic*.

A first pass at an abstraction principle for determinates might go as follows.[104] Given a domain $\mathbf{D_o}$ consisting of objects $o_1...o_m$ and a domain $\mathbf{D_\delta}$ consisting of dimensions $\delta_1...\delta_n$, a term-forming operator $\mathbf{P}(x)$ for $x \in (\mathbf{D_o} \times \mathbf{D_\delta})$, and a binary relation $\mathbf{R}$ on members of $(\mathbf{D_o} \times \mathbf{D_\delta})$, we may say:

$$(2)\ \mathbf{P}(x) = \mathbf{P}(y) \leftrightarrow x\ \mathbf{R}\ y$$

I have given the principle in this form because it shares a form with our canonical abstraction principle, (1), above. The interpretation is straightforward enough. The product $\mathbf{D_o} \times \mathbf{D_\delta}$ is the set of pairs (x, y) where x is an object and y is a dimension. Read $\mathbf{P}(x)$ as *the property of x*. Finally, read $\mathbf{R}$ as *exact resemblance*.[105] Roughly, then, the principle (2) says that pairs (o_1, δ_1) and (o_2, δ_1) pick out the same property if and only if they perfectly resemble (or more generally: pairs (o_1, δ_1) and (o_2, δ_2) pick out the same property just in case they perfectly resemble *and* $\delta_1 = \delta_2$).

What we have so far is a principle which has a canonical form, and a halfway plausible interpretation. But our first-pass principle does not yet admit of an interpretation that is satisfactory from an ontological point of view, as I will presently argue. My claim will be that a better, *second-pass* principle may be offered which patches the problems with (2) above, but departs a little from our canonical form in doing so. I will argue, of course, that this change of form is not problematic.

To see the problem, note that there is something odd with the notion of an ordered pair on

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[104] I offer a version of the abstraction principle here for dimensions determined by *single* entities – that is, for monadic properties. The principle can be modified simply enough to apply to relations.

[105] Exact, because $\mathbf{R}$ must be an equivalence relation, and inexact resemblance is not transitive.

both sides of the equivalence. On the left – the side of the identity statement – it simply seems *wrong* to associate a property with an ordered object-dimension pair. Properties are *of* objects, and *in respect of* dimensions; this seems an appearance worth preserving. While the asymmetry of an ordered pair guarantees that the members of a pair cannot be simply permuted, the use of ordered pairs here does not indicate *why* this is so. Formally speaking, the problem is superficial: it may be resolved simply by finding the right *interpretation* of the left hand side, i.e. of '$\mathbf{P}(o_1, \delta_1) = \mathbf{P}(o_2, \delta_1)$'; so long as the ordered pairs are understood under the right interpretation, we should not be misled. Nevertheless, a question remains whether ordered pairs are the best *fit* for the intended interpretation.

A more pressing problem concerns the occurrence of pairs on the right hand side of the equivalence. The identity of $\mathbf{P}(o_1, \delta_1)$ and $\mathbf{P}(o_2, \delta_1)$ is said to rest on the exact resemblance between (o_1, δ_1) and (o_2, δ_1). But is this right? To be sure, both (o_1, δ_1) and (o_2, δ_1) are presumably the kinds of things that can resemble each other – they are, after all, both ordered pairs, and resemble in (for example) their *having two members*. But this is the *wrong kind* of resemblance, and our proposed principle fails to rule it out. Moreover, the abstraction principle requires *exact* resemblance, and it is plausible to hold that ordered pairs exactly resemble only if they are identical. So this sort of resemblance between pairs is hardly the sort of resemblance fit for work in the abstraction principle for determinates: it is at once both too weak, and too strong. What is intended on the right hand side of that principle is not a relationship of resemblance between ordered pairs, but rather a relation whose relata are the *members* of those pairs themselves. However one writes it in symbols, what is *meant* on the right hand side is, in regard to a certain object and a certain dimension on the one hand, and a certain object and the same dimension on the other, is that *they* (the first object and dimension) should exactly resemble *them* (the second object and the same

dimension). The relation **R**, in other words, should be taken as a two-place relation that is *plural* at both places, and indeed, *collectively*[106] so.[107]

Such plural ascriptions of resemblance are tailored precisely to tolerate individual differences: the things *a* and *b* may collectively resemble the things *c* and *d* even if neither *a* nor *b* resembles *c* or *d.* The ascribed resemblance is between how *a* and *b*, and *c* and *d*, are *together.* For example, to say that C and G♭ collectively exactly resemble G and D♭, for example, is *not* to say that either C or G♭ resembles either G or D♭ individually. It is to say – in a way that is not ontologically committal with respect to relations – that C and G♭ are *related* in a way that exactly resembles the way G and D♭ are related. We shall therefore take the expression '*wx* **R** *yz*' to mean that *w* and *x* collectively, and *y* and *z* collectively, exactly resemble.[108]

The point here – that we need a collective understanding of resemblance – is independently motivated by considerations concerning the logic of plurals. The thought – forcefully put

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[106] A plural predication 'the Fs are G' is *distributive* iff it is equivalent to 'each F is G', and collective otherwise.

[107] Besides getting the form of the resemblance relationship right, this way of understanding **R** also eases the path from our present account to an account of relations, since it is easy to vary the number of entities collectively involved at each relation place.

[108] It is hard to see, indeed, what difference the *order* of the object and dimension should make. There are some cases of where order does matter: Abraham and Isaac, for example, collectively resemble Isaac and Jacob *in that order* and not in the reverse order. But this is because one might permute Abraham and Isaac, or Isaac and Jacob, within the relation *x* is the father of *y*, without committing any category error. By contrast, the *determination* that obtains between an object and a dimension is a *formal, internal* relationship: there is no corresponding sense, therefore, to thinking that one might 'permute' an object and a dimension within a determination relationship without thereby reversing the direction of the relationship too. Thus, while it does no harm, one might think that the use of ordered pairs on the right of the abstraction relationship actually supplies *too much*, since the order of the object and dimension should not matter.

by Oliver and Smiley (2001, 2013/2016) and Lewis (1991), is that collective plural predication is not in general reducible to singular predication on 'pluralities' or aggregates: given a collective statement 'the Fs are G', it is not legitimate in general to *change the logical subject* – as Oliver and Smiley put it – from a plural term *the Fs* to a singular term, *the aggregate of Fs*.[109] One might, then, think that the treatment of what ought to be a collective resemblance relation as a binary relation between *singular* relata – ordered pairs – is therefore a one-off application of a singularist approach to plurals which cannot generalise, and which, hence, seems *ad hoc* for reasons quite apart from specific considerations concerning the abstraction of determinates.

Drawing all this together, we may express the sought abstraction principle 'longhand' like this: *the property of the object a in respect of the dimension δ is identical with the property of the object b in respect of δ if and only if a and δ on the one hand, and b and δ on the other, collectively exactly resemble.* In symbols, we may make a second pass at property abstraction [**PA**]:

$$(3)\ \mathbf{P}_{\delta n}(x) = \mathbf{P}_{\delta n}(y) \leftrightarrow \underline{x\delta_n}\ \mathbf{R}\ \underline{y\delta_n} \qquad [\mathbf{PA}]$$

Here, read '$\mathbf{P}_{\delta n}(x)$' as *the property of x in respect of* δ_n, and read the right hand side as before (with underlined relata expressing collectivity). I have here eliminated ordered pairs from the left hand side in favour of *indexing* property terms to the dimensions in respect of

[109] As I have put it, the reduction merely shifts collective plurality elsewhere since the aggregate in question is an aggregate *of Fs*. But even without this issue, the singularist reductive strategy will not work. For suppose one holds that, in general, collective statements about Fs should be reduced to singular statements about F-aggregates. Then there will be some truth about *all the aggregates*, and hence, specifically, some truth about *all the aggregates that are not aggregates of themselves*. Such a collective truth could not be analysed along singularist lines, on pain of a Russellian contradiction. This argument is made in a more refined way by both Oliver and Smiley, and Lewis.

which they are arrayed; the difference should not matter.

R on the right hand side is now a binary relation[110] that is plural and collective at both places. This replaces **R** in (2) which is *singular* and whose relata are ordered pairs. This means that **PA**, unlike (2) and our canonical form (1), no longer states an equivalence between the identity of abstracts and the **R**-relatedness of the *very things* whose abstracts are stated to be identical. While this constitutes a departure from the standard form of abstraction principles, it is no loss – indeed, as we will see in the next section, this is one feature that makes **PA** a *better* fit for our purposes than (2).

2.3 Interpretation of **PA**: Further Details

We have already discussed some issues of the interpretation of **PA** in the process of introducing that principle. In this section, I fill in some further details on that score. Section 2.3.1 discusses objections to my account based on the factored structure of determination, while Section 2.3.2 adds some further details to the interpretation of **PA**.

2.3.1 Factoring Objections

In the context of **PA**, the relation **R** obtains between pluralities of objects and their related dimensions. Now, much in my account turns on the fact that the relationship between these objects and dimensions – the determination relationship – is an internal relationship. But one might object here with a dilemma. Either that relationship *is* internal, or not. If it is not, then it is a *relation* – in which case not only do I lose my whole ontology of objects and dimensions, but I also fail to offer a reductive account of properties (if relations are to count as polyadic properties). On the other hand, if it *is* internal, then the principle **PA**

[110] I say 'relation' because that, formally, is what **R** is. Ontologically speaking, I treat **R** as a *relationship* rather than a relation – but that distinction is alien here.

would seem too *weak* to support the abstraction of determinate properties. For we may factor out two components involved in the relationship between an object and any of its associated dimensions: first, the relationship of *determination* – the object's determining that dimension at all – which *is* formal and internal, and second, the particular *way* in which the object determines the dimension, which is *not* a formal or internal relationship. The argument for this latter claim is straightforward: while an object may determine a given dimension essentially, it need not essentially determine that dimension in some particular way: a beard may essentially have *some* length, but it does not have any particular length essentially. Hence, *that* relation – the relation of the beard to the dimension *length* whereby it determines *length* in a particular way – is not internal, since both the beard and the dimension *length* could exist without the beard being *that* length. This is what I have called the 'factored' structure of determination, here turned against my view.

If the above 'factoring' argument is correct, then I have a problem. For in that case, what *is* internal between objects and dimensions – the bare relationships of determination at-all – are too weak to support **PA**. For *any* combination of objects and dimensions will perfectly resemble any other pair, in the sense of 'resemble' that I have described, provided the objects in question determine those dimensions *at all*. So a merely collective approach to the **R** relation would not be enough: I would have to introduce explicit reference – and hence commitment – to a *relation* (the second 'factor' above) on each side of **R**. Thus, **R** would become merely a second-order relation or relationship – and it would be unclear how my account could still amount to a full *explanation* of determinate property possession.

The objection under consideration would seem to challenge my whole proposed account. But I reject it, because I reject the factoring argument. In particular, the factoring argument requires that that there be a certain kind of *gap* between an object's determining a dimension *at all* and its determining that dimension in some particular *way* – call these determination *at all* and determination *somehow*. While I admit that there is a *distinction*, I deny that it is a problematic sort of *gap*.

One might initially be tempted to cast this response in modal terms: *necessarily*, if an object determines a dimension *at all*, then it determines that dimension *somehow*.[111] Thus, there is no possibility of an object's determining a dimension *at all* but failing to determine it *somehow*: there is no modal gap of the appropriate sort between determination *at all* and determination *somehow*. While determination *at all* entails determination *somehow* in a non-rigid, nonspecific way, this is enough to rule out there being a relationship of *bare determination* – determination *at all* with determination-*somehow*, in some sense, 'factored out' – and so the factoring argument fails.

But such a response only gets us partway. For the objector might respond that determination-*somehow* may *necessarily accompany* determination-*at all* without it following that the two relation(ship)s don't factor apart. Indeed, the objector's point seems to have a model in the following case. Let us admit, for argument's sake, a three-category ontology of *objects*, *dimensions*, and *modes*. Modes are conceived along Lowean lines as non-substantial, qualitative particulars inhering in objects – as *ways that objects are*. Let us also say that modes stand in a formal relationship of *instantiation*[112] to the dimensions that

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[111] Wilson (2013) denies this in the case of the *open future*. However, I will set this complication aside here.

[112] This term is definitely *not* used in a Lowean way here, but I just need a word.

they fall under. Now, objects may be rigidly existentially dependent on dimensions and *also* non-rigidly existentially dependent on the modes that characterise them.[113] In the resulting 'ontological triangle', we may identify determination-*at all* with the direct relationship of *determination* between objects and dimensions, and determination-*somehow* with the *resultant* of *characterisation* (from objects to modes) and *instantiation* (from modes to dimensions).[114] On such a model, determination-*at all* remains distinct from determination-*somehow* – they are different *formal* relationships – even though there is no modal gap between them.

The initial objection might be averted, then, if I were able to admit a further category of *modes* into my ontology. But to do so would entirely diminish the explanatory work left for a category of *dimensions*, and would diminish our reasons for believing in dimensions accordingly. In pursuit of a better alternative, it is worth staying with the mooted three-category ontology a little longer. Consider again the objector's claim that determination-*somehow* may be identified with the resultant of characterisation and instantiation: for an object determine a dimension *somehow* is for it to be characterised by a mode which instantiates that dimension. The objector's argument relies on there being such a model which factors apart determination-*at all* from determination-*somehow* – but we may reply here that the model itself is vulnerable to the *very same* factoring problem! For if *determination* admits of factoring into *at-all* and *somehow* components, why should the *instantiation* relationship in our mooted threefold model not also admit of the same factored structure? Consider: a mode – some way of being – falls under a dimension *at all*, but it also does so *in a particular way*.

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[113] I borrow the term 'characterise' straight from Lowe (2006). Whether it is, in some ultimate sense, *correct*, is not relevant here.

[114] The idea here is meant to parallel Lowe's (2006) treatment of *exemplification.*

It seems, then, that factoring cannot be *averted* by positing modes. But our objector may now take a different stance. Rather than arguing that that determination-somehow is a relation rather than a formal relationship because it is *separable* from determination at-all, at least in the case of objects, our objector might argue instead that it must be a relation rather than a relationship because it is susceptible to *change*. The point is that even if objects and modes should both stand in factored relationships under dimensions, objects can *change* their relationships of determination-somehow whereas modes cannot. Thus, a mode - in virtue of its being the very mode that it is - can only determine its associated dimension *in a specific way*, while an object may determine a dimension in *different* ways over time. This means - so the objector argues - that relationships of determination-somehow do not supervene on the mere *existence* of their relata in the case of objects: an object and dimension may exist, and be such that the object determines that dimension at-all, without it being fixed *how*. Hence, determination-somehow cannot be an *internal* relationship: it must, instead, be a relation. The objector may point out, furthermore, that modes are not susceptible to the same problem: the existence of a mode and its associated dimension *does* suffice to fix how the mode determines the dimension.

In responding to this further objection, we may begin by noting that *resemblance* is often taken to be an internal relationship, not only where *identity* is concerned - for example, where *tropes* are said to resemble in virtue of their identities, and objects are said to resemble (on universalist ontologies) in virtue of the identities of the universals that they instantiate. Of course, this should not be so if by 'internal relationship' we mean a relationship that is fixed by the mere *existence* of its relata (that is, an internal relation in Moore's (1919:47) sense). But there are other senses of 'internal' available. In particular,

dimensionism may avail itself of Armstrong's (1978b:84-5; 1997:87-9) sense of 'internal', according to which a relationship is internal just in case its holding between its relata is fixed by the intrinsic *natures* of its relata. It is *this* sense of resemblance that is needed to make resemblance-based ontologies of properties go.[115]

It would be extremely odd, then, for dimensionism to claim that resemblance is internal in Armstrong's sense, but that determination-somehow is internal in Moore's sense. The dimensionist ought to hold, instead, that *both* determination-somehow and resemblance are internal in Armstrong's sense.[116] We can further motivate this move by considering what dimensionism is claiming in the first place. I have said that objects are understood as qualitatively thick, and that they have their determination profiles essentially. We should *expect*, therefore, that determination at-all should be a *Moorean* internal relationship, and determination-somehow (as well as its cousin, resemblance) an Armstrongian one. With this core of a response in place, the dimensionist may then admit, without incoherence, that the intrinsic natures of objects undergo *change over time*, and that for this reason, an object's relationships of determination-somehow and resemblance will change accordingly. Change will not, obviously, be analysed in terms of an object's changing relations to *properties*, whether modes, tropes, or universals, or in terms of changes in *which tropes or modes exist* - but a further argument would be needed from our objector to show that change *should* be treated in this way (I will assume, here and in Chapter 5, that it need not be).

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[115] The same is true of Rodriguez-Pereyra's resemblance nominalism. For suppose that resemblance were an external relation. Then an object's resembling other objects would itself need a further explanation beyond the intrinsic natures of those objects, and it is hard to see how such an explanation should not undercut resemblance nominalism's account of property possession.

[116] By contrast, determination at-all is intrinsic in Moore's sense. Thus, the proposed response here supplies a further way to distinguish determination at-all from determination-somehow.

I have argued that the factored structure of determination can be turned into a problem for dimensionism only if dimensionism is committed to Moorean internality for determination- somehow where it ought to, and can, be committed to Armstrongian internality instead. Our discussion of objections from factoring has resulted, then, in a clarification of the kinds of internal relationship to which dimensionism is committed. Indeed, as I argue at various points in this thesis, given proper commitments on this score, the factored structure of determination is a *strength*, not a weakness, of a dimensionist ontology.

2.3.2 Further Details

We now set aside our discussion of the factoring objection, and return to the interpretation of **PA**. Recall the principle:

$$\mathbf{P}_{\delta n}(x) = \mathbf{P}_{\delta n}(y) \leftrightarrow \underline{x\delta_n}\ \mathbf{R}\ \underline{y\delta_n} \qquad [\mathbf{PA}]$$

A great deal of discussion of abstraction principles has focused on the epistemic, semantic, cognitive, and ontological commitments that are incurred in moving from the right hand side to the left of the biconditional.[117] The status and reputation of abstraction principles as problematic arise, in large part, from the fact that these discussions occur for the most part in contexts where abstraction principles are put to use as means for *introducing* – ontologically, semantically, cognitively, or epistemically – the abstracts that are involved in the identity statements on the left hand side.[118] In the present context, however, the ulterior

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[117] See e.g. Wright (1983), Fine (1998), Hale and Wright (2001, 2009), Heck (2011), and Ebert and Rossberg (2016) for a sample of these discussions.

[118] The special (and prominent) case of Hume's Principle in the neo-Fregean programme is, of course, even more demanding.

demands on **PA** are much less burdensome. I am not relying on **PA** to provide cognitive access to determinate properties Platonistically - or at any rate, transcendently - conceived, or to provide semantic or ontological machinery for the *construction* or *generation* of such properties (whatever that might mean). Instead, my use of **PA** serves the purposes of *nominalism* about determinate properties: the principle is intended to explain determinate properties *away*. More precisely, it is intended to explain *statements* of the form on the left – containing terms that purport to refer to determinate properties – in terms of statements of the form on the right, which don't – in such a way that no such referential commitments are incurred.[119] The sort of nominalism that I have in mind, then, is not a view which holds that determinate properties are in some sense non-fundamental or derivative: there simply aren't any.[120] Determinate predicates turn out, in Russell's (1918) sense, to be incomplete symbols – symbols which are analysed away and do not appear in an ontologically perspicuous (as Sider would say: joint-carving) language.[121]

Finally, before moving on, recall from the previous section that according to **PA**, the abstracts occurring on the left hand side are not abstracts of the very same things that stand **R**-related on the right hand side of the equivalence. I said there that this counted in favour of **PA**. The reason is that it captures the explanatory role played by *external denomination*

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[119] I want to remain silent on the question of whether the two sides of the equivalence have the same truth conditions. This question seems to involve certain complications – for example, over whether the statements on the left should be properly regarded as *true* – which it is not necessary to enter into here.

[120] I make this choice for the sake of definiteness. Nothing much will turn on it: as far as the rest of the thesis goes, it will be perfectly fine to say that determinate properties exist and are derivative entities. It might take some care to express such a view properly, in light of the framework that I will adumbrate in Chapter 7. However, I am not at all against taking existence questions lightly in this sort of context, along the lines suggested by Schaffer (2009).

[121] It is a little strange, given my nominalist intentions, to call **PA** an *abstraction* principle, or to call determinate property terms (as they appear in **PA**) *abstracts* – one might after all protest that they are not being abstracted at all, but *concretized away!* Nevertheless, 'abstraction' is the term that I will stick with.

– in the sense of Cowling (2014) – in my account. To see what this means, consider again the notion of a thick entity. My view has the following in common with Cowling's (2014) *locationism*, and ontologies based on certain conceptions of *facts* (as I explain in a later chapter): it supports a conception on which thick entities are *compositionally simple* but *qualitatively complex*. This means, in particular, that determinate properties – the abstracts introduced by **PA** – should not be *components* of the objects whose abstracts they are. According to **PA**, this condition is satisfied – and its satisfaction is secured by the fact that the relation **R** in terms of which identity is given for property abstracts relates *more* than just the objects whose abstracts they are. More intuitively, this means that the qualitative complexity of an object is not a matter of its having *internal qualitative components* – it has none – but is conferred upon it *externally* in virtue of its relationships of *resemblance* and *determination-somehow*. (This is not to say that the resulting view that I defend is either a relational or a constituent ontology. It is not a constituent ontology, because determinate properties are not constituents of objects. It is not a relational ontology, because **PA** offers no account of the relational conferral of qualitative profiles upon bare particulars: it offers only a relational account of how an object possesses a *property*[122] that it *shares* with other objects.) On Cowling's view, the same result is achieved through the notion of *location in property space*; on fact ontologies it is achieved by rather diverse means (Armstrong 1997, for example, appeals to *non-mereological* composition). I will

[122] Strictly speaking, since I am taking properties not to exist, I should say that it offers an account of what underlies our truly *saying* that an object has a property.

argue in later chapters that none of these views is satisfactory.[123]

3. Caesar?

Frege famously got himself into troublesome cahoots with extensions and value-ranges as a result of rejecting Hume's Principle as a basic abstraction principle through which to introduce the notion of number, and hence, upon which to base his logicist programme. Here is Hume's Principle:

$$\#F = \#G \leftrightarrow F \approx G \qquad [\mathbf{HP}]$$

Here read F and G as concept expressions, and # as a term-forming operator which takes a concept term to form an expression – such as #F – whose *intended* interpretation is 'the cardinal number of Fs'.[124] The relation ≈ expresses one-to-one correspondence. Thus, **HP** says – under the intended interpretation – that the number of Fs is identical with the number of Gs if and only if the concepts F and G are *equinumerous* – that is, if and only if the objects falling under the concept F correspond one-to-one with those falling under the concept G. This principle was rejected by Frege, not so much because it was false, as because – he thought – it was inadequate to play the theoretical role that he needed it for. For while **HP** equips us to deal with number terms so long as they occur in the form #F,

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[123] Note, too, that external-denomination views are fruitfully dissimilar from amorphous-blob views. On an external denomination view of determinate properties, objects – whose abstracts determinate properties are – are indeed blobs, in a compositional sense – but they are not thereby *amorphous*. External-denomination views do not hold, either – unlike amorphous-blob views – that blobs receive their structure from an imposition of some language or conceptual scheme. We may say, then, that I conceive of objects as *morphous blobs*. (This gets us, I suggest, out of the way of worries raised by e.g. MacBride (2016) over amorphous blobs). The opposing intuition, that any blob *must* be amorphous – is closely tied to the factoring objection discussed above.

[124] As various commentators point out, it is doubtful whether it HP manages to successfully pick out that intended interpretation.

#G, and so on, the principle says nothing of number terms that have simply the form N – that is, *numerals*. Thus, while we are in fact able to judge the truth-values of such statements as:

#(sharps in the key of A) = 3, *and*

#(sharps in the key of A) = Julius Caesar,

it is in no way *thanks to* **HP** that we are able to make such judgments (Heck 2011). It is a matter of some controversy (again) exactly *why* this problem rendered **HP** unfit for service in Frege's logicist programme. For our purposes, though, this does not matter: we are concerned to see whether any analog of the Caesar problem arises for the principle **PA** as I am using it here.

PA, recall, allows us to deal with occurrences of property terms when they appear in identity claims in the form $\mathbf{P}_{\delta n}(x) = \mathbf{P}_{\delta n}(y)$. Thus, for example, the following is fine:

$$\mathbf{P}_{\text{COLOUR}}(\text{Sunset}) = \mathbf{P}_{\text{COLOUR}}(\text{Postbox}) \leftrightarrow \underline{\text{Colour/Sunset}}\ \mathbf{R}\ \underline{\text{Colour/Postbox}}$$

The question of whether there is a 'Julius Caesar' problem here is the question of whether we can make sense, on the basis of **PA**, of statements of the following form:

$\mathbf{P}_{\text{COLOUR}}(\text{Sunset}) = \text{F}$, *specifically*:

$\mathbf{P}_{\text{COLOUR}}(\text{Sunset}) = \text{Red}$, *and*

$\mathbf{P}_{\text{COLOUR}}(\text{Sunset}) = \text{Julius Caesar}$.

The short answer here is 'no'. A longer answer, however, is 'no, but it does not matter'. Consider the statement $\mathbf{P}_{\text{COLOUR}}$(Sunset) = Red. This is true, and we know it[125] – again, *no thanks to* **PA**. The difference, though, is context: in our case it does not matter. For both **HP** and **PA** may be helped around their respective Caesar problems by *supplementation* with a background understanding that is, broadly speaking, ontological. In the case of **HP**, what is needed is a background understanding of *what numbers are* (Heck 2011); in the context of Frege's logicist project, this is (supposedly) sufficient reason to reject **HP** as unfit for purpose. In the case of **PA**, we may take it that *if* **PA** needed supplementing with a background understanding of *what properties are*, then **PA** would likewise be unfit for the purpose of explaining what properties are (or rather: what property statements mean). Fortunately, though, it is not so. We can get away with supplementing **PA** with something weaker: a background understanding of the determination dimensions of determinate property terms, or concepts.

Consider again the statement '$\mathbf{P}_{\text{COLOUR}}$(Sunset) = Red'. It is a problem, but not a problem *for **PA***, if the term 'red' occurs here *uninterpreted.*[126] For 'red' to occur interpreted, however, is for it to be associated in this occurrence with a range of assignments that it can take. To understand an interpreted occurrence of 'red' is, to use Geach's (1980) distinction, to understand what it is occurring as a term *for* (as opposed to *of*). In this case, we are interested in whether 'red' occurs as a term *for a colour*. And what it *is* for 'red' to occur as a term for a colour is just for the determination dimensions of 'red' to be the dimensions along which the dimension *colour* varies. Now, knowing whether an occurrence of 'red' is

[125] Likewise: '$\mathbf{P}_{\text{COLOUR}}$(Sunset) = Julius Caesar' is false and we know it.

[126] By 'uninterpreted' here I do not mean to suppose that the sentence has not been assigned some particular interpretation function, i.e. an assignment of values from the domain of discourse to the terms of the sentence. Rather, I mean to suppose that the sentence – or the term 'Red' in particular as it occurs in the sentence – has not been associated with a *range* of such functions, i.e. the assignments that it *could* take.

associated with the right determination dimensions is not a matter of grasping or understanding the *nature* of anything, but rather, simply a matter of grasping its use on an occasion.[127] Given such a grasp, what is required by way of background understanding is simply an understanding of the dimensions of variation of the dimension in question – *not* an antecedent understanding of the nature of determinate properties.[128] The Julius Caesar problem, then, does not directly transfer from **HP** to **PA**.[129]

4. Mid-Level Determinates

I have set out, interpreted, and defended **PA** as the core of an account of determinate structure. It remains to *apply* the account. To apply the account, here, means to eliminate reference to determinate properties by supplying corresponding instances of **PA**.[130] In the canonical case, we may eliminate statements of the form $\mathbf{P}_{\delta n}(x) = \mathbf{P}_{\delta n}(y)$ in favour of statements of the form $\underline{x\delta_n}$ **R** $\underline{y\delta_n}$. For example, intuitively, we eliminate *the sunset and the postbox are the same colour* in favour of *the sunset and the postbox exactly resemble in respect of colour*.

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[127] How is this to be realized empirically and concretely? Gärdenfors (2000) offers a detailed overview of one promising kind of answer.

[128] I leave open the question of whether such an answer is available on behalf of **HP** too.

[129] It does not follow, of course, that the *spirit* of the Caesar problem does not transfer from **HP** to **PA**. In particular, one might think that statements involving determinate colour terms that are not of the form $\mathbf{P}_{\text{COLOUR}}(\text{Sunset}) = \mathbf{P}_{\text{COLOUR}}(\text{Postbox})$ need not be of the form $\mathbf{P}_{\text{COLOUR}}(\text{Sunset}) = \mathbf{F}$, either. This will be the case if one admits higher-order properties – that is, properties of properties – so that determinate properties may be bearers of properties and hence, subjects of predication. We would have, then, besides statements of the form $\mathbf{P}_{\text{COLOUR}}(\text{Sunset}) = \mathbf{F}$, also statements of the form $\mathbf{F}[\mathbf{P}_{\text{COLOUR}}(\text{Sunset})]$ not covered by **PA**. In that case, **PA** would need supplementing with some further reductive principles. But the issue here is piecemeal, and hostage to a decision about *which* putative higher-level properties one should be salvaging in the first place. I am sceptical that there are any such cases. The two paradigm cases – examples of which are 'red is a colour' and '*...is a current British prime minister* has exactly one instance' both receive natural treatments on my view that do not seem to disturb the explanatory role of **PA**.

[130] To reiterate: I am reading **PA** 'left-to-right', and therefore stay clear of all the problems associated with reading it 'right-to-left'.

Cases of the form $\mathbf{P}_{\delta n}(x) = \mathbf{F}$ may be treated as derivative from the canonical case. Given the class **C** of *all* the things *y* such that $\underline{x\delta_n}$ **R** $\underline{y\delta_n}$, we may treat a statement of the form $\mathbf{P}_{\delta n}(x) = \mathbf{F}$ as saying that $\underline{x\delta_n}$ **R** $\underline{y\delta_n}$ for some *arbitrary* value(s) of $y \in \mathbf{C}$. The predicate **F** is thus useful for picking out the class **C** where it does not matter – or where there is divergence over – *which* members of **C** serve as the value(s) of *y* in a particular occurrence of $\mathbf{P}_{\delta n}(x) = \mathbf{P}_{\delta n}(y)$, but it introduces nothing new to our ontology.

Our account so far has dealt with determinates on three assumptions. Here are two of them. First, I have dealt only with *maximal,* or *lowest,* determinates. Second, I have assumed, tacitly, that - in the terms introduced at the end of Section 2.1 - the qualitative characters of objects are not only *actually* maximally determinate but also maximally determinate *in principle*. Both of these assumptions might be plausibly rejected. I have already mentioned some reasons given by Mellor (2000), and Wilson (2012), for doubting the first assumption. Moreover, these reasons carry over for doubting the second assumption too. It is therefore necessary to extend the account given above to cover determinate properties that are *mid-level determinates* in the sense of their not being maximally determinate *in principle,* and also to cover properties that are mid-level determinates in the sense of their not being maximally determinate *in fact*.

The third assumption I have made is that resemblance is always *perfect* or *exact* resemblance. This was, as noted, in part simply a constraint imposed by my use of **PA**, since **R** is required to be an equivalence relation and imperfect resemblance is not transitive. In part, however, it is also motivated by the thought that perfect resemblance is a more tractable notion than imperfect resemblance from an *ontological* point of view. So, in

any case, I will assume. In what follows, then, this third assumption – that resemblance is perfect resemblance – will continue to stand as a *constraint* on what may pass as an acceptable amendment to **PA**. The remainder of this chapter will be concerned to sketch how such an amendment might go. My aim will not be to develop the extended account in detail, but rather, to summarise the trajectory of the approach.[131]

My proposed revision to **PA** concerns the notion of perfect resemblance expressed by **R**. Initially, we may point out that while the intended *interpretation* for **R** must be perfect resemblance, this does not settle the question of how, in the world, relationships of perfect resemblance are *realised*. We are, then, seeking an understanding of perfect resemblance that plays three roles: (1) it must be fit for the purpose of offering a version of **PA** that deals with mid-level determinables, (2) it must show how the relation **R** remains an *internal* relation, and (3) it must offer some explanatory account of apparent relations of *imperfect* resemblance. It will turn out - obviously - that the amended interpretation of **R** expresses perfect resemblance only in an extended, metaphorical sense, but this is no problem for the proposed account.

Let me begin with Mellor's thought that a spinning pointer must have *some* positive width, and hence, must point in a direction that has a positive interval value. These claims carry with them a notion of *grain*, or *minimal discernible difference*: that is, so to speak, the gap between maximal determinateness *in fact* and maximal determinateness *in principle.* Let me say - as a rough way to capture this notion - that where maximal determinates *in fact* are mid-level determinates *in principle*, the in-fact maximal determinates span a positive *interval* relative to the in-principle maximal determinates. The determination of the *value*

[131] I will leave it an open question how, and two what extent, my proposal here is related to the more developed views of Funkhouser (2006, 2014) and Gärdenfors (2000, 2014).

of such intervals will not concern us here: let us call any such interval value simply **I**.

Continuing on the assumption that maximal determinates *in fact* are mid-level determinates *in principle*, I will assume that the notion of perfect resemblance that I have used up to this point suffices only for an account of in-principle maximal determinates. I will now aim to define a further relation, **R***, that is able to stand in place of **R** in an amended version of **PA**, which will supply an account of in-principle mid-level determinates.

I have introduced **I** as an arbitrary term for an in-principle interval spanned by in-fact maximal determinates. I understand the notion of an *interval* here in terms of Armstrong's (1978b:122) notion of *partial identity*, already introduced briefly in Chapter 1. Given the notion of an interval, I will say that two in-principle maximal determinates are **I**-related just in case they are *both* spanned by a single interval of value **I**. Put intuitively in terms of spaces, to be **I**-related is to be *no further than the distance **I** apart* in the relevant quality space.

Plainly, **I**-relatedness is not fit, as it stands, to be a surrogate for **R**: a good surrogate for **R** must be an equivalence relation, and **I**-relatedness is not transitive. To get a surrogate **R*** for **R** from **I**-relatedness, we must find an appropriate equivalence relation that is defined in terms of **I**-relatedness.

Note that **I**-relatedness is, in a way, perfectly well suited to explain the *pairwise* sharing of in-principle mid-level determinates: transitivity only becomes a problem when *further entities* are introduced (or when pairwise property-sharing entities are supposed to share those properties *with each other*). This observation suggests an obvious way to build on **I**-

relatedness: we may say that *some things* - plural and collective - *are **R*-related just in case every pair of things among them is I-related***. Since **I**-relatedness is symmetric and reflexive, it is trivial to prove that the relation **R*** will be an equivalence relation.[132]

My proposal, then, is that an amended version of **PA** may be posited in which the relation **R***, understood as outlined here, stands in for **R**. Since I am aiming here only to sketch an outline of this extended account, I will not pursue its details further.

[132] The easy availability of such a proof leaves no room to wonder whether my argument here is open to any objection analogous to the problem of imperfect community that I will discuss in Chapter 6 in relation to Rodriguez-Pereyra's resemblance nominalism. Indeed, my invocation of pairwise **I**-relations here bears only a *superficial* resemblance to Rodriguez-Pereyra's use of pairs. For the problem in Rodriguez-Pereyra's case concerns the invalidity of inferring, from the premise that *for all x and all y, there is some z that x and y share* the conclusion that *there is some z such that for all x and all y, x and y share z*: the issue is one of quantifier scope. In my case, by contrast, no such issue is afoot.

Chapter 4 - Facts, Instantiation, and Predication

0. Intro

Having set out my dimensionist ontology in Chapter 1, I have gone on to discuss its application to determinable-determinate structure (Chapter 2) and properties (Chapter 3). I have given a dimensionist treatment of properties on which properties are either *derivative* entities or *nonexistent*. Since I do not treat property structure as fundamental, my proposed view does not include any fundamental formal relationship of *instantiation*, the relationship that characterises the ontological form of *objects and properties*. Why, then, a chapter on instantiation structure?

Let me offer three answers. First, other ontologies *do* feature instantiation in a fundamental role. Instantiation structure - as I will later explain - may occupy an *explanandum* role, even for an ontology that does not treat instantiation structure as belonging to any *explanans* structure. Second, as I have mentioned, my view is flexible on the question of whether properties are nonexistent, or existent but derivative. One could, then, understand the present chapter as offering a treatment of what instantiation structure is *if* it is real but derivative. Even if one were to think, for more principled reasons than my pursuit of simplicity, that properties do not exist, the availability of such an account would make dimensionism more *flexible* in a desirable way. Third, one may understand the discussion of this chapter as centred around the structures that *predication* introduces as *explananda*, and thus remain noncommittal about instantiation. These themes will be expanded upon as the chapter's discussion develops.

The main rival position, over which dimensionism will be argued to improve in this

chapter, is factalism.[133] I begin by searching out some sense of unity from the literature on facts. Section 1 surveys a range of ways in which facts have been conceived, focusing on specific ontologies of facts and choice points facing any ontology of facts. It will be seen that while such approaches may impose greater *clarity* upon discussions of facts, they do not draw out much greater *unity*. Section 2 draws things together. I relate what I will call the problems of *instantiation* and *predication* structure to the literature on facts. Sections 3 and 4 argue, drawing on previous chapters, that the target *explanandum* structures under discussion are are ternary *determination* structures, not binary *instantiation* structures. Finally, Section 5 sums up the explanatory light that my proposed ontology sheds on facts and fact ontologies. I will suggest that dimensionism should be preferred over factalism, but that it also preserves the best elements of the factalist view.

1. Conceptions of Facts: A Survey

'Fact' is a wretch of metaphysical nomenclature. Philosophical discussions embark from a currency of platitudes about what facts are, developing them into conceptions that are alarmingly conflicted. Facts are said to be, *inter alia*: things, not things, things that exist but do not obtain, things that obtain but do not exist, truths, truthmakers, concrete, abstract, complex, simple, combinations, combinings, proposition-like, substance-like, mode- like, trope-like, chain-like, composed by their constituents, and abstracted into their constituents. To be of any use, the notion of a fact must be demarcated in a principled way: an account is needed of how facts may legitimately be conceived. It is, I suggest, not possible to construct a *general* conception of facts by looking for common factors between

[133] Factalism shares with dimensionism a rejection of conferral approaches to quality. I will say more about this in the main body of the chapter.

theories of facts. We consider a range of theories to show this.[134] (The range of views considered is intended to be illustrative, not exhaustive.)

One common conception of facts (implicit, for example, in Dummett 2006) is as the referents of terms of the form: *the fact that p*. Here *the fact that p* consists of a propositional term *p*, and the operator *the fact that...* which takes *p* as an argument and yields a term – *the fact that p* – which purports to refer to a fact. The problem is that a term's merely purporting to refer to a fact settles neither what it is that is purportedly being referred to, nor whether the term succeeds in referring to it. For one thing, the term-former is not associated with any existence condition for facts. It will not do to merely stipulate that 'the fact that p' successfully refers whenever p is true, since such a claim will either yield a vacuous notion of a fact, or will be severely hostage to metaphysical fortune (even cases of successful references will be 'flukes', as far as the conception of facts is concerned).

The term-former does not supply much of a criterion of identity for facts, either.[135] This is not, to be sure, because no identity criterion might be supplied. Lowe, for example,

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[134] Since I am concerned only with conceptions of facts as they appear in *fact ontologies* – by which, for now, I mean ontological theories in which facts play some fundamental explanatory role (this will be clarified later) – I am ruling out certain senses of 'fact' from the start as irrelevant. For example, I will not be discussing the idea (see e.g. Austin 1950) that facts are simply *truths*. I will not discuss, either, conceptions of facts as *contents of judgments* – what was sometimes meant by *sachverhalte* in a certain pre-analytic tradition – except insofar as such views might overlap with conceptions of facts as *states of affairs* understood as I discuss later. A further, obviously irrelevant conception is the *epistemic* conception of facts as known or established truths.

[135] I offer some focused discussion here on identity conditions because I do not think that the general impression – that identity criteria for facts are deeply and indefensibly problematic – is entirely fair. I do not aim to show here that they are a straightforward matter – only that they are more defensible than their reputation might suggest.

suggests the following criterion: *the fact that P = the fact that Q iff necessarily: P iff Q.* Now, Lowe argues that such a criterion is unsatisfactory.[136] For, as he points out (1998:239), the right hand side of the first biconditional is true when a contradiction is substituted for *P* and *Q*: necessarily, (*Fb* & ¬*Fb*) iff (*Fb* & ¬*Fb*). Since the right hand side is true, the left must also be: the fact that *P* = the fact that *Q*. In this case, the fact that (*Fb* & ¬*Fb*) = the fact that (*Fb* & ¬*Fb*). This would be right, except that *x* = *y* only if *x* and *y* exist. So it follows that the fact that (*Fb* & ¬*Fb*) exists: reductio.

But Lowe's argument can be resisted. Lowe's reductio here draws on the assumption that identity entails existence. He acknowledges that this assumption fails in free logics, but the argument may be resisted without resorting to such moves. For given that identity entails existence, we can – and should – exclude instances such as Lowe's reductio by amending our identity criterion to say: *if the fact that P exists and the fact that Q exists, then* the fact that *P* = the fact that *Q* iff necessarily, *P* iff *Q*. This cuts out cases where contradictions are substituted for *P* and *Q* on the right side of the biconditional, since such cases will not pass the new antecedent of our criterion in the first place. Moreover, the amendment is not ad hoc – for given that identity entails existence, we should, in any case, wish to provide identity conditions for facts *only* when they exist.[137] I suggest then, that one can resist Lowe's argument at this point.

So, the problem with the *fact-that* term-former, *vis a vis* fact identity, is not so much that no accompanying criterion for identity *can* be given – but rather, that the term-former does not

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[136] This is, of course, also the territory of the infamous 'slingshot' argument. Neale (2001) sets out, with great clarity, both the problem that the argument poses, and the conditions that any conception of facts must satisfy in order not to be susceptible to it.

[137] With the exception of conceptions of facts as states of affairs, as I explain shortly.

introduce, but rather *presupposes*, a prior understanding of what facts are – including a prior understanding of their identity criteria.

A close relation of propositional conceptions of facts is the family of conceptions on which facts are modelled on *situations*. Such conceptions are marked out by the thought that facts exist *whether or not they obtain*. Turner (2016) leaves open the option of such a view, which has close structural affinities with Cowling's (2014) absolute conception of location space. Here I merely note that the view exists, and reserve the term *state of affairs* for facts conceived this way.

Closely related to the views above is a family of views according to which facts are worldly *correlates* of thoughts, truths, sentences, or assertions.[138] Russell (1918) holds a representative version of this view: facts are the things in the world that are *meant* by whole sentences, just as objects are the things in the world that are *meant* by individual terms.[139] Russell's view relies on a great deal of metaphysics in the background: just as before, it is no trivial matter to set out the conditions under which whole sentences succeed in *meaning* anything at all. Moreover, the sense in which Russell's facts[140] are correlates of anything is a semantic one. This is by no means the only kind of correlate conception of facts in play, however. For example, one might instead understand 'correlate' in terms of

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[138] It is worth stressing this both ways: not just worldly *correlates*, but *worldly* correlates. It is possible to hold, on a correlate view, that *necessary truths* – at least, necessary truths of a certain sort, such as *2+2=4* – have no corresponding facts. Whether this is because they have no truthmakers (and facts are essentially truthmakers), or for some other reason, is optional.

[139] Note that, strictly speaking, on Russell's view it is not possible to *refer* to facts, since referring is how *individual terms* mean, and facts are the things that are meant by *sentences*. Others have, of course, held that it *is* possible to refer to facts – see e.g. Fine 1982 – though it is far from clear whether this discrepancy is more than merely verbal.

[140] I restrict my focus here to Russell's views in the *Logical Atomism* lectures.

truthmaking, as has been widely suggested.[141] Here it becomes hard to draw a clear, substantive line between facts and other notions that are not introduced *as* conceptions of facts, but which are nonetheless similar - Lewis's (2003) things-*qua*, for example.[142]

Correlate conceptions of facts go hand in hand with the idea that facts are *proposition-like* entities: they are, after all, conceived to be worldly correlates either of propositions, or of other proposition-like things (or actions, such as assertions). According to some views, part of what it is for a fact to be proposition-like is for it to have *constituents* that correspond to the constituents of propositions.[143]

(Facts may have constituents whilst being themselves either *simple* or *complex*. What brings together the present family of conceptions of facts is their concern, one way or another, with the *combining of fact constituents*.)

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[141] Lowe (1998:245) has suggested that a truthmaking conception of facts need not supply distinctive identity criteria for a category of *facts*. This is because facts – conceived functionally as the kinds of entities that are truthmakers for at least atomic truths – may turn out to be a species falling under some broader and more fundamental category of being. Lowe's suggestion is that facts, on such a view, may be understood as *ways that the world is*, standing to the world as ordinary modes stand to objects. A similar point is made by Sommers (1993).

[142] Indeed, once one drops the assumption that facts *must* be referred to by means of the *fact-that* term-former, the line becomes *very* hard to draw. Consider, for example, the following putative fact: the fact that Bertie is bespectacled. It is well within the customs of the literature on facts to refer to this fact by other expressions – such as *Bertie's being bespectacled*, and *that Bertie is bespectacled*. It is a very short hop from here to the further thought that one might also get at the same fact using the expression *bespectacled Bertie*, or indeed, *Bertie qua bespectacled.* If the latter expressions could not even purport to refer to facts, then it is a task for *metaphysics* to show why.

[143] But one can also hold that facts are truthmakers, or correlates of propositions, without thinking this. Turner (2016), for example, offers a view on which facts get their 'constituent' structure through external, quasi-geometric relationships with each other, and on which correlation is understood in terms of these relationships and a certain translation function. What sets Turner's view apart is his insistence that facts are *utterly structureless,* so that fact 'constituents' cannot even be conceived as abstractions on some *non-mereological* internal structure of facts.

One might think that facts combine their constituents by being themselves *complex*.[144] An early version of this view is at work in Russell's multiple relation theory of judgment.[145] The Tractarian Wittgenstein arguably also held a complex view of facts.[146] In more recent times, Westerhoff (2005) has defended a conception of facts as complexes. Armstrong (1997) has also defended a conception of facts[147] as *non-mereologically composed* of their constituents (precisely what non-mereological composition *is* is unclear, but I am taking facts on such a view to be non-mereological complexes – whatever that means).

Here, too, challenges have been raised against the cogency of identity criteria for facts. Suppose that facts are indeed complexes. Then Lowe (1998:239)[148] moots the following representative identity criterion: *if x and y are facts, then x = y iff x and y contain the same constituents structured in the same way.* Now Lowe argues by *reductio*: Suppose it is an

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[144] One might wish to distinguish here between facts being *combinations of* their constituents, and their being *composed of* their constituents.

[145] According to that theory, judgments are not relations to propositions, but 'multiple relations' between subjects and the *constituents* of propositions judged. Hence *Russell believes that Wittgenstein loves logic* is a relation – on one version of the theory – between Russell, and the sundry complex *Wittgenstein*, *logic*, *love*, and *xRy*. Add to the multiple relation theory a correspondence theory of truth: for a judgment to be true is for a complex (a fact) to exist corresponding structurally to the complex judged. (This structural correspondence was a further guarantee of propositionlikeness, since facts had to structurally parallel what could be *judged* – i.e. propositions.) For details, see Bostock (2012).

[146] *TLP* 2.03: 'In the atomic fact, objects hang in one another, like the links of a chain.' Wittgenstein does not say very much about what this 'hanging' amounts to. This is a little problematic, as Ramsey (1925) famously pointed out. We will come to this later in the chapter, when we discuss instantiation structure.

[147] I am regimenting my terms. Armstrong talks about *states of affairs*, but I am using *fact*. It should make no difference. In my usage, *state of affairs* is reserved for the kind of thing that either *obtains* or does not, and may *exist* even if it does not obtain.

[148] Lowe's argument is a dilemma; I have presented the horns separately.

atomic fact that *Fa*.[149] Then *Fa* is true. *Fa* is true iff {a}={x|Fx ^ x=a}. That is: *a* is *F* if and only if singleton {a} is identical to the set of things that are both *F* and identical to *a*. Now, either the *fact* that *Fa* is identical to the fact that {a}={x|Fx ^ x=a}, or not. If they are identical, then by our criterion of identity, the two facts have the same constituents. But then it is utterly opaque what those constituents are, for on the face of it, one fact has as its constituents *F* and *a*, and the other {a} and {x|Fx ^ x=a}. So, suppose that the two facts are not identical. We have noted that *Fa* is true iff {a}={x|Fx ^ x=a}. So now infer {a}={x|Fx ^ x=a}. Since *Fa* is true, {x|Fx ^ x=a} will have *a* as its sole member. So{a} and {x|Fx ^ x=a} are intersubstitutable: they are different ways of representing the same set. So, the *fact* that {a}={x|Fx ^ x=a} has as its constituents {a}, {a}, and identity. Likewise the fact that {a}={a} has as its constituents {a}, {a}, and identity. These two facts therefore have the same constituents. Moreover, their constituents are structured in the same way: {a} ={a} in both cases. So by our identity criterion, the fact that {a}={a} is identical to the fact that {a}={x|Fx ^ x=a}. But the fact that {a}={x|Fx ^ x=a} entails that *Fa*, while the fact that {a}={a} does not. The two facts differ, hence they cannot be identical: reductio.

Again, however, Lowe's argument may be resisted. Note that a crucial step in the argument states that, since *Fa* is true, the expression '{x|Fx ^ x=a}' designates the set {a}. The evaluation of the argument turns on precisely *how* it does so. Here are the options: '{x|Fx ^ x=a}' designates either a *set*, or a *class*. If it designates the *set* {a}, then the form of the expression '{x|Fx ^ x=a}' is merely a notational flourish: the appearance of *Fx* adds nothing to the meaning of the symbol. Then it is indeed the case that the fact that {a}={a} is identical to the fact that {a}={x|Fx ^ x=a}, but the fact that {a}={x|Fx ^ x=a} no more entails *Fa* than the fact that {a}={a} does. On the other hand, if '{x|Fx ^ x=a}' designates a

[149] Lowe uses the example 'Mars is red'.

class, then the claim that {a}={x|Fx ^ x=a} when *Fa* is true is simply false: {a} and {x|Fx ^ x=a} are different kinds of entity, and so cannot be identical. For it will be true of {x|Fx ^ x=a}, that if it is not empty, then it will intersect {x|Fx}. By contrast, the same is not true of {a}, and this is precisely *because* {x|Fx ^ x=a} being nonempty entails *Fa* while {a} being nonempty does not. In that case, the argument does not get as far as the final reductio.[150]

One might also, instead, think that facts combine their constituents while being themselves *simple*. These views divide again into those according to which the constituents of facts are *abstractions* from some non-compositional internal structure of facts, and those according to which the combining of fact constituents is effected by facts *externally*. Examples of the former sort of view are Armstrong's (1997), again, and arguably, the view defended in Appendix C of the second (1927) edition of *Principia Mathematica,*[151] according to which fact constituents are explained in terms of facts standing to each other in relations of *predicate-resemblance* and *subject-resemblance*. Examples of the latter sort of view include Hossack (2007), according to which facts are not combinations, but rather external *combinings* of constituents, and Turner (2016), who moots the view that apparent fact constituents are explained in terms of quasi-geometrical relationships between internally structureless facts.[152]

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[150] A parallel objection to the argument can be made in different terms: assuming that '{x|Fx ^ x=a}' designates a set rather than a class, does it designate the set {a} *rigidly*, or *nonrigidly?* If rigid, then the fact that {a}={x|Fx ^ x=a} does not entail *Fa*. If nonrigid, then there is no reductio at the end of the argument. Compare: 'the fact that Bertie = the author of *Principia* is identical with the fact that Bertie = Bertie'. If 'the author of *Principia* is nonrigid, then the two facts are simply *not* identical.

[151] It is unclear exactly who wrote (which parts of) the appendix. Russell and Whitehead wrote *Principia* – of course – but seem to have credited much of the philosophical work in the appendix to Wittgenstein.

[152] Turner's discussion is not *too* far from the 'locationist' view of Cowling (2014). I return to this point later.

Our fast survey of the literature has thrown up some systematic groupings of conceptions of facts. These are propositional conceptions, situational conceptions, correlative conceptions (either in terms of semantic values, truthmaking, or simply truth), and constituent-combining conceptions (on which facts may be either complex – by way of composition or combination – or simple, with constituents on simple conceptions being either abstracta or externally combined).[153] I have indicated, in passing, that identity criteria for facts may not be the terrible challenge that they are reputed to be. Rather, I suggest, the problem here is the sheer spread of different views. Our survey – which is representative, but far from exhaustive – has shown that while it is possible to impose some *structure*, and hence clarity, on the discussion by grouping various conceptions of facts together, this does not result in much increase in *unity.* The next section turns to the task of imposing unity.

2. The Unifying *Explananda*: Predication and Instantiation

To get unity from the literature on facts, I draw again on a familiar resource: the

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[153] Another way to frame the discussion in this section is in terms of the *choice points* that a theory of facts must face. Here is a non-exhaustive list, in no particular order: Do facts have *constituents?* If so, what are they? Are facts complex or simple? If complex, are they combinations of, or composed by, their constituents, or neither? If simple, do they combine their constituents externally, or are their constituents abstracts of them, or neither? Are facts structured – mereologically or otherwise? Internally or externally? Are they correlates – semantic, alethic, or otherwise – of anything? If so, what? At what *level of grain* are they correlates of those things? Are there any atomic facts? Are there *only* atomic facts? What is the explanatory role of facts? Three especially important choice points bear mentioning, to which I will return: (1) Are facts *fundamental* entities? (2) Are the various things that are said of facts a part of their theoretical *role*, or a part of the very way in which they are *conceived?* (3) Is commitment to a fact ontology commitment to the existence of a *kind of entity*, or to the world's having a *kind of structure?*

regimentation of structure into *explanandum* and *explanans* roles.[154] We saw this resource at work in previous chapters in relation to the structures associated with respects (Chapter 1), determinables (Chapter 2) and universals (chapter 3); here we apply the same approach to facts.

One might think at first that such a regimentation must be futile: there are just too many different *explanandum* structures in the mix. This is true, to a degree: facts have been posited in pursuit of explanations of phenomena as diverse as instantiation, truthmaking, truth, judgment, predication, and so on. Indeed, the notion of a fact seems as fraught as it does – arguably – precisely because it falls under such multifurcating explanatory demands: as an explanatory resource, it is hopelessly stretched.[155]

None of this, however, implies that our present pursuit is futile. For the unfruitfulness of facts under such conflicting explanatory demands is no indication that facts will be similarly unfruitful when the air is less thick with *explananda*. The task, then, is to clear the air.

To clear the air, I suggest that we take *instantiation structure* as the core *explanandum*

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[154] Turner (2016) discusses a similar idea in terms of *appearances*. On Turner's regimentation, what I have called the relationship between *explanans* and *explanandum* structures is expressed as a relation between a metaphysically sober *fundamental language* **F** and a *language of appearance* **L**, where sentences in **F** provide the 'appearancemakers' – rather than truthmakers – for selected (i.e. somehow privileged and worth preserving) sentences in **L**. I leave it open to what extent the two regimentations coincide.

[155] But this is not a problem with my regimentation: it is a problem with the discussion. The regimentation remains helpful insofar as it offers a clear way to articulate what is going on.

structure where facts are concerned.[156] By instantiation structure here, I mean the relationship – whatever it is – between an object and its associated properties.[157] We may regard the present explanatory project as a close relation of its broader neighbour, the problem of universals. For while the problem of universals seeks an explanation of what it is for an object to have a property (in a neutral sense) or for some objects each to have the *same* property, we may regard the present problem as asking what the relationship is between objects and their properties, whereby objects *have* their properties – that is, on the assumption that objects, in a less neutral sense, *have properties at all*.

Understood this way, the task of explaining instantiation structure (which I will call the 'problem of instantiation') arises *within* a certain solution to the problem of universals – namely, one which posits objects and properties as explanatory categories of being. On such a conception of the problem, the problem of instantiation is expressed by two questions: what is the relationship between an object and a property whereby the object *has* the property?

But we should not stop here. The problem of instantiation is not parochial: it is not merely a problem *within* an object-property solution to the problem of universals. To see why, consider two factors. First, the problem of universals itself has a certain *explanandum*

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[156] I offer no argument for this other than the theoretical utility of doing so, which I demonstrate in the remainder of this chapter. Really, my claim goes no further than this. I do not claim that instantiation structure *is* a core explanandum in any deeper sense: all I claim is that it is theoretically fruitful to treat it as such. I am not claiming that instantiation structure is, in some spuriously profound sense, *the* underlying concern of every philosopher who ever wrote about facts; indeed, I leave it open whether privileging other *explananda* might lead to other, equally fruitful understandings of facts. (A further point, in the context of my thesis, is that I am considering facts at this point in the thesis *because* they offer a distinctive treatment of instantiation structure.)

[157] Here I am using 'property' in a neutral sense, without the regimentations imposed on it by my own views in previous chapters.

which is quite general and neutral with respect to most substantive ontological commitments – in the terms introduced in Chapter 1, that *explanandum* is the ontological structure of *objects* conceived in the fourfold way that I have outlined, which are understood to be *qualitatively thick*. Second, consider one core motivation for fact ontologies within object-property views: Bradley's regress. The regress argument holds that an object cannot possess its properties in virtue of the mediation of any instantiation *relation*, since such a relation would itself *relate* the object to its properties only in virtue of further mediating instantiation (or super-instantiation) relations, and so on: the regress is vicious since explanatory success at each step is *deferred* to the next step, which iterates the *same* explanation. Bradley's regress motivates a fact ontology because it motivates the thought that objects and properties are not prior to the instantial 'complexes' in which objects *possess* properties, but rather, those instantial complexes[158] are ontologically prior to objects and properties.

Now, fact ontologies are obviously not the only option here. One might, following Lowe, hold that instantiation is not a relation but an internal *formal relationship*. Or one might, in a more Quinean spirit, hold that instantiation belongs to a theory's *ideology* rather than its ontology. But fact ontologies remain an option. They are, indeed, an option which turns the whole object-property approach to the problem of universals on its head. If objects and properties are not fundamental entities, what are they? In particular: why should they have the privileged status of *appearances to be preserved* in the resulting fact ontology? The answer here cannot be that objects and properties are needed to solve the problem of universals: in positing facts as prior to objects and properties, a fact ontologist should hold that facts *supplant* objects and properties in the *explanans* role in the problem of

[158] I drop the scare quotes, but they remain implicit since 'complex' is used loosely.

universals.

It is, I suggest, the apparent structure of *predication*[159] that confers special *explanandum* status upon objects and properties.[160] By 'structure' here, I do not mean *grammatical* or *syntactic* structure. It is irrelevant, for example, exactly *how* one's preferred natural language expresses the copula. Rather, I mean the *operational* structure of predication. The thought is that the *act* of predication, in assertoric contexts, is an act which gets at the structure of the world in a certain way, and moreover, appears (since we seem to predicate successfully) to be one that *correlates* successfully with the structure of the world in a way[161] that stands for explanation.[162] In predicating and asserting, we do not just react verbally to the world in arbitrary ways which *happen* to suit us pragmatically: we *operate* on the structure of the world.

Successful predication succeeds *in virtue of* the underlying operations that *carve at the joints of nature*. It succeeds not in virtue of some *transcendental* relationship that linguistic contents bear to reality, but rather, in virtue of the *immersion* of the *vehicles* of those contents in the world that the contents are about. In the present setting, the point is this: it is the immersive, operational *success* of predication in virtue of which predication introduces structure into the *explanandum* role.

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[159] Strictly speaking: predication in assertoric contexts. I return to this point in a later chapter.

[160] One might object here that it is simpler than this: even an ontology, such as factalism, that does not treat objects and properties as fundamental may treat them as *derivative*, and hence, fitted to an *explanandum* role. My reply, however, is that it is their salience in predication structures that *gives* plausibility to the idea that objects and properties should be kept as derivative entities in the first place.

[161] Of course, not the only way. Szekely (2015), for example, makes a case for thinking that feature-placing assertions do not have a predication structure.

[162] Turner (2016, §1.4.2) makes the point nicely.

Call this question – *what structure does predication introduce into the explanandum role?* - the *problem of predication*. We are now in a position to set out the problem of instantiation as well. For given an answer to the problem of predication – an appropriate structure in the *explanandum* role – the problem of instantiation will arise *if and only if* the corresponding, *proximal explanans* structure is *fundamental*. In other words: if the *explanandum* structure of predication is explained *directly* by the world's structure at a fundamental level, then the *explanandum* structure of predication will supply 'constituents' – objects and properties, *say* – concerning which a fundamental problem of instantiation may be posed. On the other hand, if the *explanandum* structure of predication is explained only *indirectly* by the world's fundamental structure, then there is no reason to think that the putative 'constituents' supplied by that *explanandum* structure should occur amid the *fundamentalia* of the world. In that case,[163] no corresponding problem of instantiation can arise.[164]

So much for the problems of predication and instantiation. What has all this to do with facts? In the remainder of this chapter, I will defend three claims. First, I claim that the notion of a fact is best captured as a specific kind of solution to the problem of instantiation, constrained by a specific understanding of predication. Second, I claim that the specific understanding of predication in question rests on mistaken assumptions. Third,

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[163] Suppose, for example, that a trope bundle theory of objects is true. Then predication will still look much as it does, but there will not *be*, fundamentally, objects and properties: there are instead property-instances and bundles thereof. Predication structure, in this case, is explained only *indirectly* by reality's fundamental structure. Now, there is still a mystery in the neighbourhood that looks a little like Bradley's regress: what is *coinstantiation*, and do tropes need to be coinstanced with *that* to be coinstanced with each other? However, it is hard to see in what sense the resulting problem – problem though it undoubtedly is – should be a version of the problem of instantiation in my sense.

[164] I am not saying that instantiation is *ontologically* posterior to predication – but that is, I think, the right *order of discovery*.

I claim – by distinguishing fact *structures* from *facts* – that a significant core of the fact ontologist's idea may be preserved on my dimensional ontology after the false assumptions are dropped. My view may be seen, then, as preserving the best of fact ontologies.[165]

Suppose that predication has a binary structure: suppose that it consists of the production of (or reference to) an object, and the attribution of a property (or a predicate) to it. Thus, a paradigm case of predication is the assertion ⊢*Fa*. Take it as read, for the sake of argument, that this means the relevant 'constituents' thereby introduced are objects and properties. A fact ontologist will hold that the fundamental entities of the world[166] are not objects and properties, but the entities captured by *a* and *F* (or rather, the corresponding operations) but rather, whatever is captured by the whole assertoric act ⊢*Fa*.[167] Fact ontologists are free to differ over *how* the whole assertion ⊢*Fa* captures the fact that *a* is *F*, exactly how it is that *a* and *F* are constituents of the fact, and so on. Fact ontologists may differ on all such matters, but must concur that the entities of the sort captured by ⊢*Fa* are the fundamental beings of the world.

Two features of this view bear noting. The first is an assumption that I will call *attachment*: that predication consists in an act of attaching, or *appending*, a predicate to a subject. The second is an assumption that I will call the *thin constituent* assumption: that distinct facts have constituents 'in common' in some way other than their having *one and the same*

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[165] It will turn out that this inheritance from fact ontologies bears significantly on a central, contentious theme running through my whole proposal: the 'factoring' of determination relationships. This factoring claim will be discussed in more detail in Chapter 5.

[166] At least, relatively fundamental with respect to objects and properties.

[167] For this reason the assertion sign here is indispensable. As I will argue in Chapter 7: terms in a language carve at joints via their associated operations, and hence, only when they are used in assertoric contexts.

constituent (no constituent is *thick enough* to span more than one fact).[168]

In terms of *thick* and *thin* (in the senses introduced previously), fact ontologies so described occupy a strange middle ground. Indeed, the point of my argument overall is that such a middle ground is a compromising place to be. For on the one hand, it is a central insight of fact ontologies that the (relatively) *thick* thing – the thing captured by ⊢*Fa* – is ontologically prior to the *thin* things – the things, if there are any, captured by *F* and *a* – which are its abstracts. Yet, on the other hand, the fact ontologist stops short of admitting the priority over facts of a still *thicker* thing: what I am simply calling the (thick) *object*.[169]

3. The Ternary *Explanandum*

Both assumptions – *attachment* and *thin constituents* – are false. This is, at bottom, because the assumption that predication introduces a *binary* structure into the *explanandum* role is false. Or rather: the *appearance* that it does so is misleading. For while predication may *seem* to involve two linguistic elements,[170] this does not at all entail that the *operations*

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[168] I am factoring out here those views on which constituents are *overlaps* between facts. This sort of view raises some significant complications – for example, over how *overlap* is to be understood if facts are not to be taken as mereological sums, and hence, non-fundamental entities.

[169] It gets stranger: what is the fact ontologist to say about properties (determinates under different dimensions) that necessarily go together, such as – for argument's sake – *colour* and *extension*? It would seem that in such cases, facts bleed into one another: the fact that my apple is green is not entirely distinct from the fact that it is roughly spherical, or at any rate from the fact that it has some shape or other. (Compare Treanor's (2013) discussion of the notion of *exactly one belief*.) So it would seem that facts must come in *clumps*, or must *vary* in thickness. I discuss a similar argument against tropes in Chapter 6.

[170] Even this appearance is questionable. Predication occurs, for example, in quantificational contexts – *all Fs are G* and so on – where the received wisdom is that we know better than to treat *all Fs* as a subject whose predicate is *...are G*. True, one would standardly write (x)(Fx → Gx), where substituting a name for *x* yields say, (F*a* → G*a*), wherein the atomic predications *Fa* and *Ga* do look straightforwardly binary. Still, such examples suggest a *general* caution about 'surface' form.

involved carve at only two ontic[171] joints. I argue in the present section that predication introduces into the *explanandum* role a structure that is not binary, but *ternary*. More strictly speaking, I argue for a structure in the *explanandum* role that is *at least* ternary: I do not rule out more joints, but three are enough for my purposes.[172] The next section will relate this conclusion to my dimensional ontology.

A proper understanding of predication's structure should supply the resources to explain not only what is happening when predication goes well, but also what is happening when predication goes awry. For it may be that a part of the structure of predication is *hidden*[173] when predication succeeds, and revealed only – or predominantly – when it fails.

Of course, predication may fail in multiple ways – not least by simply being false. For our purposes though, *category mistakes* are a more interesting kind of case. Magidor (2013) offers roughly the following account of category mistakes.[174] Category mistakes occur when a subject and a predicate are mismatched in the following specific way: picking out that subject *does not raise any question of whether that predicate applies to it*. For

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[171] I use this term here in Heidegger's sense, in which the *ontic* concerns entities, while the *ontological* concerns the 'being' (roughly: ontological form) of entities.

[172] Perhaps this move is made too lightly. One may think this if one worries, for example, that I will struggle to set a non-arbitrary level of specificity at which operations, in the relevant sense, are to be understood (a similar problem afflicts reliable-process theories of knowledge). I will return to this issue in a later chapter. For now, my short answer is that I take it to be a good thing that my view leaves it an open, empirical question exactly what kinds of operations there are, and which kinds are relevant.

[173] Or at least, less noticeable – but not entirely hidden: see the discussion of Johnson in Chapter 2.

[174] It does not matter a *great* deal for my purposes whether one considers the example that I will offer shortly to be a genuine category mistake, or just an odd and infelicitous predication: in either case, it is an example of predication failing in a way that brings out what I want to illustrate. Indeed, Magidor's stated aim is simply to explain what is *infelicitous* about such statements, though she does also consider them to be category mistakes.

example, 'Mozart is prime' is a category mistake (at least, in a broad sense) because nothing about Mozart raises any question about whether or not he is prime. Magidor cashes out what I am calling 'not raising any question' in terms of *presuppositions*, in keeping with her stated aim of explaining "what makes category mistakes infelicitous" (2013:2). For our purposes, we may note that Magidor's account brings out a *third structural element* in predication, which is evident when predication fails through a category mistake – the aforementioned presuppositions.

Magidor's presuppositions set us on our way toward a ternary structure. But for our purposes, Magidor's presuppositions had better turn out to be more than a merely *psychological* affair. It must be the case that certain predications – category mistakes – fail because they contravene something stronger than a mere expectation. What is contravened must be some aspect of our dealings with the world which – unlike mere expectation – *succeeds* in a way that requires explanation.

A good next step would be to show that the third structural element in predication is present as a broadly *logical*, and not just psychological, matter. For this, we return to Johnson. For present purposes it is enough to recap four central points from Johnson's (1921) discussion (for more detail, see chapter 2):

i. Determinable-Determinate Hierarchy: Adjectives stand to other adjectives in hierarchically ordered determinate-determinable relationships.
ii. Upward Presupposition: possession of (relatively) determinate adjectives always entails – or rather, *presupposes* – possession of their related determinables.
iii. Non-Conjunctive Specification: Determinates are non-conjunctive specifiers of

their determinables.

iv. Fundamentum Divisionis: Determinables play the role of a *fundamentum divisionis* – a founding basis for the division of objects into exclusive and exhaustive natural classes.

We may treat these four statements as premises in arguing for two further claims.[175] First: each object (Johnson: each *substantive*) is associated with a set of (highest) determinables which amount to a profile of the kind of object that it is. Second: objects are related to their determinate qualities not directly but via their associated (highest) determinables.

Here is an argument for the first claim. Consider first the observation (iv) that determinables play the role of a *fundamentum divisionis* in the classification of objects. This underwrites my claim that determinates *presuppose* their determinables rather than merely *entailing* them. For it is hard to see how determinables could *play* their categorising role – how they could be the basis for classifying objects – if they were merely entailed by their determinates. To be clear, there are two ways in which determinables serve to categorise objects: objects may be classified either according to the *determinate values* that they have under some given determinables (for example, fugues may be classified according to their determinate number of voices), or they may be classified according to *which determinables they fall under at all* (for example, a minim must have *some* pitch). If determinables are merely entailed by their determinates, then both of these classifying roles suffer. For in the first place, it is hard to see how an object could be classified by determinables in the latter way – according to which determinables it should fall under at

[175] The premises, as well as the further claims, are all to be found in Johnson. The present regimentation of the argument, however, is my own.

all – if determinables are merely entailed by their determinates. For in that case, determinables are mere 'danglers', and should not do any explanatory work. Moreover, the former kind of classificatory role suffers in turn because of this. For if objects cannot be sensibly classified according to the determinables that they fall under at all (not in the sense that they cannot be so classified, but rather, in the sense that it is a mystery why they *can*), then it is equally unexplained why the determinate values of *these* determinables rather than *those* should be the basis for classifying such-and-such objects into their natural classes. For this reason, we may suppose that determinables are presupposed, and not merely entailed, by their determinates. To put it another way: an object's relationship to the highest determinables under which it falls is *intimate* and *direct*: it is not related to them *via* its determinate qualities under the relevant determinables, but directly, in virtue of the kind of thing that it is. This gives us our first claim.

Here is an argument for the second claim.[176] Suppose that an object's relationship to some determinate[177] quality is *direct.* By *direct* here I mean *not mediated* - in particular, not mediated by the determinable under which the determinate falls.[178] Then it is unclear how an object's relationships to determinates may be *constrained*, and in particular, how they might be constrained by an object's relationships to its associated profile of determinable s.

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[176] A full argument for this point, which I am developing elsewhere, goes beyond what I can give here. Here I offer a telescoped version of *one* argument for the intended conclusion. To give the argument in full would require a long digression about determinables and determinates, which is best reserved for another occasion.

[177] By 'determinate' here I shall, by default, mean '*maximal* determinate'; by 'determinable' I shall by default mean 'maximal determinable'.

[178] See Lowe (2006, 2013) for an illustration of this distinction. On Lowe's view, *instantiation* and *characterisation* are both direct formal relationships. *Exemplification*, by contrast, is indirect: objects exemplify attributes *by* being characterised by modes that instantiate the relevant attributes, or by instantiating kinds that are characterised by them. The relationship between objects and attributes is thus indirect: it is mediated by modes (when exemplification is occurrent) or kinds (when exemplification is dispositional).

What constrains the domain of determinates which an object may possess, in such a way that it *coincides* with the domain of determinate values under the profile of highest determinables with with an object is associated in virtue of its ontological kind? Since we are supposing that an object's relationships to its determinate qualities is unmediated, it is quite mysterious how its relationships to its determinable profile might play this constraining role. In that case, three options remain. Either (1) the coincidence is a happy accident, or (2) it occurs in virtue of an object's being directly and essentially related to some *common factor* among the determinates which it may possess, or (3) it occurs in virtue of an object's being directly and essentially related to each determinate which it may possess in a piecemeal way.

Plainly, (1) must be rejected: it is an admission that an object's relationships to its determinate qualities is not constrained at all.

Option (2) should also be rejected, on the grounds that *highest* determinables cannot be reductively accounted for in terms of the determinates that fall under them.[179] This is of course a controversial claim, and I can only offer a briefest defence of it here. To be clear, the claim is not that determinables *in general* cannot be accounted for in terms of their determinate values - indeed, I believe that plenty can. My claim is rather that *highest* determinables are not so reducible. (Determinable-determinate hierarchies are by no means sure to be ontologically uniform: *determinate* and *determinable* by themselves, after all, only mark a relative distinction.) The reason for this is, as Johnson himself pointed out, that what unifies determinates under a common (highest) determinable is not a shared factor which marks and grounds their *similarity* to each other, but rather, a *special kind of*

[179] For a different view in a similar ballpark, see Wilson (2012).

difference: determinates under a common highest determinable *differ* from each other in a distinctive way. Specifically, they differ from each other *in respect of* their shared highest determinable; that determinable is nothing other than the *respect* in which those determinates differ (and hence, in which the objects that possess those determinates may differ *or* resemble). Interestingly, non-maximal determinables diverge from maximal determinables on precisely this point: determinates under non-maximal determinables *are* united by characteristic resemblances.[180] Highest determinables are distinctive respects of difference: they *are* the common factors - the common respects of difference - that their determinate values share, and so leave no room to be reductively explained by some *further* common factor.

Finally, option (3) should be rejected on grounds that, once again, it fails to *explain* the coincidence of the two domains of determinates. While it explains how an object may be related to the relevant plurality of determinates *distributively*, it does not explain why those determinates should *collectively* exhibit the structure - unity under a profile of determinables *and* completeness under those determinables - that they do. This gives us our second target claim, that objects are related to their determinate qualities not directly but via their associated (highest) determinables.

I have argued that objects are related to their respective dimensions *directly*, not via their associated determinate values. I have also argued that objects are related to their determinate qualities *indirectly*, via the associated dimensions whose values they are. The resulting, ternary view looks like this:

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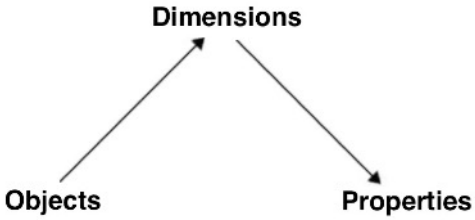
[180] They are related to *each other* by resemblances, in addition to the distinctive respect of difference that they share with the wider class of determinates under their common *highest* determinable.



This ternary structure is, I suggest, what predication introduces into the *explanandum* role. The next section argues that my proposed ontology of dimensions offers a better *explanans* structure for predication structure, so understood, than standard fact ontologies. The final section (Section 5) will argue that a core idea behind the notion of a fact is nevertheless preserved on my view.

4. From Facts to Dimensions

If the *explanandum* structure of predication is indeed ternary as I suggest, then standard fact ontologies are in trouble, because the *attachment* and *thin constituent* assumptions are in trouble. The challenge to *attachment* is both direct and thorough. It is direct because on the ternary view, objects and determinate qualities are simply not directly related. It is thorough because the *attachment* assumption cannot be simply shifted and *reapplied* to the threefold *explanandum* structure. At a *logical* level, the reason for this is that dimensions are *presupposed* by both objects and determinate properties. They are, in Johnson's phrase, associated with objects "from the start", and the attribution of a determinate property to an object does not consist – Johnson again – in the appending of a wholly new adjective to the relevant substantive, but rather, consists in specifying the determinate value of a determinable adjective that the substantive already possesses. There is thus no room within the *explanandum* for the 'attachment' assumption to reappear. Predication and instantiation, then, do not involve *copular ties*. Rather, they are *determination* structures, in a sense to be

further clarified below.

The challenge to *thin constituents* follows on from this. If the relationship between an object and a dimension is *intimate* in the way outlined, then an object will bear it to *all* the dimensions that it falls under (that is, the dimensions that collectively constitute its categorial profile – see chapter 1) if it bears it to *any* such dimension at all. If the *thin constituents* assumption is true, then given some arbitrary predication *P1* of some property to an object **O** under the dimension **D**, and some further predication *P2* of some property to **O** under the further dimension **D***,[181] it will be true both that **O** occurring in *P1* is intimately related to **D**, and that **O** occurring in *P2* is intimately related to **D***. But it will also be true that **O** occurring in *P1* is *not* intimately related to **D*** – or at any rate, it will be true that *if* **O** occurring in *P1* is intimately related to **D***, this has nothing much to do with **O**'s occurrence in *P2* being so. (A similar thing follows for **O** in *P2*). This, in turn, undermines the very grounds for holding, in the first place, that **O** in *P1* and **O** in *P2* are intimately related to **D** and **D*** respectively. The *explanandum* has changed; standard fact ontologies are no longer able to save the appearances in a satisfactory way.

Factalism, then, make a poor *explanans* for our ternary *explanandum*. My proposed ontology of dimensions, by contrast, is well-placed to stand in the *explanans* role. Objects and dimensions, on my view, correspond with their *explanans* counterparts directly; properties are derivative entities introduced by abstraction on objects in respect of the relevant dimensions, in the manner discussed in Chapter 3.

The abstractionist account of properties given in the previous chapter works in favour of

[181] Where **D*** is independent from **D** in relevant ways, etc.

my proposed view here. For on that account, it is clear just *how* acts of predication get at the world's structure, and moreover, it is clear that the operations involved have much in common with the operations involved in the ubiquitous and relatively tractable activity of *measurement*.[182] Moreover, acts of predication offer a clear application for the indexed, instrument-oriented conception of resemblance described in my account of determinates.

On my view, the operations of predication are – or are at least continuous with – operations that bear directly on reality's fundamental structure: predication structure is, then, of a piece with instantiation structure. Such an outcome is by no means guaranteed *a priori*, but desirable nonetheless.

Moreover, on my view, a clear story can be told about *why* the *attachment* and *thin constituent* assumptions are false, not only at the *explanandum* level but (as one would expect) at the level of the *explanans* structure. For the relationships between objects, dimensions, and properties are all *internal* relations (so *attachment* is false), and objects simply are not sliced up into proposition-shaped portions by their relationships to their determinate properties (so no *thin constituents*). I suggest, then, that my dimensional ontology solves both the predication problem and the instantiation problem in a satisfying way.

5. Not Factalism, but Near Enough

Standard fact ontologies – understood as those that subscribe to proposition-shaped facts through the *attachment* and *thin constituent* assumptions, motivated in turn by a binary view of predication structure – are mistaken. I have argued against the binary view of

[182] I will touch on the significance of this in Chapter 7.

predication, and so against *attachment* and *thin constituents*. What remains of fact ontologies if these assumptions are dropped?

At least two core components of the standard conception of facts must go. One is the proposition-like nature of facts. The other is the closely related view that the ontologically fundamental things are those picked out by whole atomic assertions such as ⊢*Fa.* If one's conception of a fact is wedded to these features, then the picture that I offer amounts to an *obliteration* of facts. Turner (2016), for example, holds that a key distinction of fact ontologies is the contrasting alternative that they offer to object-centred conceptions of the world's structure. By such lights, I have not preserved much of a fact ontology.

But it needn't be so. I said above that I would single out instantiation structure in the *explanandum* role (and as it turns out, predication structure along with it) on grounds that it would be fruitful to explore the contribution of fact ontologies *with respect to those explananda in particular*. It is not clear at all, in *that* connection, that either of the jettisoned components – propositionlikeness and facts as fundamental correlates of atomic assertions – is really a central insight of fact ontologies.

The core 'factalist' insight, in relation to instantiation structure, seems not to concern facts as *entities* at all. It seems, rather, to concern a certain *structure* – a structure exhibited by facts, but the exhibiting of which is by no means limited to facts. It amounts to this: that *instantiation*, understood as the relationship between objects and properties, understood in turn as constituents in predication structures – is not a *direct* relationship, and hence, not a fundamental one.

In this regard, dimensionism may be considered *broadly* factalist in spirit. In particular, objects, as I conceive them, are – as mentioned – unstructured particular and qualitative wholes from which at least *one* kind of constituent – their properties – are understood to be introduced by abstraction.[183] The insight of such *structural factalism* concerns the priority, where *quality* is concerned, of the ontologically thick over the ontologically thin (the latter being *abstracted* from the former), rather than what we may term *ontic factalism*, the positing of *facts* as a distinctive and fundamental category of being.

I have argued that the most viable factalism is structural, and that structural factalism best fits a substance - indeed, *dimensionist* - ontology. We should be receptive to the idea behind facts structurally conceived, but we should reject conceptions of facts as *sui generis* entities. The moral, then, is: *thus far, and no further*. In view of the problems discussed, my proposed view marks a kind of balance point - an optimal middle ground between the spirit of factalism and the concrete demands of the problems of predication and instantiation.

[183] I leave it open whether dimensionism may permit the abstraction of *objects*. As I mention in the Conclusion to this thesis, the Cartesian approach of Hawthorne (2007) may be one option here.

Chapter 5 - Factoring and Governance

0. Intro

Chapter 4 advanced a conception of instantiation as determination. A central resource of that account - and indeed much of the rest of the thesis - is the claim that determination has a factored structure: the claim that objects determine dimensions in a twofold way, both *at all* and *somehow*. The present part of the chapter discusses this factoring claim more directly. In Section 1, I supply some plausibility arguments for the factoring claim. I then put the claim to work in relation to the topic of *nomic governance*. In Sections 2 to 4, I apply factoring to Stephen Mumford's 'Central Dilemma'. Section 2 presents the dilemma, in the abstract, and brings it in line with the dialectic of my discussion. Section 3 presents the first horn of the dilemma, applied to 'the' DTA theory of laws. Following Mumford, I focus on Armstrong's theory in particular. In Section 4, I present the second horn of the Central Dilemma. Following Mumford again, I discuss its application to Lowe's (2002, 2006, 2013) account of laws, and again. In Section 5, I set out a dimensionist treatment of the Central Dilemma's challenge, which incorporates the lessons that - I argue - should be learned from Armstrong and Lowe: in particular, my account will be a Platonist one, insofar as I will be rejecting a principle of instantiation for dimensions. I argue that the proposed view falls on neither horn of Mumford's dilemma. The view that I will propose is an instance of what I will call an 𝙸-theory (read: I-theory), whether of laws or not.

1. Factoring

I have claimed, at various points, that determination is a *factored* formal relationship. For instance, in chapter 2, it was the factored structure of determination, relating objects to dimensions, which allowed objects to stand as ontological correlates of maximal

determinate adjectives. In chapter 3, it was the factoring that allowed determination to give rise to a property abstraction principle of the form that I proposed: the collective plural relata of the *resemblance* relation featured in that principle depended on one factor of determination, while the resemblance relationship itself depended on the other. In Chapter 4, the factoring of determination plays a key role in my argument for dimensionism and against factalism. The factored structure of determination is, then, a very central resource of the dimensionist view.

The factoring claim may be put, most generally, as the claim that objects determine dimensions both *at all* and *somehow*, and hence, that determination has a twofold, factored structure.[184] Why think that factoring is a plausible thing to posit?

One reason is that determination-somehow and determination at-all do appear to be distinct relationships. For it may be a part of the essence of an object, both that it determines some particular dimension at-all, and that it determines it somehow. But to determine a dimension somehow is always also to determine it *in a particular way,*[185] and it may not be a part of the essence of that object to determine that dimension in some particular way rather than another. Thus, determination-somehow may feature in the essence of an object in a *nonrigid* way, in a way that determination at-all does not.

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[184] It is perhaps possible, if a bit misleading, to talk about *determinable determination* and *determinate determination*. I will generally avoid talking this way, preferring the terms 'determination-somehow' and 'determination at-all'.

[185] I have offered an account of identity for these ways in chapter 3.

Another reason to posit factoring is that certain obvious attempts to reduce it away fail. In particular, it is at least *plausible* that factoring should not be explained away in terms of *determinables*, or in terms of *modes*.[186]

Determination is concerned with *dimensions*, not with determinables. 'Determinable', and its relative 'determinate', are after all not *categorial* terms, but rather terms that mark a relative distinction in status within an ordering of some kind or other. I have argued in Chapter 1 that determinates - determinate *adjectives*, say - under a common determinable are united by a certain kind of one-over-many - a *respect* of comparability - that cannot be reductively accounted for.[187] The relationship between objects and these respects is not straightforwardly the same as the relationship between determinate and determinable adjectives, nor is it the same as the relationship between objects and those adjectives. Thus, there is no straightforward way in which determination is reducible to instantiation or satisfaction: the factoring of determination cannot be simply reduced to the co-instantiation of determinate and determinable properties (or the satisfaction of their corresponding predicates).

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[186] It is not straightforwardly obvious, either, that factoring in this context should be an instance of any unified wider phenomenon. Consider, for example, the claim, mooted briefly by Simons (1994b), that there is room for an ontology of *ways* - that is, in my terms, that *ways* (roughly, adverbially understood) belong in an *explanandum* role. Simons proposes an ontology of ways that appeal to higher-level tropes. I leave it an open question, whether my description of factored determination as involving different *ways* of determining is covered by the sense of 'way' discussed by Simons.

[187] To recap briefly: respects are not only respects of sameness but also respects of *difference*. Thus, two things may have a respect in common by *differing* in that respect, and hence, not in virtue of some shared quality in that respect. It will not do, either, to put the sharing of respects down to the sharing of a subset of causal powers, since the subset account (which does not respect the 'non-conjunctive specification' condition on determination) *overgenerates* and fails to distinguish respect-constituting subsets of powers from others.

Moreover, determination is concerned with *objects*, not objects and modes. There are two reasons for this. The first, general reason concerns parsimony: as I argued in chapter 3, given objects and dimensions, there is no further *need* to posit modes. The second, more specific reason is that an ontology of objects and modes faces a dilemma: either determination is *distributed* between objects and modes, or not.

Suppose that determination is divided between objects and modes. The proposal under consideration is that objects do the work of determining *at-all* (since they *essentially* determine the dimensions that they do), while modes do the work of determining *somehow*.[188] But the proposal faces a further dilemma: do objects and modes *only* determine dimensions at-all and somehow, respectively?

Suppose that they do. Here the proposal is that objects determine dimensions at-all and *not* somehow, while modes determine dimensions somehow and *not* at-all. The problem with this proposal is just that it is not clear at all what is being proposed. On the one hand, it is unclear how something *can* determine a dimension somehow, without also determining it at-all. On the other, it is unclear how something can determine a dimension at-all without determining it also somehow.[189] One might doubt this latter claim precisely in the case of objects and modes: one might think that an object *can* determine a dimension at-all, and leave the work of determination-somehow to its modes. But in that case, it is quite unclear why we should think of the *object* as determining a dimension in *any* way - why, that is, we

[188] One might - to keep the analogy with determinables going - hold that objects instantiate determinable properties, while modes instantiate determinates. But this would be to introduce many complications to the proposal.

[189] One might think that an object can instantiate (in a sense of 'instantiate' that I have rejected in Chapter 4) a determinable property without instantiating its relative determinates. But not every determinable is a highest determinable; hence, not every determinable is a dimension.

should not rather think that it is *modes* that determine *both* at-all and somehow. (On such a view, the determination profiles of objects would be the dimensions that their *modes* would determine.) We should not, then, think that objects and modes determine *only* at-all and somehow, respectively.

Suppose instead that they don't: suppose that objects and modes *both*, each, determine dimensions both at-all and somehow. One obvious issue here is that it is no longer clear how determination is a *formal* relationship. For formal relationships are grounded in the ontological forms of their relata, and it is not entirely clear how an object-dimension relationship and a mode-dimension relationship could be the very same. Setting that issue aside,[190] we have a further bifurcation: let us call the options *internal* and *external*.

On the *internal* option, it pertains (to use an intuitive expression; nothing here will turn on clarifying it) to *each* of the natures of objects and modes, that they should each determine dimensions both at-all and somehow. Besides leading to some redundancy, this view immediately entails what I am claiming, that determination is a factored relationship - indeed, even *more* so than I am arguing.

On the *external* option, the proposal is that objects and modes each do their determining work separately (*at-all* for objects, and *somehow* for modes), and that they, in some sense

[190] The issue is rather unclear. In Lowe's (2006) ontology, the duplication of formal relationships is allowed: *characterisation* relates both objects to modes, and kinds to attributes, while *instantiation* relates both objects to kinds, and modes to attributes. The same is true of *constituted* formal relationships: *exemplification* relates objects to attributes *both* via kinds *and* via modes. (Indeed, Lowe's exemplification is another example of a factored formal relationship.) One might think that this is permissible because the two instantiation (*mutatis mutandis,* characterization) relationships are involved in constituting structurally comparable relations of ontological dependence. I will not pursue this issue here.

or other, *confer* the fruits of these labours upon each other. But the notion of *conferral* required here is, as ever, obscure.[191]

Still, things might not be so simple. A defender of an object-and-mode ontology, taking this external option, might offer an explanatory setup that parallels my treatment of Mumford's 'Central Dilemma' later in this chapter. Here is the idea: let us say that it is *part of the essence of an object* that it should be characterised by some mode.[192] Now, a particular mode will determine (somehow) some dimension or other; indeed, it will be a part of the essence of the mode that it should do so. Very roughly, the point is that determination-somehow features as a part of the essence of a *mode*, and hence features *indirectly* as a part of the essence of an object. Note that in Lowean terms, the *characterisation* relationship constitutes a relationship of *nonrigid* dependence of objects on modes: the existence of an object depends on its being characterised by *some* modes or other. Thus, although the dependence of modes on the dimensions that they determine is *rigid,* no mode confers upon an object the determination of either *a specific dimension* (rigidly understood), or the determination of a given dimension *in a specific way* (though it will be a part of the essence of a given mode not only to determine a particular dimension somehow, but also to do so in a specific way).

I cannot see, in principle, why this kind of divide-and-confer strategy could not work - at least, given a prior commitment to an object-and-mode ontology. But my aim here is not to argue against such an ontology; rather, it is to argue that determination is a factored

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[191] This is a recurring point in the thesis. See the Introduction, and the discussion of module and modifier tropes in Chapter 6.

[192] Here I adopt the terminology of Lowe (2006, 2008a) for convenience. I set it out in more detail later on.

relationship. We have seen that there is a plausible way to make sense of how modes might confer determination-somehow, in an indirect way, upon objects - but it is less clear, for the external conferral strategy under consideration, how objects could confer determination at-all upon modes. It seems clear that whatever determines a dimension somehow, *by that token* will determine it at-all. Thus, modes will stand in both kinds of determination relationship - at-all and somehow - and will, importantly, stand in at-all determination relationships quite independently of any role that objects might have in conferring such relationships upon them. Thus, even on this picture, determination has the factored structure that I am claiming for it.[193]

We have supposed that the two varieties of determination (the somehow and at-all varieties) *are* divided separately between objects and modes, with the result that determination turns out to be factored anyway. The other horn of the dilemma, that the two facets of determination do *not* occur divided - leaves three options: determination will relate dimensions to *modes*, to *objects*, or to *both*.[194] We need not pursue the details here: the important point is that on each option, determination comes out as a factored relationship in precisely the sense that I am claiming.[195]

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[193] There are further ways to complicate this picture. For example, one might posit *two* factored relationships, one between objects and dimensions, and the other between modes and dimensions. But I will not pursue this line further.

[194] Or indeed, neither. But in the present context, this option is not salient.

[195] It is true that factored determination relationships have less *flexibility* in the case of modes than objects: an object may have, in Vetter's (2015) terms, various *potentialities* to determine a given dimension in *more than one way*, and thus to *come to resemble* or *cease to resemble* other objects in respect of that dimension. With modes - at least, understood as maximally determinate - this is not so. But while this alters the details, it does not change the score: determination remains a factored relationship.

2. Mumford's Central Dilemma

Let us proceed, then, on the assumption that determination is a factored formal relationship. We turn now to an application of this idea. I will discuss the Central Dilemma posed by Stephen Mumford (2004, 2005) against nomological realism.

Some stage-setting is needed to bring the Central Dilemma into the dialectic of our discussion here. Mumford's own discussion takes place within his case for *realist lawlessness* - the view, roughly, that the *explananda* that laws are posited to explain - the patterned, animated behaviours exhibited by entities, which go beyond Humean *mere* patterns - are real enough (*realism*), but that reified laws of nature are the wrong things to play the *explanans* role (*lawlessness*). Thus, Mumford poses the central dilemma in as a challenge to *nomological realist* ontologies. But I am not concerned here with laws of nature - at least, not directly. It will not matter much for my account, whether the view that I arrive at is an account of *laws* or not. I will, then, frame the dialectic differently, in terms of *animation*, *structure*, and *conferral*.

To begin, it is worth giving Mumford's own setup (2004:158) in detail. The setup begins with a dilemma. Nomological realist positions claim that laws of nature are entities that play a *governing* role with respect to the patterned behaviours of entities. So Mumford poses an initial dilemma: either laws *govern*, or they don't. Call this the *Frame Dilemma.* Plainly, if they do not govern, then nomological realism is false. So nomological realists must take the first horn of this dilemma.

On the first horn of the Frame Dilemma, a further dilemma arises: either laws govern their instances *externally*, or *internally*.[196] This is the Central Dilemma. Let me briefly present the two horns in the abstract.

On the first horn, laws govern their instances externally. Laws are, to put it a little differently, *external* to the things over which, or in relation to which, they play a governing role. The problem, on this horn, is that the governing relation remains unclear - and that it remains unclear in a way that threatens to lead to *quidditism* about properties.

On the second horn, laws are *internal* to the things over which they exercise a governing role. Such a theory must do two things. It must give a clear sense to 'internal', and it must, again, make clear *how* the exercise governing relation is supposed to work. Mumford's claim (2004:153) is that internal accounts cannot successfully do both.

Since neither horn of the Central Dilemma is viable, the nomological realist is forced onto the second horn of the Frame Dilemma. But this is to concede that laws play no governing role in the world: nomological realism should be rejected.

To bring the central dilemma in line with my present discussion, consider the notion of a *feature,* as I have been using that term throughout this thesis. The notion of a feature is a broad notion indeed: it includes any aspect of reality that stands for grounding or explanation: any structure in the *explanandum* role. *Quality* is an example of a feature, in this sense, that has featured prominently in the rest of this thesis; *respect structure* is

[196] There are two kinds of externality in the mix here: that pertaining to the relation between universals, on the DTA account of laws, and that pertaining to the governance relation between laws and their instances. The Central Dilemma, on my understanding of it, concerns both.

another. Mumford's discussion focuses on a further feature, which I will call *animation*. The idea is, intuitively, that the world *moves*: things in the world are *dynamic*, acting over time in ways that are constrained and driven by their *modal involvements* with each other.[197] Central to the metaphysical project in which nomological realism is involved is the idea that the animation of the world is a feature that requires explaining - that without such an explanation, it would be unclear why reality should not be inert and inanimate. As Mumford puts it:

> Recall that Lewis allows modal truth but no modal properties that might be their truthmakers. His is the Humean demodalized world. The problem with nomological realism is that it accepts the demodalized world as its starting point. It sees the world as containing no modal properties and therefore needing the imposition of laws to make the world active and dynamic. Our world self-evidently is active and dynamic, but are laws the best explanation of the source of such dynamism? (2005:407)

I will follow Mumford here in taking animation to be a central *explanandum* feature under discussion. To accept animation as an *explanandum* is to deny the *Humean* view of laws, that the regularities - the lawlike patterns in the world - are not targets for further explanation.[198] It is to accept that among the explanatory tasks of a metaphysical or ontological theory is the task of accounting for the *source* - the generative, determining *grounds* - of such patterns. Taking 'governance' broadly, *any* such view is committed to the claim that whatever turns out to be the source of nomic regularities plays a *governing* role with respect to the things that *exhibit* those regularities. Thus, we can offer a generalised version of the Frame Dilemma: *whatever* the source of the relevant worldly regularities turns out to be: does *that* source play a governing role? Here it is hardly coherent to

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[197] Schaffer (2010) has developed an argument for priority monism that draws on a notion of *modal independence*. I leave it open exactly how these notions are related.

[198] Of course, animation is not, by itself, necessarily *patterned* animation. I will take up this point later.

suppose that there *is* such a source to be accounted for, and yet such a source does *not* play a governing role. So the first horn of the generalised Frame Dilemma is one on which *any* anti-Humean should quickly find themselves. Thus, since in the present context I am not considering Humean views, we can cast the Frame Dilemma as a question for anti-Humeans: *whatever plays the governing role on your account, how does it do so?*

To take stock: both Humean and anti-Humean accounts can, and should, be equally committed to the claim that a certain domain of entities does, in fact, exhibit regularities of a certain sort.[199] Anti-Humeans are committed to the further claim, which Humeans deny, that these regularities can be explained in terms of *modal features* of the world: the entities that exhibit the regularities in question are *governed* in such a way as to produce the regularities.[200] The things that play this governing role may, but need not, be laws. Thus, the Central Dilemma faces not only nomological realism, but *any* anti-Humean view. In a generalised form, the Central Dilemma asks whether the things[201] that play the governing role are external to, or internal to, the things that exhibit the *explanandum* regularities.

Note that the Central Dilemma, thus posed, leaves room for the notions of *governance*, *internality,* and *externality* to be understood in a range of ways. This freedom matches a further dimension of freedom in the dilemma, which is general with respect to the

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[199] It is not important in the present context to put this more precisely. It is not clear, at a first pass, how patternedness relates to the feature that I have called 'animation' (a point that Tugby 2017 has developed into a challenge for anti-Humeans).

[200] Humeans about nomic regularities - 'nomic' meant neutrally - *could* be committed to modal features in the world, but tend not to be: their attitude toward regularities is closely tied to their commitment to 'Humean supervenience', a 'mosaic' world-picture of maximally local matters of fact, on which there are no genuinely modal connections between distinct things.

[201] I use 'things' here in a loose way, that is not intended to rule out whatever might be real but not an entity, such as a formal relationship (Lowe 2006, ch.3).

underlying ontological accounts that one might give of the things that govern, and the things that exhibit, the *explanandum* regularities. As we will see, the Central Dilemma relies on certain connections that these notions must stand in: governance, in the required sense, must involve *determining*, while externality must be related appropriately to *independent variation,* while *internality* allows a greater breadth of theoretical interpretation. Anti-Humean theories wishing to meet the challenge of the Central Dilemma - as they must - must give a clear account of the lines that they take with respect to these choice points.

Finally, it bears mentioning here that the Central Dilemma dovetails with recurring theme in this thesis: the notion of a *conferral ontology.*[202] Since Mumford's discussion of the first horn of the Central Dilemma focuses on David Armstrong's theory of laws, the problem is most directly put in terms of Armstrong's 'principle of instantiation' and the notion of independent variability. However, there is a further background threat that external approaches to governance may turn out to be what I am calling *conferral ontologies* of animation. Since I am committed to rejecting conferral ontologies in general - at least, such ontologies that do not heavily clarify the notion of conferral that they employ - I am committed to addressing the first horn in a way that does not appeal to a problematic notion of conferral.

[202] See the Introduction for discussion.

3. The First Horn: External Governance

Since the Central Dilemma, as noted, leaves interpretive *luft*[203] with respect to the notions of internality and externality, it is not entirely clear why the Central Dilemma should be understood as a *dilemma*, if this is taken to mean that the two horns are mutually exclusive. Whether they are so is a matter to be decided by filling in one's account of what internality and externality amount to: it seems quite possible, in the abstract, to offer a non-dichotomous conception of those notions. Indeed, dimensionism - as I will argue - is compatible with such a conception. On the view that I will propose, therefore, dimensionism will not meet the Central Dilemma's challenge by taking either horn and rejecting the other. The proposed account will fall in more closely with the second horn than the first - but it will not be a clean division.

Mumford (2004, Ch.9) discusses the dilemma in relation to the DTA theory of laws and Jonathan Lowe's (2002, 2006, 2013) four-category ontology. Since my view has much in common with both of these positions, I will follow Mumford's choice of examples. My goal in these sections is to bring out some weak spots in the DTA and Lowean theories that generate the problem posed by the Central Dilemma, before arguing later that a dimensionist treatment avoids these weaknesses. In presenting the dilemma against Armstrong and Lowe, I will mix my own argumentation with that of Mumford.

Mumford discusses the theories of Dretske, Tooley, and Armstrong in detail (2004, Ch.6), but focuses on Armstrong's position - in Mumford's view, the most plausible of them - in his presentation of the Central Dilemma. Here I shall focus on Armstrong directly.

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[203] In the chess player's sense. The term is used ('creating *luft*') to describe moves that make space for a (typically castled) king to move, as prophylaxis against tactical motifs (such as back-rank and smothered mates) that rely on the restriction of the king's freedom of movement *by its own pieces*.

Armstrong's ontology of laws is set within his systematic ontology of universals and states of affairs (Armstrong 1983, 1997). Roughly, states of affairs are concrete particulars whose abstracted, non-mereological constituents are *objects* and *universals*. A universal is an *unsaturated* entity: it is a *type* of state of affairs. Thus, on Armstrong's view, for an object *a* to have a property *F* is for there to exist a state of affairs whose constituents are *a* and *F* paired just so:[204] the state of affairs *F(a)*. Universals are types that distinct states of affairs may share: the states of affairs *F(a)* and *F(b)* share as a constituent the universal *F*.[205] Since they are merely abstracted constituents of states of affairs, Armstrongian universals fall under a *principle of instantiation*: only instantiated universals exist.

On an Armstrongian ontology, the *explananda* in focus here are the regularity-constituting relations between states of affairs. It is these relations that a Humean would claim to be *mere* regularities, and which, on Armstrong's view, are the target for explanation by laws.

Let us take, as a dummy example, some regularity-constituting relation R between the states of affairs *F(a)* and *G(a)* as a target for such explanation. If such states of affairs exist, then the universals *F* and *G* exist. Moreover, the universals *F* and *G* may be *related*. In particular, they may stand in a relation of *natural necessitation.* This will be a matter of their being the relata of a higher-order relational universal - that is, a matter of the existence of a higher-order state of affairs: *N(F,G).*[206] On Armstrong's view, the state of affairs *N(F,G)* obtains contingently. But that it *does* obtain is sufficient to explain the R-

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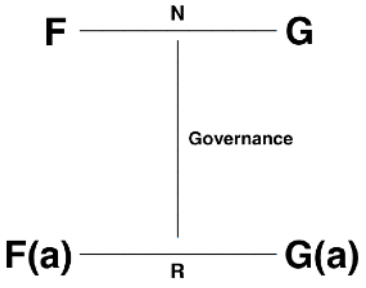
[204] This qualification is a simplified fix here against distinct states of affairs with the same constituents, such as *R(a,b)* and *R(b,a)* where R is a non-symmetric relation.

[205] Or rather, *F(x)*.

[206] So it is customarily written. Again, *N[F(x),G(x)]* would be more perspicuous in some respects.

relatedness of instances of *F* and *G* - or so goes the claim. We can represent the Armstrongian view diagrammatically:



On Armstrong's picture, then, the *explananda* in focus in our dummy example are the regularity-constituting R-relations between states of affairs *F(a)* and *G(a)*, and the *explanans* is the existence of a higher-level state of affairs *N(F,G)*; the explanatory relation is a relation of *governance* between this state of affairs - a *law of nature* - and the R-related states of affairs, which are its *instances*.[207]

The Armstrongian theory, sketched here, faces objections that have been extensively discussed. Here I focus on the problem that features most directly in Mumford's Central Dilemma. The problem begins with the Armstrongian claim that the relation *N* is an *external* relation between *F* and *G*. This makes the law *N(F,G)* contingent not only in the sense that *F* and *G* might have gone uninstantiated and thus not existed, but also in the stronger sense that they might have existed *and not been N-related*. This, in turn, makes the governance relation external. In particular, the R-relata *F(a)* and *G(a)* might have existed and *not* been R-related. Since the target *R* is not guaranteed by the existence of *F(a)* and *G(a)*, or by the existence of *F* and *G*, it falls to the relation *N* to secure the explanandum *R*.

[207] One might hold that instances of R-relatedness should coincide broadly with instances of *causal* relatedness. Since this point is not central to my discussion, I will not pursue it.

But what, in turn, explains *N?* Since *N* is an external relation between *F* and *G,* so *F* and *G* cannot play that role alone. What further factor is involved? Since *N* is posited to explain *R*, so it cannot be that *R* in turn is what secures *N*. This leaves two options: either the states of affairs *F(a)* and *G(a)*, or *nothing*. To take the first option is, in effect, to *flatten* the Armstrongian explanatory picture: the relation *N* will govern the target regularity, *R*, only because it is itself explained by the relata of *R.* Here we veer toward the second horn of Mumford's dilemma: *R* becomes an *internal* relation between its relata, and the relation *N* is redundant. On the second option, *N* becomes a brute posit. It is brute not only in the sense that it is an *arbitrary* matter to say which part of Armstrong's picture is the ground of *N*'s obtaining, but in the worse sense that Armstrong's picture leaves *no room* to ground *N.* Thus, we cannot even say that *N* should be taken as a theoretical posit whose bruteness is mitigated by its functional, explanatory role - for it is precisely that explanatory role which shows that *N* has no viable ground in the Armstrongian ontological picture.

Can Armstrong amend his view, and claim that the relation *N* is *internal* between *F* and *G?* I argue not - at any rate, not in a beneficial way.[208] The culprit here is the principle of instantiation. For *N* to be an internal relation between *F* and *G* is for the existence of *F* and *G* to suffice for their *N*-relatedness.[209] But *N* is not *superinternal*: we cannot simply suppose that the existence of *either* relatum suffices to guarantee the existence of the other. What guarantees the existence of both relata, according to the principle of instantiation, is *their both being instantiated*. This makes the instantiations of *F* and *G* ontologically prior

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[208] I leave aside the question of whether Armstrong's further systematic commitments permit this amendment. As Mumford (2004:95) points out, they do not.

[209] It will not help matters to add that the existence of *F* and *G* 'just *as they are*' should suffice for their *N*-relatedness. Although such an addition would make the instantiation of *F* and *G* specifically *in the object a* available as a ground for *N*, it would not help *N* to play its explanatory role any better than before.

(or at least, not ontologically posterior) to their being *N*-related, but it is precisely *posteriority* on the part of those instantiations that is required if *N* is to exercise a governing role over them. Thus, even internalising *N* between *F* and *G* will not help Armstrong's account of laws. Here again, the problem isn't just that making *N* internal leaves the explanatory role of *N* mysterious - but rather, that the demands of internality and explanation are *in conflict* given Armstrong's principle of instantiation.

A further problem for Armstrong's view is that it entails a quiddistic conception of properties.[210] As Mumford points out, if *N* is an external relation between *F* and *G*, then *F* and *G* may exist without being *N*-related. Now, *N* is the ground of the *modal* profiles of *F* and *G* (or else it would be explanatorily redundant). So to say that *F* and *G* may vary with respect to *N* is to say that they - the very same properties - could exist with modal profiles that differ from that expressed by *N*. Since *N*, *F,* and *G* are arbitrary terms, the point generalises: properties are not individuated by their causal profiles. As Mumford (2004, §9.5) notes, quidditism is an implausible thesis.[211] Moreover, it raises the further question of how (natural) modal profiles could be externally conferred upon properties *at all*. So: if Armstrong's theory of laws entails quidditism, then so much the worse for Armstrong's theory.

I have argued that Armstrong's account is brought down by two factors: his principle of instantiation, and his claim that *N* is an external relation. Moreover, the theory cannot be saved by dropping just *one* of these components. For, as I have argued, to drop *N*-

[210] In this context, quidditism can be understood as the claim that properties and their causal/ dispositional profiles may vary or recombine independently of each other.

[211] While this is by no means uncontroversial, I will simply assume here that Mumford is right.

externality without dropping the principle of instantiation brings no explanatory benefit, while *N*-externality entails quidditism without appeal to the principle of instantiation.

4. The Second Horn: Internal Governance

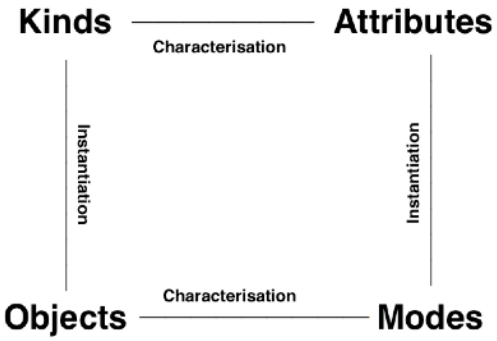
I have discussed the downfall of Armstrong's theory as an example of the first horn of Mumford's dilemma at work. We saw that *N*-externality, besides posing direct problems for Armstrong's explanation of laws, also led to quidditism. Yet *N*-externality was unavoidable, since Armstrong's background theory - in particular, his principle of instantiation - could not allow a different setup. In the present section, I turn to the second horn of Mumford's dilemma, and follow Mumford in discussing Lowe's four-category ontology as a case study.

Before turning to Lowe, it bears noting that various other theories take the second horn of Mumford's dilemma that are very different from Lowe's in their form. Examples are the dispositional essentialist views of Ellis (2001, 2002), and Bird (2007), and indeed Mumford's own 'realist lawlessness'. As Mumford points out, what unifies *some* of these accounts (such as those of Mumford and of Bird, but arguably, not that of Ellis) is their claim that the things that exhibit our target features - animation and nomic regularities - are *themselves* the things that play the governing role. It is properties that exhibit the target features, and properties themselves that possess the dispositional profiles that explain them.

Such views are not vulnerable to Mumford's dilemma. For Mumford's dilemma is not intended for them - at least, insofar as they do not claim to be *nomic realist* theories. Rather, the dilemma is raised as a problem for accounts that purport to explain the target phenomena by positing *laws*. Mumford's discussion (2004:xii) concerns the *reification* of

laws, but - as I explain in the next section - I will focus my discussion here on ontologies that explain the target phenomena by appeal to a particular sort of *structure.* It is ontologies with this structure - shared by the views of Armstrong and Lowe - that Mumford's dilemma attacks, and an ontology of such a structure that I will be concerned to defend. For this reason, I will leave dispositional essentialism and other related views out of my discussion.

As above with Armstrong, I will restrict my presentation of Lowe's view to the bare minimum. Lowe's account of laws is set within his four-category ontology, defended in various writings (2002, 2006, 2013 *inter alia*).[212] According to that ontology, there are - unsurprisingly - four fundamental ontological categories: *objects*, *kinds*, *modes*, and *attributes*. Obtaining between members of these categories are two formal ontological relationships: *instantiation* (between objects and kinds, and between modes and attributes) and *characterisation* (between objects and modes, and between kinds and attributes). These can be represented diagrammatically in an *ontological square*:



[212] Lowe himself cautions (2006:114) against too-readily combining his statements over a large span of time into a single system. The context for his warning is his discussion of Fraser MacBride's argument - inspired by Ramsey (1925) - against categorial uniqueness in the four-category ontology. Indeed, Lowe's treatment of categorial uniqueness underwent further change later (2013), with the introduction of *strong* and *weak* dependence relationships. I will therefore only claim, if pressed, that the account discussed here is *Lowean,* rather than Lowe's, or even Lowe's-at-*t*.

Each category can be uniquely identified by a distinctive dependence profile. For example, objects depend rigidly for their existence on the kinds that they instantiate, while kinds depend nonrigidly on the objects that instantiate them. Likewise, modes are rigidly dependent on the attributes that they instantiate, while attributes depend nonrigidly on the modes that instantiate them. These dependence relationships are *constituted* by the formal relationships of instantiation that relate objects to kinds, and modes to attributes. These shared formal relationships are the basis, in Lowe's ontology, for the distinction between universals and particulars: *universal* is a transcategorial term that includes both attributes and kinds, while *particular* is a transcategorial term including objects and modes. The characterisation relationship plays a similar role in underwriting the distinction between *substantial* and *nonsubstantial* entities (latterly, properties).[213] Thus, objects, kinds, attributes and modes may be termed respectively: substantial particulars, substantial universals, non-substantial universals, and non-substantial particulars.

On Lowe's ontology, the relationship of *characterisation* between kinds and attributes plays a role similar to that played by the *N* relation between universals within Armstrong's theory. On both accounts, laws of nature are accommodated as *relations between universals*. Here it will help my case to consider some points of similarity and difference between the two views.

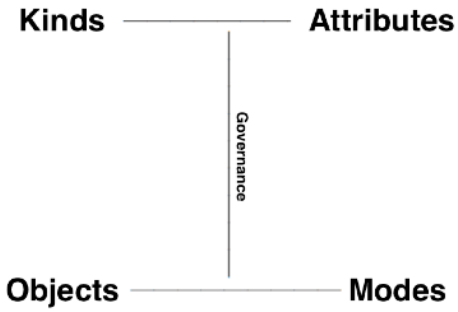
The differences between Lowe and Armstrong are extensive; here are a few. First, the relation to which Lowe's account appeals is not an external relation, but an internal one.

[213] There is a curious apparent glitch here, since modes depend rigidly on objects, but kinds depend rigidly on attributes - yet attributes characterise kinds, and modes characterise attributes. It is not clear how this reversal in the direction of rigid dependence, without a reversal in the direction of the constituting characterisation relationship, is supposed to be understood. This is why I have included lines, rather than arrows, in the ontological square. I return to this point later.

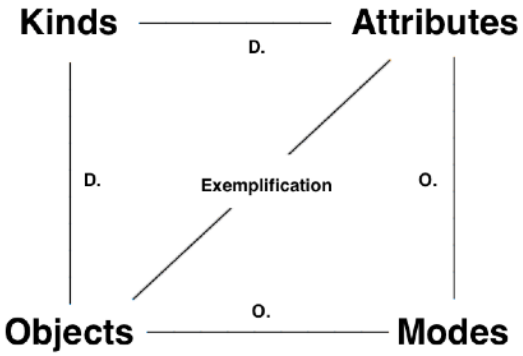
Indeed, in Lowe's terminology, it is not a relation at all, but a *formal relationship* - whose obtaining does not consist in the existence of a further entity (a relation), but which obtains simply as a matter of the *ontological forms* of the relata. On Lowe's view, the formal relationship in question is not Armstrong's natural necessitation, but the *characterisation* relationship between kinds (substantial universals) and attributes (nonsubstantial universals). Second, Lowe's account relies explicitly upon a distinction between two sorts of universals: substantial and non-substantial. Lowe's relationship between universals is a *transcategorial* relationship, unlike Armstrong's. Thus, Lowe's relationship is *richer* than Armstrong's, in the sense of being grounded in the ontological forms of two categories rather than one. Third, Lowe's conception of universals - which, unlike Armstrong's, is transcategorial - does not involve a conception of universals as unsaturated, abstracted constituents or types of states of affairs. All this is to say that the background ontology in which Lowe's account of laws is couched is *wholly different* from that of Armstrong.

The similarities between Lowe and Armstrong are fewer. Here I will point out only one, which is most important: Lowe, like Armstrong, subscribes to a *principle of instantiation* for universals (kinds and attributes): universals are non-rigidly existentially dependent on the particulars (objects, modes) that instantiate them.

An intuitive first pass at an explanatory picture for governance, on Lowe's scheme, might look like this:



Here the governance relationship is posited to relate characterisation relationships *directly*: kind-attribute characterisation *governs* object-mode characterisation. That is not too far wrong, as far as it goes, as I will explain in the next section. But to stop here would be to pass over the richer resources of Lowe's ontology in comparison with Armstrong's. For Lowe's distinction between two kinds of universals allows for an explanation of dispositionality in terms of a formal relationship of *exemplification*. Exemplification, in the four-category ontology, relates objects to attributes In particular, objects may exemplify attributes two ways: *dispositionally*, and *occurrently*. For an object to exemplify an attribute occurrently is for it to be characterised by a mode that instantiates that attribute; for it to exemplify an attribute dispositionally is for it to instantiate a kind that is characterised by that attribute. Thus, exemplification relationships are indirect: they are *constituted* by instantiation and characterisation relationships (in an order appropriate to the kind of exemplification in question). Diagrammatically:



Here the letters **D.** and **O.** label what I will call the dispositional and occurrent *tracks* of exemplification. Note again that exemplification is a relationship between *objects* and *attributes*. It is *objects* that exemplify attributes occurrently or dispositionally. This places the explanatory work in Lowe's theory firmly at the feet of *substantial* particulars and universals.[214] For objects depend rigidly on the kinds that they instantiate - they are objects

[214] On an Aristotelian ontology, this is just as things should be.

of those kinds - and kinds, in turn, stand in a *direct* relationship to attributes; it is in virtue of these direct relationships between kinds and attributes that objects dispositionally exemplify the attributes that they do. Roughly, we may say that it is the characterisation of a kind by an attribute that makes it *possible* that an object instantiating that kind should be characterised by a mode instantiation that attribute: kind-attribute characterisation confers on objects the *potentiality* to be characterised by modes that instantiate the relevant attributes. Three things can be noted here.

First, kind-attribute characterisation relations express *tendencies* (Lowe 2013:41). These tendencies correspond to the *dispositional profiles* that kinds confer upon the objects that instantiate them. This point helps Lowe's case in two ways. First, it helps to make clear how the four-category ontology improves upon Armstrong's view by avoiding quidditism, at least with respect to substantial universals. It avoids quidditism because kind-attribute characterisation is an *internal* relationship, in what I have in Chapter 3 called a Moorean sense, not an external relation. Second, the fact that kind-attribute characterisation expresses a *dispositional* profile of which object-mode characterisation expresses the *manifestation*, goes some way toward helping to make sense of the strange reversal of dependence relationships at the top and bottom of the ontological square. Without this connection to dispositionality, it is hard to explain how those characterisation relationships should constitute dependence relationships in opposite directions, despite themselves being directed 'in the same way'.

Second, we may observe that on the four-category ontology, governance is properly understood as a relationship between the two *tracks of exemplification*. An object's exemplification profile *on the dispositional track* governs its exemplification profile *on the*

occurrent track. Here we can note, further, that the work of governance is done entirely on the *substantial* side of the ontological square: the characterisation profiles of kinds constitute the dispositional profiles that kinds confer upon objects, consisting of dispositions to be characterised by modes that instantiate the appropriate attributes. We may note, too, that it is rather unclear what work the instantiation relationship between modes and attributes is supposed to do in the resulting picture. Indeed, this ambiguity of role is symptomatic of the problem for Lowe's view that I will discuss below.

Third, we may observe that kind-attribute characterisation must be a *direct* relation, since it is an internal formal relationship. This is a direct consequence of the explanatory role that that relationship is supposed to play with respect to dispositions and laws; in particular, kind-attribute characterisation must not turn out to be grounded in prior relations at the *particular* level. This is, as we will see, a source of problems for Lowe's theory.

Lowe's account of nomic governance draws, as we have seen, on far richer ontological resources than Armstrong's: something that is not immediately obvious from the similar surface forms of the theories. Unfortunately, despite these improvements upon Armstrong's theory, Lowe's account of governance suffers from problems as a result of the principle that it shares with Armstrong's view: the principle of instantiation.

The problem gets going if we note that dispositionally exemplifying an attribute is not the same thing as being disposed to exemplify it (occurrently). This is because an object dispositionally exemplifies an attribute in virtue of its instantiating a kind that is characterised by that attribute, and this kind-attribute characterisation relationship requires that the attribute in question should *exist*. For attributes are universals, and universals - the

principle of instantiation tells us - must be instantiated to exist. This poses a problem in *at least* those cases in which an object may be disposed to occurrently exemplify an attribute which, but for its being exemplified by *that* object, *would not exist*. The point here is not a temporal one: it is not that an object may be disposed to occurrently exemplify an attribute that nothing *yet* exemplifies. For positing a four-dimensionalist world-picture here will not help. We may imagine a world in which a given object is the *unique* occurrent exemplifier of a given attribute. On four-dimensionalism, the attribute will exist *simpliciter* at any time. But in such a case, *that* object's exemplifying the attribute dispositionally will be explained *by its exemplifying that attribute occurrently*, and this is to get the direction of explanation - if we are concerned about governance - entirely wrong. The point will not be helped by introducing *further* objects for which the direction of explanation is right, in virtue of our initial object's having secured the existence of the attribute in question, since (especially on a four-dimensional world-picture) the choice of the initial 'anchoring' object will be entirely and viciously arbitrary. This leaves kind-attribute characterisation relationships being governed by object-mode relationships after all, which is precisely the wrong result.[215]

As an account of governance, then, Lowe's view does not quite work. While Lowe's view improves upon Armstrong's by allowing an *internal* governing relationship within an

[215] Mumford makes the same point in terms of a resurgence of Humean mere regularities within the Lowean framework.

enriched ontological framework, its preservation of Armstrong's principle of instantiation gives rise to the very same problem that afflicted Armstrong's view.[216]

5. Dimensionism and Governance

We have seen how the theories of Armstrong and Lowe fall on problems associated with external relations (for Armstrong) and the principle of instantiation (for both views). But we have also seen that the Central Dilemma is not universally problematic: lawless theories are well-equipped to pass by unharmed. In arguing against Armstrong and Lowe, however, nothing has turned out to hinge on calling their views *nomic realist* views - or indeed on calling anything in their accounts *laws*. Rather, the Central Dilemma is targeted against theories that have an Armstrongian or Lowean structure, that are theories of *governance*.

I will call the class of theories of governance, to which Lowe's and Armstrong's theories belong, the class of `I`-*theories* (to be read: I-theories). The reason, in the case of Armstrong, is obvious enough. In Lowe's case, it is less obvious, since I have taken Lowe's account of governance to involve a governance relation between two tracks of exemplification. Nevertheless, I will maintain that Lowe's theory has the general form of an `I`-theory. In general, `I`-theories, as I understand them, take the target *explananda* of an

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[216] Heil (2012:116-117) raises a further problem for Lowe's principle of instantiation. Suppose that there is no salt in the light cone of any water. In such a world, we should still hold that salt *is* disposed to dissolve in water, but there will be no *instances* of salt dissolving in water, and hence, since universals require instances to exist, none of the relevant attributes will be available to characterise the kind *quantity of salt*. It should be noted, however, that Heil takes this to be an argument against admitting universals, not an argument for Platonism about universals. Thus, arguments against the principle of instantiation are not necessarily arguments for Platonism. However, Tugby (2016) has argued in favour of taking the Platonist route here. I will not discuss those arguments here. The reason is that my aim in this chapter is to present a dimensionist account of governance, and it would not *be* a dimensionist account of governance that I was presenting, if dimensions were *eliminated* (Heil-style) from their claimed governing role.

account of governance to be certain regularity-constituting relations between entities (particulars, presumably), and take the *explanans* to involve two components: a relationship between *further entities* (universals, perhaps), and a relation of governance between the two, *however this relation of governance is cashed out.* I will say, then, that Lowe's account has the *specific* form of a □-theory, but the *general* form of an ⌶-theory.[217]

The rest of this chapter will take up the task of presenting a dimensionist account of governance. The account that I present will qualify as an ⌶-theory, but - I will argue - one that does not run into the problems that face the theories of Armstrong and Lowe. I will argue this by offering an account that rejects the two problematic assumptions of externality and the principle of instantiation, and by making clear exactly how dimensionism avoids problems at the points where these assumptions posed problems for Armstrong and Lowe. I am not aiming here to show that the dimensionist account that I will propose is *true.* That would require a discussion beyond the scope of the present chapter: I would have to show that the account can deal with all kinds of *further* objections. Moreover, I do not intend to argue that the account offered here is the *only* account of governance that is compatible with dimensionism. Rather, I will pursue the more modest goal of showing that dimensionism *can* supply an account of governance that is *at least preferable* over the accounts of Armstrong and Lowe.

On dimensionism, the target phenomena for an account of governance are the nomic,[218] regularity-constituting relations between the *determinate properties* of objects. Since

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[217] A further, irrelevant but pleasing reason that I have for being keen about the '⌶-theory' term is that the Chinese character 工 (gōng) happens to translate roughly, but appropriately, as *work*.

[218] This is intended, as usual, in a neutral sense.

dimensionism, as I have presented it, is committed to a nominalist account of such properties, this is not the full story. Recall, from chapter 3, the account of determinate property abstraction: two objects have the same determinate property in respect of **D** just in case the pluralities consisting of each object and the dimension **D** collectively perfectly resemble. This reductive account of determinate properties rested on the factored structure of determination: the appeal to resemblance is enabled by the lack of additional ontological commitments incurred in specifying the *relata* of resemblance, namely the pluralities of objects and dimensions. What enables the account to use simply pluralities rather than say, *sets*, is the at-all determination relationships between objects and dimensions, which guarantee *some* accompanying relationships of determination-somehow, supplying the space in which resemblance relationships may be situated.[219] Thus, the target phenomena, on dimensionism, for an account of governance, are concerned with patterns in these resemblance relationships situated in the ontological space provided by relationships of determinate determination, or determination-*somehow* - an ontological space provided, moreover, by relationships of determinable determination, or determination *at-all*. On the dimensionist view, as we will see, an account of governance can be given on which these relationships of determination at-all and somehow play a central explanatory role. Dimensionism thus shows at least as much *integrality* as the Armstrongian or Lowean accounts: the central resources for the *explanans* of governance are the very resources that are appealed to in the ontological account of the *explananda*.

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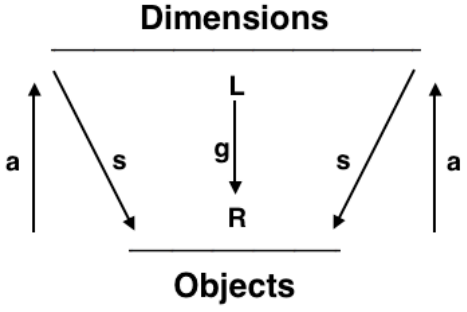
[219] The at-all determination relationships are not easily eliminable from the account. For suppose they were eliminated. Then trivially, *any* two objects could perfectly resemble under a dimension by *not* determining that dimension at all. But it is absurd that objects should have the same properties (in a neutral sense of 'properties') in respect of **D** precisely by having *no* properties in respect of **D**. At-all determination relationships enable the account to avoid such cases by specifying that the account is concerned with resemblance relationships between only those objects that determine the relevant dimensions *at all*.

Objects enter into determinate determination relationships in such a way that their resemblance relationships with each other, *in* those determination relationships, is constrained by something or other that is external *to those relationships of determination-somehow*. This is the phenomenon of governance that I aim to explain.

Here is the rough picture. Objects determine the dimensions that they do, *at all*, essentially. Those dimensions stand in certain internal relationships which are *functional* relationships, of the sorts expressed by functional laws. These relationships are not themselves individuated by appeal to determinate properties (which are reduced away on the dimensionist ontology), but represent, functionally, relationships that *determinate* determinings of those dimensions must satisfy. These relations can be understood as *joint potentialities* that dimensions have, or rather, as their joint *lack* of potentialities to be determined in any *other* way than would count as satisfying the functional relationship between them. This amounts to a constraint, not directly on determinate *properties* that objects can possess, but on the *ways* in which objects may *resemble* under the dimensions in question. The claim is, in effect, that the joint potentialities of dimensions place restrictions on the range of determinings-somehow that *count* as determinings at-all. Diagrammatically:



The diagram is admittedly rough. Here the lower-case letters designate the formal relationships of determination at-all (**a**), determination-somehow (**s**), and the governance relation (**g**). **L** and **R** label the horizontal bars, that stand in for *laws* - the functional internal relationships between dimensions - and *regularities,* or regularity-constituting resemblances between objects in virtue of their ways of figuring in relationships of determination-somehow, respectively.

Let me spell out the picture in more detail. On the dimensionist view, objects stand in the at-all determination relationships that they do essentially. I will follow Lowe (2008a:39) in saying, here, that it is *part of the essence of an object* that it should stand in at-all determination relationships to certain dimensions. Here the *essence* of *X* is just understood as *what it is to be X*; essences are not themselves further beings that are *possessed* by the entities whose essences they are. The same goes for 'part', which is understood in a non-mereological way. The essence of X is what is articulated by giving the *real definition* of X, or by giving its *generating principle* (2012b:935). Since my aim here is not to defend a full-blown Lowean account of essence, I will simply take that account for granted.

Lowean essences are closely tied to metaphysical possibility. Indeed, what is *possible* may, roughly, be understood as what is not incompatible with the essences of what there is. To be sure, this is not a *reductive* account of metaphysical modality, since the notion of incompatibility that it involves is itself a modal notion. Lowe's account here sits well with Barbara Vetter's (2015) account of metaphysical possibility in terms of *potentialities*, on which for *p* to be possible is, roughly, for nothing, or no things, to have a degree-1 potentiality (or degree-1 potentialities) to be such that ~*p*.

However, the combination of Lowe's and Vetter's views is not unproblematic. On Vetter's account of potentialities, potentialities are individuated *only* by their manifestations. Thus, two things that have potentialities to be *such that p* have the *same* potentiality (though they may have it to different degrees). Vetter's way of individuating potentialities by 'such-that' clauses - cashed out formally by λ-abstraction - potentially leaves out a distinction that Lowe's account of essence allows us to make. This is a distinction between those metaphysically necessary truths that are *intrinsic,* and those that are *extrinsic,* to a thing's essence.

Lowe supplies us with two distinctions here. The first is between metaphysically necessary truths about X that do, and those that do not, capture the generating principle of X. Lowe offers an example with ellipses (2012b:936):

(E1) An ellipse is the locus of a point moving continuously in a plane in such a fashion that the sum of the distances between it and two other fixed points remains constant.

(E2) An ellipse is the closed curve of intersection between a cone and a plane cutting it at an oblique angle to its axis greater than that of the cone's side.

As Lowe points out, E2, by contrast with E1:

> […] tells us a *necessary property* of all ellipses, but not the *essence* of an ellipse - what an ellipse *is*. For it does not capture an ellipse's generating principle. It characterizes an ellipse in terms that are *extrinsic to its nature* as the particular kind of geometrical figure that it is. (2012b:936)

The second distinction is between what is *properly contained* in the essence of a thing, and what is not. In particular, it is a distinction between what follows from the essence of a thing singly, and what follows *jointly* from the essences of things. Of the same examples, Lowe points out:

> Consider now a metaphysically necessary truth [E2]. It is not part of the essence of any *ellipse* that this condition holds, nor is it part of the essence of any *cone* that it does. What is very plausible to contend, however, is that this metaphysically necessary truth hold *in virtue of* the essences of an ellipse and a cone, which are two quite distinct essences. It is because of *what an ellipse is*, and *what a cone is*, that this relationship necessarily holds between ellipses and cones. But it is not *part of anything's essence* that it holds. (2012b:939)

Here we can note that E2 may follow jointly from the essences of cones and ellipses *without* entailing that whatever is part of the essence of either is a part of the essence of the other sort of thing.

We have, then, a distinction between a thing's necessary properties and its necessary properties that capture its generating principle, and a distinction between what follows from the essence of something, and what follows *jointly* from the essences of some things.[220] To this, let me add a third notion, that of what I will call *ancestral essence.* Suppose it is part of the essence of X that *p*, and *p* entails that Y exists. Suppose, furthermore, that it is part of the essence of Y that *q*. In such a case, although *q* will be a

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[220] Lowe (2012b:939) points out that what follows jointly from the essences of cones and ellipses does not follow from a single essence of a hybrid kind of thing, a cone-ellipse. I will follow Lowe in this. I will therefore observe, in general, a distinction between it following *collectively from the essences of* some things that p, and it following from the *collective essence* of those things that p: where the latter locution is used (for example, where I have talked about *joint potentialities*, following Vetter), the former is meant. General reasons against saying *and meaning* the latter sort of thing are given by Oliver and Smiley (2001).

necessary truth (with respect to X), *q* stands to the essence of X in a relationship that is hard to precisely capture in terms of the two distinctions already introduced. I will therefore say that it is a part of the *ancestral essence* of X that *q*. In general, whatever is part of the essence of some Y such that the proposition that Y exists is part of the essence of X is part of the ancestral essence of X, and whatever is part of the essence of some Z such that the proposition that Z exists is part of the *ancestral* essence of X is also part of the ancestral essence of X. The point here is that the relationship of essential dependence of X on Y in such cases is such as to render whatever is part of the essence of Y not quite *extrinsic* to the essence of X, but not quite *intrinsic* to it either.

With these notions in place, we are in a position to see why the governance relationship on a dimensionist ontology should deserve the name. Begin with objects. It is part of the essence of an object that it determines certain dimensions. Now, the dimensionist posit of *laws* amounts to this: dimensions stand in internal functional relations to each other, where it follows *jointly from their natures* that they should do so. These internal relations are expressive of the *dispositional profiles* of dimensions; dimensions have their dispositional profiles essentially, just as kinds and attributes stand in their characterisation relationships essentially on Lowe's ontology, and just as *properties* have their dispositional profiles essentially on a the views of Mumford, and Bird. These dispositional profiles place constraints on what can count as determining the relevant dimensions at all: nothing *could*

be a determining of those dimensions except those things that determine them in such ways as to satisfy the functional relations specified by the relevant dispositional profiles.[221]

In my terminology above, these functional dimension-dimension relations - call them L-relations - will be part of the *ancestral essences* of objects. They are not *intrinsic* to the natures of objects, but are nevertheless *necessary* in relation to those natures: objects are *necessarily such that* the relevant L-relations obtain.[222]

Here the dimensionist must bridge a gap. For one might object that, while L-relations may guarantee that nothing *could* count as a determination of the L-related dimensions except such things as satisfy the functional L-relations, L-relations themselves are not enough to guarantee that anything *does* satisfy those relations. In particular, given some objects, and given that they stand essentially in at-all relations of determination to some L-related dimensions, it seems that the dimensionist can only say, at best, how the objects in question *would* have to figure in 'somehow' relationships of determination: nothing in the account guarantees that they *should* do so at all. According to this objection, my account has only shown that *dimensionism* would be incoherent if objects failed to stand in the appropriate

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[221] An example may be drawn from Cartwright (1983:57, 59ff), who discusses the interaction of Newton's law and Coulomb's law. There, bodies that are *massed* and *located* (supposing that *location,* in some sense that I will not precisify given my present illustrative focus, underlies *distance*) are governed by a certain relationship between the dimensions *mass* and *location*, while bodies that are massed, located, *and charged* are governed by a further internal relationship between the dimensions *mass*, *location*, and *charge*. Though I will not develop this connection here, it is not implausible to suggest that these multiple internal relationships between dimensions may play some role in offering an ontological basis for *ceteris paribus* laws that are the focus of Cartwright's discussion.

[222] This point is an asset for my view, since it allows me to answer certain objection against necessitarianism about laws. The objection is this: how can laws be necessary, since it is *conceivable* that they should be different? My answer: it is conceivable only in the sense that laws are not written fully into the essences of *objects*.

sorts of determinate determination relationships - but it has not explained why objects should be at all inclined to *save* dimensionism from incoherence by behaving appropriately. The objection rests on a worry that, although I am subscribing to *Platonism* about dimensions and thereby *purporting* to improve upon Armstrong and Lowe by avoiding the problems associated with their principle of instantiation,[223] I am also simultaneously *undermining* those improvements by positing a factored determination structure in which the relationship of determination-somehow serves to *reintroduce* those very same worries.

The objection rests, I suggest, on a mistaken conception of the kind of explanation that is being attempted here. For the objection rests, at a crucial point, on my inability to explain why objects should stand in appropriate determinate determination relationships *given that they already stand* in the appropriate at-all determination relationships. But this is to commit to a *staged* conception of the kind of explanation at which I am aiming. This kind of staged conception of explanation is implicit in one construal of nomic realism, on which laws are posited to *confer* animation upon a world that is, in a metaphysically antecedent way, *inanimate*. But I am inclined to reject that explanatory project, because I am inclined against conferral ontologies in general, and because I think it is plausible that *animation* is an unconferrable feature of the reality. I am in line, then, with Mumford's claim that the world *already contains* all the animation that it needs, and I am in agreement with his claim that laws cannot do the job of conferring animation upon antecedently inanimate things.

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[223] I should stress here that I intend 'Platonism' to express no *more* than the denial of a principle of instantiation (or rather, determination) for dimensions. It does not entail, in addition, that dimensions are *necessary* beings, or that they inhabit some *transcendent* domain.

I reject, then, the claim that the entities of the world are inanimate *prior to* their being animated by governing laws. Along with this, I *also* reject the staged conception of explanation that is implied in that view - the idea that explanation should consist in showing, step by step, how one kind of world may be built *out of* a world that could coherently be supposed to be disposed to be otherwise. In particular, I reject the kind of explanation, in this context, that allows one to *pause* partway through - to take a *proper part* of the explanatory world-picture - and ask *how the next part follows*.

In the place of these ideas, I subscribe to the view that the target *explanandum* for laws is not animation as such, but the *regularities* and *patterns* that the animated behaviours of entities obey. Along with this, I subscribe to - and aim to realise - a conception of explanation on which the components of an explanatory world-picture act *all together* rather than in a kind of explanatory queue. The point here is intended to be analogous to that made by Martin (2008), that causal interactions are not staged, asymmetric actions of causes upon effects, but simultaneous and mutual manifestations of powers. Since the notion of a manifestation need not be that of the manifestation of a *causal* disposition, or of a disposition by a *causal* stimulus (Vetter 2015:97), there is no obvious obstacle to extending Martin's notion of mutual manifestations to the present case.[224]

An analogy may help here. Consider the inverse square law of gravity, which says that the force due to gravity between two bodies is proportional to the product of their masses and inversely proportional to the square of their distance from each other. Consider an arbitrary,

[224] One difference here is that I am talking about *metaphysical*, not *temporal*, staging. But it is not clear why this should present an obstacle, either. Indeed, it is not clear even how this should present an obstacle to the extension of the present account from synchronic applications of functional laws to diachronic ones.

particular case in which two objects *obey* this law. It would be a mistake - as Mumford points out - to think that the determinate values in the concrete case - the masses and the distance - are governed *by the inverse square law itself*. Rather, the law describes how those determinate values (or their bearers) act, *all together and at once*, to govern *themselves.* Similarly, on a dimensionist view, what it is to give an account of how the elements of a dimensionist ontology - *none of which are inherently inert* - act *all together* to govern themselves. I do not, as stated above, claim that the account offered here is an account of *laws* that play the kind of animation-conferring governing role that I am rejecting explicitly here.

I intend to leave it open whether my proposed view is a nomological realist view. That seems to be a verbal issue. What is more important is to note the concrete features of the proposed view that make it *similar* to Armstrong's and Lowe's views, and to show how my proposed view keeps these elements while avoiding the Central Dilemma.

I have already claimed that my theory shares a form with the theories of Armstrong and Lowe - it is an ⌶-theory - and that it shares with Lowe's view an *internal* conception of the relation which does governing work. This is to say that dimensionism preserves the general form of other theories that have been understood in nomologically realist ways.

Moreover, the proposed view does not fall cleanly on either horn of Mumford's dilemma. The L-relations that play the governing role are extrinsic to the essences of the governed objects whose resemblance relationships exhibit the target *explanandum* regularities. But they are external, therefore, only in the sense that nothing that is a part of the essence of an object will determine how these L-relations should go. They are, crucially, *not* external in

the sense of allowing independent variation: objects are *necessarily* such that the very L-relations that do hold, hold. So the proposed view does not fit the Central Dilemma's first horn.

Nor does the proposed view fall cleanly on the dilemma's second horn. For the governing L-relations are not *intrinsic to* the essences of the governed objects,[225] but are only, rather, parts of what I have called their *ancestral essences*. This is not enough to secure internality in the sense that would turn the second horn of the dilemma vicious: L-relations still have an explanatory role to play that is not *swamped* by the explanatory power of the essences of the governed objects.

Finally, on the proposed view, to say that all the components of the ontological picture 'act together' is not to say that each component acts *individually*. To say that the explanatory system is 'sprung' all in one go does not fix *how the ontological elements combine* as *functional parts* of the explanatory system being sprung. What distinguishes my proposal from Armstrong's and Lowe's is that my commitment to Platonism about dimensions allows the posited L-relations to act *as one unitary component* in the explanatory scheme. It allows this because it *guarantees* the existence of the relata of the L-relations, which allows those relata not to be *mismatched* in explanatory priority. For the problem brought on by the principle of instantiation was precisely such a mismatch: one universal could not be appropriately internally related to another except *in virtue of* the instantial facts. The all-in-one conception of explanation at work on the dimensionist view, therefore, is simply not *available* for the theories of Armstrong and Lowe.

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[225] As I claimed above, the Central Dilemma leaves its target ontologies free to supply their own conceptions of internality and externality.

I have argued that the dimensionist can supply the ontological basis for an ⌶-theory of governance that preserves what the Armstrongian and Lowean theories are looking for, while steering a safe middle course through Mumford's Central Dilemma. Although I have used the terms 'law' and 'L-relation', whether my theory is ultimately a theory of *laws* is a question that I am leaving open. If it is, then it is certainly a *reductive* theory of laws: laws are not *entities* on my view, but are relationships *between* entities. Perhaps my 'laws' are reified to the extent that they act as unitary components in the explanatory picture for governance - but I can claim no more 'thinghood' for laws than that.

In closing, let me briefly suggest that none of this should create much explanatory cost for my ontology. The account of governance proposed here is simply a further case of something to which the dimensionist should be committed *already* - namely, the work that dimensions do in *fixing their ranges*. I am committed already to the thought that a *solitary* dimension does the work of fixing the *range* of determinates that count as *its* determinates. This ought to be so, because it is not clear how it could be otherwise. Suppose, for example, that we try to build such ranges 'bottom-up' from determinates. Simply identifying the ranges of (highest) determinables with their *actually instantiated* determinates is obviously both circular and inadequate: no account is given of how *new* determinate instantiations might fit or not fit under the determinable in question. Identifying the range of the determinable **D** as the set of *possible* determinates of **D** does not help either: it is ontologically extravagant, and again, circular. It will not do to say that the range of **D** is the class of all determinate instantiations that are determinates in some given *respect* (again, on pain of circularity), and - as noted before - the most promising reductive account of the determinate-determinable relation - the reduction in terms of

subsets of powers - simply obliterates the requirement that determinates be *non-conjunctive specifiers* of their determinables, and with it, any hope of being an *explanans* for *respect structure*. (The upshot of this is that the subset account permits cases that are gerrymandered in relation to respect structure.) Dimensions, then, fix their own ranges individually: this is just to say that they come with their potentialities for determinate determination relationships 'built in'. The view proposed in this chapter, amounts simply to an extension of this point: it may be that the essences of dimensions *collectively* place further restrictions on their determinate ranges (at least, when they are *jointly* determined), restrictions that are not part of the essence of any *dimension*.

Chapter 6 - Rival Accounts of Property Possession

0.Intro

I have set out dimensionism (Chapter 1), and its applications to determinables (Chapter 2), the problem of universals (Chapter 3), instantiation (Chapter 4), and governance (Chapter 5). The present chapter discusses my ontology in comparison with rival ontologies. Rival ontologies of *what?* I will focus on rival ontological accounts of objects, understood as thick particulars: accounts of the natures of objects, properties, and the relationship between them. One family of such accounts - fact ontologies - I have discussed at length in Chapter 4, and will not discuss again here. Instead, I focus on five further rivals: resemblance nominalism, trope theories, neo-Aristotelian modes, universals, and locationism. In each case, my aim is twofold: I aim to *situate* my view in relation to rivals in the literature, but I also argue that my proposed dimensional ontology can make a fair bid for *preference* over the rival theory. Coverage of each rival theory will relatively brief, for reasons of space: where necessary, rather than discussing a view comprehensively, I discuss *representatives* of the views under consideration. In view of the range of discussion in this chapter, I cannot aim to *establish* my ontology's claim to be preferable. Instead, I aim to establish a *bid* for preference, focusing on clarifying *points of contact* with other theories.

The views under discussion may be grouped as follows. Resemblance nominalism is discussed first (Section 1), since it is - on the face of it - the closest relation to my favoured approach to the problem of universals. It, along with universalism and locationism (Sections 4 and 5, respectively), are *external denomination* theories of property possession, which aim to treat objects' possession of properties in terms of their relationships to things

that are in some sense external to themselves - either other objects, universals, or locations. By contrast, the other accounts - trope theory (Section 2), and neo-Aristotelian modes (Section 3),[226] deal with property possession in terms of the *internal structure* of objects. As we will see, my own approach qualifies as an external view, though it will involve also some considerations about the 'factoring' of an object's internal structure.

1. Resemblance Nominalism

According to the account of chapter 3, for two objects to have the same determinate property in some respect is for them to resemble each other in that respect: objects share properties in virtue of their resembling other objects (in relevant respects). Put this way, a close relation of my view would seem to be *resemblance nominalism*, defended by Rodriguez-Pereyra (2002). According to resemblance nominalism, for an object to have a property is for it to resemble certain other objects. *Which* property an object has is determined by *which* other objects it resembles, and objects share properties by virtue of resembling each other.[227]

A cursory glance suggests that my view is an attempt to improve on resemblance nominalism by way of a small adjustment. For resemblance nominalism faces an inconvenience in accounting for the possession of *coextensive* properties: where all the *F*s *are* all the *G*s, being *F* and being *G* cannot be explained in terms of resemblance to different objects. Rodriguez-Pereyra's solution to this is to accept possibilia (2002:99): to be *F* is to resemble not only the actual *F*s (which might turn out to be identical with the actual *G*s), but to resemble *all F*s, both actual and merely possible. Moreover, this appeal

[226] Facts and states of affairs, which I am not discussing here, also belong among such accounts.

[227] The story is familiar, so I will not summarise it in detail.

to possibilia as relata of *resemblance* relations that are explanatory of property possession places further demands on the natures of the required possibilia: it is not enough that they should be *specifiable* in terms of their properties; rather, they must be of the very same kind as the *actualia* that they are posited to resemble. Thus, resemblance nominalism is committed not just to possibilia, but to a Lewisian kind of concrete *modal realism*.

Now, modal realism itself is not a disaster: it is a viable (and perhaps even true) account of what there is.[228] But it is undeniably committal: for an ontology to *require* modal realism is for it to incur a heavy theoretical cost. Here the aforementioned cursory glance might suggest that, by positing a fundamental category of *dimensions* - understood as respects - my ontology is poised to offer a parallel account to the resemblance nominalist's, with regard to the problem of universals, where the involvement of *respects* in resemblance removes the need for modal realism, since coextension problems no longer arise. One might think, then, that my theory should be understood as a revision of resemblance nominalism along these lines.

Such a comparison is right, as far as it goes: my theory does avoid modal realist commitment in the way outlined. But it is not thereby a *revision* of resemblance nominalism, since the two views differ in far more than their respective commitments to possibilia and dimensions. Indeed, I argue now that it cannot be understood as such.

1.1 Resemblance

One crucial difference here is the treatment of resemblance. While Rodriguez-Pereyra's view appeals to a notion of resemblance that comes by degrees, with perfect resemblance

[228] Indeed, once posited, it proves a rich resource for Rodriguez-Pereyra's view.

as a limiting case, my view appeals only to *perfect* resemblance.[229] Moreover,[230] the notion of resemblance at work in Rodriguez-Pereyra's resemblance nominalism is not clearly intelligible. Rodriguez-Pereyra's resemblance is by degrees, and his account of degrees of resemblance is given in terms of some version or other of the following principle:

(D) *x* and *y* resemble each other to degree *n* if and only if they share *n* properties. (2002:65)

The occurrence here of 'properties' may be paraphrased away: *x* and *y* resemble each other to degree *n* if and only if they belong to *n* of the same resemblance classes (of the relevant sort). So the principle (D) is not circular - but it had better be *intelligible.* Now, (D) is intelligible only if the paraphrase notion of belonging to *n* of the same resemblance classes is intelligible, but it is not. For the intelligibility of that notion requires that Rodriguez-Pereyra's notion of resemblance be properly suited to underwrite what he calls the *many over one* - the "multiplicity of groups of particulars that a certain particular resembles" (2002:53). Rodriguez-Pereyra puts the problem like this:

> Is Resemblance Nominalism's a good answer to the Many over One? In particular, does it not presuppose what it seeks to explain, namely that a single particular can be in some way multiple? For in saying that *a* is **F** in virtue of resembling the **F**-particulars, **G** in virtue of resembling the **G**-particulars, and so on, it explains the multiplicity of *a*'s properties by invoking a multiplicity of resemblance relations. (2002:54)

[229] It also appeals to the grain-relative notion of *indiscernability* set out in chapter 3. Whether this is an advantage or not, it serves to further distance my view from resemblance nominalism.

[230] A further difference is that Rodriguez-Pereyra takes resemblance always to relate exactly two things at a time, while I take resemblance to be a dyadic relation that obtains between pluralities.

He goes on to solve it:

> But is this multiplicity of *a*'s relations really puzzling? If it is, it is not puzzling in the way in which the multiplicity of *a*'s properties is. The Many over One puzzle is how the *same* particular can have *different* properties. But that puzzle is not raised by the fact that *a* resembles *b* but not *c*, that *a* is to the right of *b* but to the left of *c*, etc. Since *b* and *c* are different particulars, there is no mystery of *a*'s bearing different relations to them: the multiplicity of *a*'s relations is grounded in the multiplicity of the particulars to which it bears them. (2002:54)

Thus: objects are not multiply faceted but multiply related: their multiple relatedness is what accounts for their multiplicity of properties. Moreover, there is no further problem for multiple relatedness, since multiple (n-adic) relatedness is explained in terms of resemblances between (ordered n-) tuples of objects (2002:55).

For this strategy to work, it must be the case that multiple relatedness is possible *in the case of resemblance*. Here, I argue, the notion of resemblance becomes unclear. Rodriguez-Pereyra insists (2002:64) that the notion of resemblance in play is *overall resemblance*, not resemblance *in a respect*[231]: objects simply *resemble*, and resemblance in respect of specific (determinate) properties is understood in a derivative way. Specifically, where objects resemble in respect of some (determinate) properties, *which* properties they are is determined by *which* shared resemblance classes (of the relevant sort) the objects belong to.

What classes qualify as being of the relevant sort? Property classes. Here again, the occurrence of 'property' is eliminable, and Rodriguez-Pereyra is at great pains to show

[231] Here 'in a respect' is not being used in my sense. For Rodriguez-Pereyra, for objects to resemble in a respect is for them to resemble in respect of some *determinate* property.

how (2002:191). Part of the task is to provide a resemblance-based solution to the *imperfect community* problem - the task of ruling out as property classes those classes of objects that resemble pairwise without there being, intuitively, any property they all have in common. The derivation of resemblance in a respect from overall resemblance will work only if the available resemblance classes can be shown not to include imperfect communities, *in a way that does not presuppose resemblance in a respect.*

Here is Rodriguez-Pereyra's solution to imperfect community (2002:166f). Given a set of objects {A}, define the *hereditary pairs* of {A} as the set of pairs, pairs of pairs, pairs of pairs of pairs, and so on up, of elements in {A}. Roughly, the proposed solution relies on the following difference between perfect and imperfect communities of objects: at every level, the hereditary pairs of a perfect community are themselves a community, while for any imperfect community, there is *some* level at which its hereditary pairs are not a community. This solution requires that resemblance be defined not only for objects, but also for hereditary pairs - and moreover, that resemblance for hereditary pairs be defined in a way that is properly derivative from resemblance for objects.[232] Call resemblance for hereditary pairs **R***. Should R* be taken as primitive, or further analysed?

One might try to give a further analysis. One might do this by specifying the conditions under which hereditary pairs stand in R* in the following way. Call the properties of objects level-0 properties (F_0, G_0, etc.), the properties of pairs of objects level-1 properties (F_1, G_1, etc.), and so on. Say that for $n > 0$, a level-n entity has F_0 if and only if both its (level n-1) members have $F_{(n-1)}$. Then it can be *shown* that the hereditary pairs of imperfect communities fail to be communities at some level or other (2002:165).

[232] Hereditary pairs arguably resemble in ways that don't depend in the proper way on resemblances between their ur-elements - such as in *being pairs*.

But there are two problems with such an analysis. For one thing, such an analysis of R* relies on the notion of a property - of whatever level - which is the very notion that the relation R* is supposed to clarify. A further, related problem is that no reason is given for preferring the stated analysis of R* over an alternative: why should we not say instead that, for $n > 0$, a level-*n* entity has F_0 if and only if *either* of its (level *n-1*) members has $F_{(n-1)}$? On such an analysis, even the hereditary pairs of imperfect communities will be communities, and such an analysis should be ruled out in favour of the stated one only if one *already* has some notion of resemblance *in a respect* available.

Rodriguez-Pereyra's response to the first problem is to treat R* as a primitive, unanalysable resemblance relation for hereditary pairs (2002:176). But this faces two problems. Firstly, given that no *recursive principle* for R* from level to level is appealed to (of the sort given in the analysis above), it is quite mysterious why we should believe in just *one* resemblance R* and not *many* - one for each level of hereditary pair, perhaps. Secondly, it does not address the *second* problem above: why should we not accept instead a primitive relation R**, understood intuitively along the lines of our *alternative* analysis?

We can conclude, then, that Rodriguez-Pereyra's notion of resemblance does *not* adequately resolve the puzzle of the many-over-one. By contrast, as we will see, my preferred ontology *does* provide some account of the phenomenon.

1.2 Property Possession and Factoring

To see how, consider a further point of difference between resemblance nominalism and my proposed view. On my view, resemblance structures are taken to explain what it is for

objects to *share* a (determinate) property, but *not* what it is for an object to *have* a property in the first place. Resemblance nominalism, by contrast, treats resemblance structures as explanatory not only of property identity, but of property possession itself. Moreover, while my view allows for property possession to be accounted for in terms of the *natures* of objects (in a way to be explained presently), resemblance nominalism leaves no room for such natures to be *more* explanatorily basic than resemblance relations (2002:89).

On my view, property possession is explained by *determination.* An object determines the dimensions that it does essentially, and - since determinables non-specifically entail their determinates - to determine a dimension just *is* to possess, in a non-committal sense, a *property* which is a determinate (or rather, a *value*) of that dimension. Determination is a formal, transcategorial relationship which admits of *factoring*: when an object determines a dimension, it determines it both *at all* and *somehow*. Determination *at all* is *constituted* by determination *somehow*: an object determines a dimension at-all *by* determining it somehow.

Determination structures - and in particular, the factoring of determination structures - should be admitted whether or not one admits the ontology of dimensions that I am proposing. For one can and should admit - even without commitment to dimensions - such truths as that *blue determines colour,* and that *blue and green each determine colour, though differently.* Blue and green each determine colour, and do not differ in *that;* they each also determine colour *somehow*, in which regard they *do* differ. Such factored determination structures should be admitted on all sides, even as targets for reductive explanation.

On my dimensional ontology, factored determination structures are a part of the fundamental structure of reality. They *make room* for the multiplicity of object resemblance - Rodriguez-Pereyra's many-over-one - in a way that resemblance nominalism cannot allow. For first, while determination at-all makes *comparison* possible (two things are comparable if and only if they determine some common dimension[233]), determination-somehow makes *resemblance* possible, and moreover, multiple determination - the determination of many dimensions by one object[234] - makes multiple resemblance (in the many-over-one) sense possible. I take it to be a virtue of my view then, firstly, that comparability, resemblance and multiple resemblance are all explained *together* in this way, and second, that they are explained together through fundamental commitment to a structure that, one way or another, ought to be admitted anyway.[235]

2. Tropes

Multiple property possession - the many over one - is grounded, I have said, in multiple relationships - specifically, multiple determination relationships. In Sections 4 and 5, we will discuss rival views on this score. Before that, though, we turn to some rival views

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[233] I ignore, for now, the fact that two objects may be comparable also by determining different dimensions that are related by *laws*.

[234] By positing a category of *dimensions*, we make room for the claim that objects are *simple* - in the sense of not possessing constituents such as aspects or modes - despite being essentially qualitatively complex. This strategy - which I am calling *external denomination* - can be realised in various ways: Hossack's (2007) 'combining' account of facts is an example. One family of external denomination views which focuses on *spatial* treatments of property possession (Wittgenstein 1921, Turner 2016, Cowling 2014) is perhaps closest in the literature to my own view. This will be relevant later, when we reach our discussion of tropes, modes, and aspects. Ehring (2011:177-180), for example, has asserted that multiple relations of a certain sort are incompatible with the kind of simplicity that I take objects to have.

[235] It is not too hard to find discussions of factoring. Here is Peter Simons, discussing Husserl: "Foundation is primarily a relation at the species level, and is as it were inherited by the instances. But this answer works only for cases of essential com presence. We may admit that any extension trope requires *some* colour trope, but it does not follow that *this* extension trope E requires just *this* colour trope C, since E may continue to exist while C is replaced by another colour trope C` of a different kind. This standardly happens when a stationary object changes colour […] one should distinguish *de specie* dependence from *de individuo* dependence." (1994a:559-560)

according to which multiple property possession is grounded in the *internal structure* of objects: tropes, and modes.

Tropes are property instances. They are properties, and they are particulars.[236] Tropes are, on my usage, not the same as *modes*: I will take it that modes depend for their existence on *objects*, where the category of *objects* is not derivative - or at any rate, not derivative from any category of properties.[237] Trope-bundle ontologies - the most prominent *pure* trope ontologies - treat property possession in terms of *compresence* and *membership*.[238] Objects are treated as *bundles* of 'compresent' tropes, and property possession is explained as the membership of tropes in bundles: for an object to possess a property is for a trope of that property to be among the compresent tropes that constitute (or just are) the object.

Compresence is seen as relating tropes in one step, rather than by stages. Standard bundle theories (such as that of Ehring 2011[239]) are *egalitarian*: they treat compresence as relating all the tropes in a given bundle equally, without divisions or strata. By contrast, a *nuclear* theory (Simons 1994a, 1998, 2000) treats the uniting[240] of tropes as stratified - as relating *first* some core collection of tropes, and *then* further 'peripheral' tropes that are either *required by* or simply additional to the nuclear tropes (1994a:568). In this section, I first

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[236] Following Simons (1994a:564), I do not take tropes in general to be particularised *ways of being*. Indeed, Simons (1994b) has briefly mooted the view that ways should be understood in terms of tropes, though it is an open question to what extent 'ways' in this sense coincide with the ways of being that Lowe has in mind for his conception of modes.

[237] By contrast, one might think that tropes depend for their existence on objects, but that objects *are* derivative from tropes.

[238] I ignore 'substrate' trope theories, insofar as substrates are supposed to be 'bare particulars'. (A parallel version of my objection to trope compresence should be applicable to bare particular theories.) I treat views on which substrates are *not* bare particulars as amounting to Aristotelian object-mode views.

[239] Ehring's theory of *tropes* is arguably not standard, but his theory of *compresence* is.

[240] I avoid 'compresence' and 'bundle' in talking about the nuclear view, following Simons (1994a:554) in holding that the nuclear view is not a bundle theory.

discuss the standard bundle theory, taking the theory of Douglas Ehring (2011) as representative. I raise the standard regress objection against compresence relations, and argue that Ehring's 'self-relating' solution fails. I then propose four objections against Simons' nuclear view, and a final pair of intertwined problems for trope theory in general.

2.1 Standard Bundles

Standard bundles face a very standard problem: the regress of unification (see e.g. Simons 1994a:559). How does *compresence* actually succeed in tying tropes into a bundle?[241] Compresence is either a universal, or a trope, or something else. If it is something else, then it is hard to imagine what compresence might be, if not a formal relationship. But then it is quite mysterious exactly what the *difference* is between tropes' being, or not being, compresent - and in particular, what such a difference has to do with their *being tropes*.[242] If compresence is a universal, then a great deal of the motivation of trope theory - its support for nominalism about universals - vanishes. So it comports best with the explanatory aims of trope theory to suppose that compresence is itself a trope. But here the obvious regress begins: if compresence is a trope, then for some tropes to be compresent is for them to be *compresent with* a compresence trope - and so on.

Ehring, who accepts the commitment that compresence should be a trope (2011:127), offers the following response to the regress:[243] compresence is a *self-relating* trope. Thus, suppose we attempt to set up a regress: some tropes $T_1 \ldots T_n$ are compresent, so they are compresent with the compresence trope C_1. This requrires that $T_1 \ldots T_n$ and C_1 be compresent with a further compresence trope C_2. But now Ehring responds: C_2 is not a

[241] Bradley's regress poses a similar problem for instantiation-based views.

[242] I return to this point in the next section.

[243] As many of the moves here are well-worn and familiar, I focus simply on Ehring's preferred solution.

further, *distinct* compresence trope, but simply C_1 itself. A regress of compresence relations may be admitted, therefore, because it need not be a regress of *new* compresence relations. To put it another way: if two tropes T_1 and T_2 are compresent, then there is a single compresence relation C_1 such that T_1 is compresent with T_2 in virtue of C_1, T_1 is compresent with C_1 in virtue of C_1, and T_2 is compresent with C_1 in virtue of C_1.

Ehring's proposal here is rather elegant, but - as I now argue - it does not work. For we may, to begin, distinguish compresence *relatings* from compresence *relations*. If compresence relations are the explanatory tropes of compresence that Ehring posits, then compresence relating are the *explanandum* compresence structures - T_1's being compresent with C_1 and with T_2, and so on - which compresence relations are posited to explain. Now, the compresence regress consists of a multiplication of compresences at *both* levels: there is a multiplication of compresence relations, *and* a multiplication of compresence relatings. Ehring's 'self-relating' response halts the regress of compresence relations at the first step, but it does not halt the infinite regress of compresence *relatings* - indeed, it is not supposed to. For as Ehring points out, once one has a single compresence trope C_1, one may simply push the *same* compresence trope into the corresponding explanatory role at each stage of the regress of compresence relatings.

Now, the problem for Ehring's proposal is that each new stage of the compresence-relating regress is not just entailed by, but a *prerequisite for,* the truth of the previous stage. For a compresence trope C_1 will render the tropes T_1 and T_2 compresent with each other only on condition that it is itself compresent with each of them: how else could a compresence trope account for the compresence of tropes? To make the point vivid, suppose that there are two sets of tropes $T_1 \ldots T_{10}$ and $T_A \ldots T_N$. Suppose that $T_1 \ldots T_{10}$ are compresent with each

other, and $T_A \ldots T_N$ are likewise compresent with each other. Suppose we go with Ehring and say that these compresences are to be explained in terms of a compresence *relation*, and so, let us posit compresence tropes C_1 and C_2. Let us say that tropes are self-relating, so there is no regress of compresence relations. Now, one way to get the regress of compresence relatings going here is to ask *which* compresence trope is explanatorily paired with *which* proto-bundle. It is no good here to say that it doesn't matter since the compresence tropes are intrinsically indiscernible from each other - for they must be paired in *some* way in order to do explanatory, even if it does not matter *antecedently* which way they are paired. The problem is that there appears to be no way to specify this pairing relation without invoking a compresence relation that does *not* consist in the existence of a compresence trope.[244] What is required is compresence that consists in something *other than* the existence of compresence tropes, from which fact we may conclude that the regress of compresence relating imposes explanatory needs that *outstrip* - because they are shared by - the explanatory resources of Ehring's compresence tropes.

2.2 Nuclear Tropes

The standard bundle theory, then, fails to overcome the standard regress objection. We now turn to the flexible, 'nuclear' theory proposed by Peter Simons (1994a, 1998, 2000).[245] The nuclear theory is neither a bundle theory,[246] nor a substratum theory. Rather, it takes the aggregate structure of tropes to be *stratified* into two stages. Tropes aggregate into *nuclei*

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[244] Presumably, appealing to more compresence tropes just gets the regress of compresence relations going after all, while adding a *pairing* trope to the bundle will hardly help.

[245] What about substratum views? I leave these out. Insofar as these are *bare particular* views, I have nothing to add beyond the standard objections. Insofar as they are not, they are close to substances in the neo-Aristotelian sense, and will be discussed as such.

[246] At least, it is not a *standard* bundle theory in my sense. Simons (1994a:554) says that it is not a bundle theory, though it *is* a bundle theory of nuclei, where 'bundle' is understood in a Husserlian way (1994a:567). Later on (1998:243, 2000), he writes as if the nuclear theory *is* a bundle theory. The matter is, of course, merely terminological - but still worth clarifying.

and *peripheral clouds*, and the resulting twofold structures go proxy for the more familiar categories of *objects* and *everyday substances*.[247]

The nuclear theory does away with compresence relations. In their place, in order to explain the aggregative union of tropes, the nuclear theory draws on ontological dependence relationships at two levels: individual and generic.[248] The strategy is this: draw on individual dependence to account for *nuclear* trope aggregation, and generic dependence[249] to account for *peripheral* trope aggregation. The result is that nuclear tropes are aggregated in virtue of their formal relationships *with each other*, whereas peripheral tropes are - for the most part - aggregated in virtue of their relationships to nuclear tropes.

Nuclei are characterised in terms of *foundation* relationships. Say that *x* is *founded* on *y* iff *x* is (rigidly and individually) existentially dependent on *y* (1994a:559). Now, say that *x* and *y* are *foundationally related* iff either *x* bears the ancestral of direct foundedness to *y*, or (inclusive) *y* bears the ancestral of direct foundedness to *x*. Finally, say that a collection is a *foundational system* iff every element in it is foundationally related to every other. An object - Simons says - is an *integral whole* iff it can be partitioned into parts which form a foundational system (1994a:562). Trope nuclei are just such integral wholes.

Peripheral clouds are - *modulo* brute inclusions - characterised in terms of generic dependence relationships. The paradigm case of such relationships given by Simons - and

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[247] While these twofold trope structures are posited in an *explanans* role, the *explanans* role here is understood in a very *revisionary* way: stratified collections of tropes don't necessarily correspond one-one to more familiar objects.

[248] Simons (1994a) also allows for peripheral tropes to join aggregates as sheer add-ons. One might wonder, too, whether *laws* might be a further source of aggregation. In view of these possibilities, it is best to treat individual and generic dependence as simply *core* sources of aggregation on the nuclear view, but not the *only* possible sources. For simplicity, I will generally ignore this detail in my discussion.

[249] *Inter alia* - see previous note.

in turn by Husserl - is necessitation between determinable kinds. Thus, a determinate colour trope might - in virtue of its belonging to the determinable kind *colour* (i.e. its being a *colour* trope) - require that *some* shape trope exist, even though it should not require any *specific* determinate shape trope to exist (that is to say: colour tropes depend *non-rigidly* on shape tropes). Given a nucleus that includes a colour trope, *some* shape trope will be required - but since it is required non-rigidly, it will not meet the bar for *rigid* dependence that is required for membership of the nucleus: the shape trope will be a peripheral trope.

The nuclear theory sidesteps certain problems that afflict standard bundle views. By explaining aggregation without drawing on compresence, it avoids - obviously - any immediate need to *explain* compresence. Moreover, nuclear tropes have all of their (rigid, individual) existential dependence needs satisfied *within their nuclei*, so that nuclei come out with a certain ontological independence. It is not complete dependence - nuclear tropes depend on their *peripheral* to exist - but since that dependence is non-rigid, the nuclear trope theorist can explain how nuclear tropes may survive *changes* in their peripheral relations, thus preserving something like a distinction between essential and accidental properties.

2.3 Problems for Nuclei

The nuclear theory is, as Simons shows, a rich and flexible theory.[250] Here I will raise four quick challenges for the view.

First, while the nuclear view successfully dispenses with compresence (by fiat), it is not clear that it succeeds in putting anything in its place. For consider the two core dependence

[250] It leaves open all kinds of bundle structures, including cloudless nuclei, nucleus-less clouds, multi-nuclear bundles, single-trope nuclei, and so on.

relationships: rigid and non-rigid existential dependence. For *x* to depend rigidly on *y* is for it to be the case, necessarily, that *x* exists only if *y* does. But things may satisfy this condition without being *aggregated* in anything like the target sense to be explained. For example, suppose that necessarily, if a certain trope T exists, then its singleton {T} exists. Plainly, T and {T} are not aggregated, in the relevant: they *cannot* be, since {T} is not a trope.[251] Thus, rigid existential dependence does not suffice by itself to guarantee aggregation.

One might alleviate the problem somewhat by insisting that the relevant dependence relationships must be *between tropes*. Such a response might be licensed by appeal to the thought that dependence relationships should be *constituted* by lower-level formal relationships (Lowe 2006), and hence that trope-trope rigid dependences is not an *arbitrary* subclass of rigid dependences in general. Nevertheless, it is unclear how the resulting view would *explain* aggregation any better than a standard bundle view. This need not be a problem for the nuclear view in itself, but it is hard to see what *advantage* the view has over a standard bundle view in explaining trope aggregation: the view explains *why* tropes aggregate,[252] but it does not explain what aggregation *is*.

Secondly, the nuclear account introduces a certain element of *bootstrapping* to the existence of trope aggregates. For in cases of nuclei that include multiple tropes, it takes *many* tropes existing to permit *any* to exist at all. In relation to nuclear tropes, a good explanation of the existence of *any* nuclear trope must also be a good explanation of the existence of *all* its associated nuclear tropes. Now, one might think that in view of the

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[251] My argument here is deliberately similar to Fine's argument against the reduction of essential truths to modal truths. Here, as there, the modal truths are not rich enough for the job.

[252] That is, if one finds the notion of rigid, individual, trope-trope dependence to be intelligible at all.

foundational connectedness of co-nuclear tropes, to explain the existence of one would suffice for explaining the existence of the lot. But it is hard to see how this should be so: the existence conditions of individual nuclear tropes *require*, but do not *explain*, the existence of their co-nuclear tropes. The result is this: just as rigid dependence relationships are not rich enough to capture the aggregation structure of tropes, so too, they fail to capture the *explanatory* relationships between tropes.

Thirdly, it is hard to see, concretely, how the required *de individuo* dependence relationships might plausibly pan out. How *could* one trope rigidly and individually require the existence of another, in the way that the theory requires? Whether there are such relationships (and which there are) might be a question to determine empirically, but there is a certain *prima facie* implausibility about the idea.

Fourthly, how should the nuclear trope theorist account for generic dependence relationships? These should be understood in such a way that they do not simply *collapse* into individual, rigid dependences between tropes. The paradigm example given - determinable kind dependence - raises the further question of how these determinable kinds should be accounted for. How are tropes regimented into their determinable kinds, and how are they *so* regimented *as* to confer the right dependence relationships on those determinable kinds? On my view, the determinable kind level dependences are direct

relationships between dimensions - but it is hard to see[253] a natural account that the trope theorist might give.[254]

The problems raised here - all too briefly - are hardly intended to be ultimate *difficulties* for the nuclear view. Nevertheless, they are intended to highlight potential *worries* about the view - specifically, concerning points in respect of which an ontology of objects (points 1 to 3) and dimensions (point 4) might do better.

2.4 Further Problems for Tropes

Garcia (2015) distinguishes between two conceptions of tropes: *modifier* and *module*. To capture the distinction, consider an ontology of tropes and substances. Both modifier tropes and module tropes are, on such a view, supposed to confer their associated qualities upon their associated substances. The difference between them is this: modifier tropes do not *themselves* have the qualities that they confer upon their substances, while module tropes *do*.[255] Here I raise two closely interrelated problems for both kinds of tropes:[256] one concerning *ineliminable bareness*, and another concerning the possibility of conferring properties at all.

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[253] The argument here turns on Johnson's (1921) observation that unity under a determinable consists not in a special kind of similarity, but in a special kind of difference. See chapter 1 for details.

[254] One might try including *determinable* tropes in trope nuclei (see e.g. Stazicker 2011, Wilson 2012, Garcia 2015). This would bring the nuclear view one step closer to what I have termed *dimensional profiles*, at the cost of considerable controversy over determinable tropes. I suggest, overall, that admitting dimensions and objects amounts to a less risky venture.

[255] For illustration, Garcia compares modifier tropes to truthmakers. Truthmakers confer truth on their associated truthbearers, without being true themselves.

[256] The modifier/modular distinction is combinable with bundle and nuclear theories in various ways.

Tropes confer properties on non-tropes.[257] The relevant non-tropes may be bundles, stratified nuclear/peripheral collections, or substrata - but trope theories have in common that tropes confer properties upon the non-tropes on which they depend.[258] Now presumably, tropes confer properties on bundles and collections by being parts of (or members of, or among) them. So it is immediately mysterious how *modifier* tropes should confer properties on bundles or collections: on a bundle or collection (including nuclear) view, tropes had better be *module tropes*. By contrast, tropes are *not* parts of substrata - so it is mysterious how *modular* tropes should confer properties on substrata. On a substratum view, then, tropes had better be *modifier* tropes.

The problem with mystery here - afflicting module tropes with substrata, and modifier tropes with bundles[259] - is that on each resulting view, *something is always left bare.*[260] But neither of the remaining views - module tropes with bundles, or modifier tropes with substrata - seems to fare much better. In the case of modifier tropes with substrata, it is simply mysterious what a modifier trope might be, and how it might confer a property on its substratum (it could not do so by being *another* property that the substratum has, in virtue of which it has some yet *further* property: that way lies a vicious regress). In the case of modular tropes with bundles, there are two senses in which something may *have a property*: the prior sense, in which a trope not only *is*, but *has* the property of which it is a trope, and the derivative sense in which a bundle has a property in virtue of its containing a

[257] The same is not true of *modes*, in the neo-Aristotelian sense.

[258] Nuclei and bundles are collections of tropes, but neither a nucleus nor a bundle *is* a trope (excepting single-trope cases).

[259] I am here including the nuclear view among bundle theories.

[260] In the case of module tropes with substrata, this might not seem so: one might imagine a module trope 'conferring' its property on a substratum roughly the way toothpaste is conferred from its tube onto a toothbrush. But it is doubtful whether such a kenotic conception of property conferral makes much sense.

trope of the relevant kind. In such cases, the bundle *itself* remains bare, though it is a bundle of things that are not.

Two further kinds of problem case involve tropes failing to confer properties on other *tropes*. These cases concern integral dimensions and dimensions of variation.

For the first kind of case, consider the determinables *colour* and *shape*. These dimensions are *integral* in the sense that the determination of one requires the determination of the other: they are an example of the determinable kind level dependence offered by Simons and Husserl. Now, neither colour nor shape sets any constraints on how the other may vary: a thing's colour does not rule out its being any shape at all, nor does a thing's shape rule out its being any colour at all. But *colour* and *shape* are, arguably, closely connected in the following way: a thing that is coloured does not need merely *supplementing* with something that is shaped; rather, the *very thing* that is coloured must also *be* shaped. If this is the case, then a trope's determining *colour* (in the sense defined in earlier chapters[261]) does not rule out its determining *shape* too, but rather, *requires* it. An upshot of this is that trope bundles - especially nuclear ones[262] - begin to look more like *objects* than tropes.[263] Indeed, since tropes determine their dimensions in specific ways *essentially*, we are left with degenerate objects that have inherited all of trope bundle theory's classic problems with *change*.

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[261] The point here can be put in terms of Simons' 'determinable kinds'; nothing here rests on accepting my ontology of dimensions.

[262] That is, if the dependence relationships involved suffice for aggregation.

[263] Either that, or one insists that tropes cannot determine multiple dimensions in this way. This seems to be a mistake, resulting from too close an association of tropes with property *terms* (which presumably don't fall under multiple highest determinables in the relevant way). It would also mean that tropes could not meet the demands posed by determinable kind dependence.

For the second kind of case, consider a single determinate colour trope. The determinable *colour* has, let us say, several *dimensions of variation* (the term is from Funkhouser 2006, 2014): *hue*, *saturation* and *brightness*. This confers a certain further structure on the colour trope: how to account for it? It is not obvious at all how tropes alone might offer an account here.[264]

3. Modes

Having discussed resemblance nominalism and trope theory in some detail, we now turn to modes. Modes, like tropes, are understood to be particulars and properties. Lowe (2006) characterises them as *ways that objects are*: I will follow him in that. The distinction between modes and tropes has been made in various ways (where it has been made at all). I will make it in the following way: tropes are, and modes are not, understood to *confer* properties upon objects. Modes do not confer ways of being upon objects; they simply *are* the ways - the particular ways - that objects are. What pulls the weight in making such a conception of modes work is the way in which the *relationship* between modes and objects is understood.[265] The relationship is not understood to be a kind of uniting *tie* of the kind susceptible to Bradley-style regress.

One way to make sense of the object-mode relationship[266] is to understand its role in a categorial scheme. Categorial schemes aim to articulate how the elements of being are *structured,* rather than sitting alongside them as further elements of being (Gibb 2015:161)

[264] This might be a good point to bring in modifier tropes: one might say that the colour trope is somehow involved with determinate modifier tropes of hue, saturation, and brightness. It is hard to judge, though, how much *sense* such an explanation makes.

[265] The same goes for accounts, such as that of Armstrong (1997), based on states of affairs. Armstrong's posits, however - non-mereological composition and non-relational ties - are famously puzzling.

[266] I assume that modes appear in ontologies of at least two categories.

- so the category of *modes* is not a further *entity* which is understood to *confer* upon modes their aggregative union with objects. Modes are not *separate* entities from objects whose binding to objects stands in need of explanation; they are rather, in Suarez's (1947) sense, *modally* distinct.[267]

I have not much to say by way of objection to modes, so understood. Here I will limit my discussion to a comparative question: how well do modes account for *respect* structure?

I have argued in previous chapters that the world has a respect structure: the terms, concepts, and operations involved in respect-talk carve at the joints of nature.[268] On my preferred ontology, respect structure is fundamental, being grounded in the ontological form of *dimensions*. But certain things may be said about respect structure regardless of one's *explanans*-level commitments.[269] In particular, respects - whether they are fundamental or not - are *determined* by other things - whatever things they might be - and that determination relationship is *factored* in the way described above. For - in the terms of an earlier chapter - it is part of the *explanandum* structure associated with determinables and determinates, that determinables have determinate values falling under them (dimensions are determined), and that the instancing of a determinable *non-rigidly* requires the instancing of some determinable under it (determination is factored).

The *explanandum* features of respect structure leaves open the question of what kinds of entity might be the determiners of respects. On an object-mode ontology, the answer will

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[267] As Lowe (2012a) puts it: the relevant ontological schemes are *neither relational nor constituent*. See also Heil (2012:122).

[268] More on structure, operations and joint-carving in Chapter 7.

[269] In earlier chapters I put this point by saying that these things belonged to respect structure in the *explanandum* role. A similar move is made by Johnson, who discusses respect structure in the context of *adjectives*.

presumably be: *modes*. On my dimensional ontology, the answer is: *objects*. Which is the better answer?

If modes are the determiners of respects, then they determine respects both *at all* and *somehow*. This raises a question: if modes can do this, why can't objects do it directly? Insofar as modes are posited to explain objects' possession of qualities in various respects, it is not clear that they *do* such explanatory in a way that objects aren't poised to do themselves.[270]

It is also unclear why modes should fare any better than tropes when it comes to arranging themselves into their determinable kinds. For while tropes - and indeed modes - are well-tailored to be the relata of similarity, a distinguishing feature of the unity of determinates under a determinable is their unity by way of identity through *difference* (Wilson 2017 *inter alia*) - as Johnson puts it, their bearing not a special kind of similarity, but a *special kind of difference* to each other.[271]

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[270] A further, tentative point: If modes are the determiners of respects, then objects - on pain of redundancy - are not. But then what becomes of the relationship of *objects* to respects? On one plausible account of category - the account of Sommers (1963) defended in an earlier chapter - the ontological kinds to which objects belong are individuated by the profiles of respects that they determine. But if modes are the determiners of respects, then objects' relationships to their associated respects become curiously *indirect*.

[271] It is not immediately clear how the power subset account will help here. For the subset account - which is a *non-reductive* account of determinables in any case - does not readily distinguish determination structures from other specification structures, such as the relationship between a species and genus, in large part because they do not tell a ready story about the non-conjunctive specification involved in determination (one might simply deny that non-conjunctive specification is an appearance worth preserving, but I take it that it at least *appears* to be). Wilson's (2009) suggestion, that non-conjunctive specification be accommodated by requiring that the complement of the powers shared by determinables and their determinates (i.e. the extra powers possessed by determinables but not by determinates) not be uniquely associated with any property seems to draw on a *presupposed* respect structure, rather than explaining it.

4. Universals

Turning from accounts based on internal structure to accounts based on external relations, we come to accounts based on *universals*. The field here is exceedingly broad. For one thing, not all universals-based accounts are external-denomination accounts: Armstrong's account of universals as type states of affairs, for example - as well as the account of objects as bundles of universals (or universal-instantiations), or Lowe's four-category ontology, which admits universals - kinds and attributes - alongside modes, all qualify as universals-based accounts but not external denomination accounts.

Moreover, universals are understood in a great many ways. For one thing, not all ontologies that admit universals admit a *category* of universals. According to Lowe (2006), for example, 'universal' is a *transcategorial* term, an umbrella term for a whole class of categories (whose fundamental members are *kinds* and *attributes*) that have in common their standing in formal relationships of *instantiation*.[272]

Theories also differ on what the *instances* of universals are. On Armstrong's (1997) view, universals are instantiated by particulars - roughly, objects - though universals are also understood to be types whose tokens are not objects but states of affairs. On Lowe's (2006, 2013) view, the instances of universals are modes in the case of non-substantial universals, and objects in the case of substantial universals, though objects may *exemplify* non-substantial universals by being characterised by modes that instantiate them.

[272] There is a puzzle here of how exactly different categories *could* stand in the very same formal relationships in this way. Lowe presumably cannot answer in terms of the dependence relationships that obtain between universals and particulars, since on his view, instantiation relationships are supposed to *constitute* these relationships of dependence.

The relationship of universals to their instances is also diversely understood.[273] It is possible, for example, to view universals as types over their instances - or, following Armstrong, as types over *wholes* that are formed, in some way, by universals and their instances.[274] Now, Armstrong describes universals as types of states of affairs, where states of affairs are non-mereologically composed out of objects and properties related by a non-relational tie. Here it is not quite right to say that the object and property constituents in a state of affairs have equal standing: they don't, since objects are understood to be *thick* - that is, to have all their properties - while universals, unlike objects, are held to be *unsaturated*. It is unclear just how much good sense one can make of this. For while the notion of unsaturatedness makes good sense in a Fregean context, where it concerns *functions*, it is less clear what kind of an entity unsaturated universals would be in an Armstrongian context.

Heil (2012), following Williams (1959), suggests an alternative, abstraction-based approach. Beginning with *modes* - Williams's tropes - he remarks:

> Socrates' whiteness is abstract, not by virtue of residing in [a] Platonic realm outside of space and time. Its abstractness consists in the fact that its 'separation' from Socrates is something that could be accomplished only by means of a mental operation, abstraction, Locke's 'partial consideration'. You can consider Socrates, the man, but you can also consider Socrates' colour, his mass, his height, his shape. These are ways Socrates is, modes, Williams's tropes. (2012:122)

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[273] This is not quite the same as the question of how universals and particulars are to be distinguished from each other - the famous universal/particular distinction. That distinction, too, has been the target of very diverse elucidations, some of which were notoriously attacked by Ramsey (1925). For a recent survey and discussion, see Ehring 2011 Ch.1.

[274] Armstrong describes universals as types of states of affairs, where states of affairs are non-mereologically composed out of objects and properties related by a non-relational tie. Here it is not quite right to say that the object and property constituents in a state of affairs have equal standing: they don't, since objects are understood to be *thick* - that is, to have all their properties - while universals, unlike objects, are held to be *unsaturated*. It is unclear just how much good sense one can make of this. For while the notion of unsaturatedness makes good sense in a Fregean context, where it concerns *functions*, it is less clear what kind of an entity unsaturated universals would be in an Armstrongian context.

The universal, whiteness, is abstracted from Socrates in much the same way that his whiteness mode is, but on the understanding that one could well abstract the very same universal from something other than Socrates, and that a sufficient condition for so doing is that their whiteness modes should perfectly resemble.[275]

One might, moreover, wonder whether universals are *transcendent* or *immanent*, whether they are *necessary* or *contingent* beings, whether they depend on particulars (and if so, whether they depend rigidly or non-rigidly), whether they are abstract or concrete,[276] and whether they correspond with properties *sparsely* or *abundantly* conceived, if they correspond neatly with properties at all. These divisions cross-cut to an alarming degree: Heil's abstractionist proposal, for example, seems perfectly compatible with both transcendent and immanent universals, and so on. The result is a very wide range of possible views indeed.

I will not discuss the merits of specific conceptions of universals here: the varieties of universals are too numerous. Note, though, a further consequence of their numerousness, in relation to my own ontology: the question of whether or not my *dimensions* are universals will have no straightforward answer. Here I will focus on three respects in which my dimensions do *not* sit comfortably within the class of universals as they are typically conceived.[277]

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[275] This approach has much in common with my own, as discussed in an earlier chapter. However, my approach there had the aim of doing *away* with modes. Note, too, that on Heil's abstractionist account, property possession for objects is *presupposed* rather than explained by universals.

[276] Ehring (2011) proposes to understand the particular/universal distinction in terms of differing sufficient conditions for identity: universals are entities for which exact resemblance (duplicatehood) is sufficient for numerical identity. The resulting view is quite compatible with the concreteness of universals, in at least one serviceable sense of 'concrete'.

[277] The point here is to block a certain kind of argument to the effect that my commitment to dimensions is, in effect, such a commitment that further commitments to 'other' universals incurs no real theoretical cost.

The first point concerns *correspondence with properties*. Universals are typically taken to correspond one-one with properties, whether abundant or sparse. But my dimensions do *not* so correspond - indeed, it is a central part of my conception of dimensions that they are *respects in which* properties are arrayed, but not themselves properties. My picture falls just as far from a picture like Lowe's, on which universals correspond with both properties and substantial kinds: my dimensions correspond with neither. In general, then, my dimensions are not *extensionally* like universals: they do not correspond with the things to which universals are typically taken to correspond.

The second point concerns universals' being *wholly present in every instance*. If dimensions are not properties but *respects,* then in what sense are dimensions *present* - at all, let alone wholly present - wherever they are determined? Suppose that an object determines the dimension *charge*: it does so either by *having a charge*, or by being characterised by a determinate mode under *charge*. If there is any sense in which dimensions are 'present' in such an instancing, it is unclear. Perhaps such a sense might be clarified, but it is hardly plausible that it should be clarified to such a degree that it might serve as a core part of the very *conception* of dimensions.

The third point concerns *resemblance*. We have met already, several times, Johnson's thought that determinables are common across a special kind of difference. Typically, one expects the sharing of a universal between objects to ground a certain *similarity* between those objects - but the sharing of a dimension grounds a certain kind of *difference*.[278] If this

[278] Strictly speaking, a certain kind of *comparability*, since two determiners of the same dimension may either resemble *or* differ: the point is that resemblance is far from guaranteed.

is right, then again, it is at least implausible that dimensions should be universals in anything like the normal sense.[279]

5. Locationism

Setting universals aside, we arrive finally at an intriguing position proposed by Cowling (2014), according to which instantiation is *location*. Cowling's view - locationism - belongs to a family of theories that draw on the resources of *geometric* structure in explaining property possession.[280]

Begin with the thought that the world has at least three spatial dimensions. These dimensions form (surprise) a *space*,[281] in which objects can be located. On an absolute conception, which Cowling favours,[282] that space consists of a structured set of *points*, or locations, so that location becomes a relation of *occupation* between objects and spatial points. We may say then, gnomically, that *location is occupation*: an object's having the location that it does is explained by its standing in the *occupation* relation to a spatial point.

Now, locationism gets going when we extend this thought. It is a plausible and common thought that properties form a *space*: they can be represented by a geometric structure.[283]

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[279] This is, of course, far from exhaustive of the range of universal-based ontologies in the literature. Dasgupta (2009, 2017), for example, has defended what is in effect a universal-based bundle theory which takes after Quine's (1960) functorese. See Sider (forthcoming) for a discussion of Dasgupta's proposal.

[280] Tractarian factalism is perhaps the best known of such views. See Wittgenstein 1921, Turner 2016. See also Arntzenius and Dorr 2011. My criticisms of locationism are not intended to apply to every geometrically motivated view.

[281] Or spacetime. But this does not matter for illustration.

[282] Cowling leaves room for the development of a parallel version of locationism on a relational conception of space.

[283] Gärdenfors (2000) offers a nice treatment, within a conceptual/cognitive setting. Funkhouser (2006, 2014) offers a view with a more logical flavour. My ontology of dimensions may be seen as supplementing these cognitive and logical pictures with a *metaphysical* picture - and indeed, one which differs from Funkhouser's preferred trope realism. It should be noted that Gärdenfors' treatment makes use of notions like *distance* and *betweenness*, and it should not be assumed off the bat that the relational theory which I defend can supply any obvious analog of these properties (it might be best described, for example, as an *incidence* structure, or some other less-than-Euclidean thing).

The locationist idea is to take property space at face value: quality space has *ontological parity* with ordinary space. Thus, just as an object may occupy a point in ordinary space, so too an object may be located - that is, occupy a point - in *quality* space. The world contains the familiar dimensions of space and time, and more: it is a space of very high dimension indeed. The instantiation of properties by objects is, then, explained as the location of objects in quality space - which in turn is explained by the occupation of quality-space points by objects.

Among the advantages that a locationist might claim are, on the one hand, parsimony, and on the other, a solution to the many over one. Locationism is parsimonious, because it is both ontologically and ideologically parsimonious: it does away with *instantiation* from its ideology in favour of a relation of occupation, and it does away with properties in favour of points. Since occupation and points are both supposedly present *antecedently* in the recommended ontology, locationism can claim simply to be making the best use of its resources. Moreover, locationism offers an explanation for the many-over one, by explaining precisely how an object may be *simple* (lacking both parts and constituents), and yet qualitatively complex: it does so by occupying a point in a *multidimensional* space.[284] Points in quality space are, as Cowling puts it, *complete qualitative profiles* - but no less simple for that.

The advantages of locationism are appealing. Indeed, they are advantages that my own ontology of dimensions preserves. My own ontology, however, does away with *points* and *occupation*, in favour of *dimensions* and *determination*, with the result that quality space - an expression which, on my view, has regained its decidedly metaphorical flavour - is best

[284] Here 'dimension' should not be taken in the special sense that I have given it. Rather, the dimension of a space is roughly just the number of values it takes to determine a point in that space.

understood as a *relational* space, rather than an absolute space. In preserving these advantages, my favoured view also avoids certain weaknesses in the locationist proposal.

Firstly, how does the locationist explain the dimensional structure of quality space? For mathematical purposes, it may be simply *assumed* that a point is arrayed along such-and-such dimensions - but for ontological purposes, the locationist should offer some account of this. I leave this as an unresolved issue.

Secondly: what, on the locationist picture, explains an object's qualitative profile? The slogan is that *occupation explains instantiation* (Cowling: instantiation is location): but what is it *about* occupation which does this? If it is the sheer individualities of the particular points that an object occupies, then one might wonder what role the whole framework of *space* and *location* is doing at all: explaining *a*'s being *F* in terms of *a*'s occupying *just that point* is not discernibly different from saying simply that *a* instantiates *just that universal*. On the other hand, if it is the *locations* of the occupied points, then *occupation* is not needed to explain location: if points can be located directly, why can't objects? We should, in that case, do away with points entirely.[285] We are left with objects located directly in quality space - and again, it is not clear exactly what explanatory benefit has been achieved by framing the issue in terms of *location.*

Thirdly: locationism faces the same problem that trope theory faced earlier. Objects are not located in quality space in virtue of their properties or characters; they have properties in

[285] A response might be that one should consider quality space to be *relational* in relation to points, and *absolute* in relation to objects since objects are (one might staunchly maintain) located in virtue of their occupation of points. This would be motivated by a desire to account for uninstantiated properties in terms of unoccupied points. However, it is not clear - if an object cannot be located *directly* - exactly how a point (effectively, a module trope of location) might so relate to it as to *confer* location upon it.

virtue of their location in quality space.[286] The locationist's objects are *thin*. But how might quality-space points confer properties or qualitative characters upon objects? Points could hardly be much like *module tropes* in Garcia's sense (they would come out, in effect, like Platonic universals, if anything at all). But they could hardly be like *modifier tropes* either, without rendering it quite mysterious how they confer any qualities on the objects that occupy them.

[286] In this, tropes differ from modes as I conceive them. For an object is characterised by a mode in virtue of its being a certain way, *and* it is a certain way in virtue of its being characterised by a mode (I use 'in virtue of' here in a sense that allows both of these claims to be true; one might equally say that neither is true): the mode just *is* the particularised way that the object is. Nothing like this can be said about tropes.

Chapter 7 - Immersive Realism

0. Intro

The preceding six chapters have presented and discussed the ontological scheme - dimensionism - that is the core of this thesis. The present chapter gives an explicit account of the metametaphysical outlook by which those discussions are informed. This is necessary for two main reasons. First, the preceding chapters have depended, in the course of argument, upon certain metametaphysical tools - for example, an appeal to the notion of *structure*, and a generally *realist* outlook. Second, an explicit metametaphysical account is needed to test my first-order claims for *consistency* - in particular, for their consistency in serving a coherent set of metametaphysical aims. The metametaphysical outlook that I present here, then, is one that is deeply intertwined with the arguments that I have given for a dimensionist ontology. Nevertheless, the two positions are in principle independent. One could accept my proposed ontology without accepting the accompanying metametaphysics, and vice versa. However, I will not discuss the revisions that this might require to either position.[287]

The view that I will propose may be regarded as bringing together sympathies for seven broad strands of metametaphysical thought: realism, structuralism, neo-Aristotelianism, alethic monism, pragmatism, operationalism, and what I will call *progressivism*. While this chapter will focus mainly on how these strands are concretely integrated, part of the burden of my discussion will be to explain why one might plausibly have these *sympathies* not only separately, but together. The view that I will defend is one that draws thoroughly on

[287] The present chapter is intended to be an outline of my proposed metametaphysical view. A fuller development of that view would be beyond, and therefore orthogonal to, the overall purpose of this thesis. Nevertheless, such a fuller discussion is something that I intend to pursue in further work.

resources from pragmatically oriented outlooks, but itself remains unambiguously realist in its commitments.

Here is the plan. In Section 1, I introduce aspects the 'metametaphysical' outlooks of Ted Sider, Jonathan Lowe, and Hasok Chang. Section 1.1 discusses the Siderean conception of structure, and Section 1.2 the Lowean notion of ontological form. Section 1.3 introduces Chang's 'active realism', and Section 1.4 discusses the integration of these viewpoints as tessellating parts of a single realist view. My discussion here will be centred on a problem of *fit* between theory and reality that I will, accordingly, call the *fitting problem*. Section 2 introduces a further motivation for my proposed view, stemming from a challenge posed to Sider's outlook by *equivalences between fundamentalia*. I argue that Sider's view must be modified if the challenge is to be met. In Section 3, I propose a solution: postlapsarian Siderean metaphysics should seek redemption from broadly *pragmatic* sources. In particular, Sidereans should repent of their conception of the *loci* of joint-carving. Central resources here are the notions of *epistemic activities* and *epistemic iteration* discussed by Hasok Chang (various).[288] But redemption through pragmatism comes at a potential cost: one might think that my appeal to pragmatic resources undermines my commitment to realism. In Section 4, I argue that this isn't so. I argue that my appeal to pragmatism takes the *magic* out of realism, leaving it on a much firmer foundation overall.

[288] A further idea in the background is the *subject* naturalism of Huw Price (2013). I will not discuss Price *explicitly* in Section 3. Nevertheless, it should be clear enough, at a broad level, how his 'subject naturalism' is relevant to my proposals there, especially in relation to what I will be calling an *immersive* conception of metaphysical enquiry.

1. Realism: Sider, Lowe, and Chang

Metaphysics, at its most ambitious, aims to articulate the *structure* of reality. Ontology, its sibling, aims to articulate the fundamental *categories of being*, in virtue of whose *ontological form* the structures of metaphysics obtain. In later sections, I will argue that the pursuit of these ambitions must be tempered from pragmatic, operational, and progressive quarters. Presently, however, I aim simply to set out these ambitions in an unmoderated form.

It should be noted, at the outset, that metaphysics and ontology are *theoretical* enterprises. For one thing that exhibits both the complete structure of reality, and the complete inventory of being, is the world itself.[289] But merely to produce the world would be no fulfilment of the aims of metaphysical and ontological enquiry: it would leave us no better off epistemically. A central aim of metaphysical and ontological enquiry, therefore, to articulate the structure and inventory of being in such a way that our having done so constitutes some cognitive and epistemic gain. This is done by building *theories* about the world - theories which, importantly, may constitute epistemic gains only if they have some *traction* on what we are antecedently able to grasp or understand.

One might think (see e.g. Lowe 2006) that such a requirement for tractability (as I will call it) constitutes a diminution of the ambitions of metaphysics.[290] Shouldn't metaphysical enquiry aim to articulate the structures and categories *of being* - as they are 'in themselves' (as it is often said), rather than the structures and categories of *thought?* Yes, it should. But my present point is that it is no epistemic good for us, as ontologists, to

[289] Compare Lowe's remarks on the possibility of ontology in a 'Lagadonian' language (2006:179).

[290] From here on I will use 'metaphysics' as an umbrella term for both metaphysics and ontology, trusting context to disambiguate where necessary.

articulate the structures of being other than *through* theoretical apparatus - through structures of thought broadly construed. Indeed, it is an open question whether any ultimate convergence between real worldly structure and the structures of thought is *possible*. This potential gap between worldly and graspable structures poses an in-principle threat to the whole realist metaphysical enterprise. Nevertheless, the risk here is of *ultimate*, not *in-principle*, failure. In the absence of a good argument that the realist project *must* fail,[291] the possibility of such a gap does not show the realist project itself to be a misguided one.

Realist metaphysics, then, should proceed on the *methodological conjecture* that the threatened gap need not result in ultimate defeat. But how? What does proceeding in this way amount to, concretely? It is among the tasks of a metametaphysical theory, to supply a guiding vision here of how the threatened gap between thought and reality should be accommodated. Call this the *fitting problem*. One overall line of argument in this chapter will be my recommendation of pragmatic and operation approaches to this problem, in preference over the approaches of Sider and Lowe.

1.1 Sider: Structure

According to Sider (2012), metaphysics is about structure. A good metaphysical theory is one couched in a language whose basic terms *carve at the joints of nature*. Terms that capture structure in this way are said to be *joint-carving*; terms that capture *fundamental* structure are said to be *perfectly joint-carving*, or *fundamental*. A *truth* is fundamental just in case it is expressed only in terms that are fundamental.

[291] Note that realists need not press for *certainty*: the aim of metaphysics need not be any more than the production of a *fallible* theory. It is not necessary, either, for realists to push for *completeness*: a realist metaphysic should aim to account for *as much as it can*, where it is an open question precisely how much that is.

What is structure? To discern structure is to discern *patterns*: it is to discern "how the world fundamentally is, as opposed to how we ordinarily speak or think of it" (2012:1). This opposition is, as I have argued, constrained by the fitting problem: the discernment of structure constitutes success in metaphysical enquiry only insofar as it is the discernment of structure that is cognitively graspable, and hence not *entirely* opposed to our actual ways of thinking. But this hardly suffices to clarify the notion of structure: the world may be other than how we take it to be, in *non*-structural respects.

A better way to elucidate structure is to contrast it with *truth*.[292] Consider two theoretical languages, one featuring the colour predicates *blue* and *green*, and the other the predicates *grue* and *bleen*. Arguably, any truth that can be stated in terms of *blue* and *green* may also be stated in terms of *grue* and *bleen*, and vice versa. Now consider two truths: 1. emeralds are green, and 2. emeralds are grue until *t* and bleen thereafter (for some appropriate value of *t*). Neither (1) nor (2) captures *more truth* than the other. But (1) does capture something that the gerrymandered predicates of (2) do not: it captures the right *structure* of the world.

The following example is adapted from Sider. Consider a world consisting of a square region R divided left-right into red (left) and blue (right) halves. Let L be an arbitrary and *imaginary* line across R, that divides R top-bottom. Now consider the following pairs of location predicates: *east*-*west*, and *north*-*south*. A point is *east* iff it is in the blue region, and *west* iff it is in the red region; a point is *north* iff it is above L, and *south* iff it is below L. Now consider a point *p* in the top right region of R. In east-west terms, *p* is *east*. In north-south terms, *p* is *north*. The statements *p is east* and *p is north* are both true.

[292] In Sider's catchy slogan: *truth is not enough.*

Nevertheless, Sider claims, the statement *p is east* captures something that the statement *p is north* does not: it captures the *structure* of R.[293]

Capturing structure, then, is a matter of capturing patterns in how things *go together* (2012:1). In the examples above, it is the *predicates* of a language that may either succeed or fail to capture the structure of the world. To treat predicate terms as candidates for success or failure in this way is to treat the world as *having* such a structure as predicate expressions might succeed or fail to capture: it is to be a realist about *predicate structure*. Thus, realism about predicate structure is distinct from realism about *specific* predicate *structures*: to reject realism about predicate structure is to hold that the world has no structure that predicate expressions *aim* to capture, while to reject realism about a specific predicate structure is to hold that the world does not have the structure that some particular system of predicates *purports* to capture.

Realism about structure goes beyond commitment to predicate structure. As Sider points out, *any* term may succeed or fail in carving reality at the joints. Thus, structural commitments are incurred also by *quantifiers*, *connectives*, various (modal, mereological, etc.) *operators*, and so on.

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[293] This example is not entirely neat. For it is not specified what *kind* of structure the east-west and north-south predicate pairs are supposed to capture (or fail to capture). What seems clear enough is that the east-west predicate pair captures (something roughly like) the *colour structure* of R while the north-south pair does not. But it does not follow that the two predicate pairs are anything other than equal as *location* predicates - that is, in respect of their capacity to capture R's *location* or *spatial* structure. Perhaps the example can be tidied up to meet these concerns. However, they needn't be. As I argue later, these loose ends do not necessarily detract from Sider's example. Rather, they show it to belong at an *early stage* of a process of epistemic iteration by which the concept of structure is fixed. This point is, indeed, not too far from Sider's own view, as we shall see.

What about the fitting problem? Here we should distinguish three questions: first, how is the notion of *structure* to be grasped within Sider's scheme? Second, how should the notion of *joint carving* be grasped? And third, how is it hoped that the structures captured by fundamental terms should turn out to be graspable?

Sider offers a primitivist response to the first question: the notion of structure is fundamental. To seek *further* understanding of what structure is, by seeking an explanation of structure in more fundamental terms, is to seek a spurious kind of understanding of structure that consists in a kind of 'magical grasp' of the meaning of the term. Sider proposes simply to build his theory on the basis of his primitive notion of structure, claiming that this is all the elucidation that one *could* give: "Theoretical terms *can* be unclear: when they have been given no clear theoretical role to play. But 'structure' has a relatively clear role - given in this book and elsewhere. What more is wanted? […]We […] build new concepts, by building theories that use them" (2012:9).

Thus, for Sider, the theoretical role of the notion of structure amounts to a kind of *implicit definition,* to which no real clarification can be added (except the sense of familiarity that accompanies frequent use of the notion in that role - 2012:9). One might wonder, however, whether this is too quick. In later sections, I will argue that one might indeed want more: one might want the notion of structure to be further clarified by the resources of *operational analysis* and *epistemic iteration*. But I will set the point aside for now.

In relation to the second question, the Siderean view is that joint-carving is a relation between *terms* in a theoretical language, and *structures* in the world. It is a *transcendental* relation, in a broadly Kantian sense (to call it *semantic* here does not change the point) - a

relation which potentially *outstrips* whatever it is that we grasp in our *use* of the terms in question. To carve at the joints of nature is not something that *we* do, but something that our theoretical *terms* do.

Finally - in relation to the third question, Sider says relatively little. One thing to note is that for Sider, where joint-carving does outstrip our cognitive grasp, it is *reference magnetism* that keeps things on track. Sider discusses reference magnetism (2012:23-35) as a response to the challenge of 'radical semantic underdetermination' (2012:33), the threat of gerrymandered semantic assignments for joint-carving terms. While noting that non-theoretical terms are a more complex affair (2012:32-3), Sider makes the Lewisian point that semantic assignments for *theoretical* terms are decided between in large part by appeal to the relative *naturalness* of candidate assignments. Thus, consider two candidate assignments A1 and A2 for term T, and suppose that A1 is more natural, in the Lewisian sense, than A2. Sider argues, following Williams (2007), that if the semantic properties of T have an *explanatory* role, then A1 should be a preferable interpretation of T over A2. In particular, if the *explananda* in question are certain distinctive features of T's use, then other things equal, where T is a *theoretical* term, the *explanans* role will be better served by a semantic assignment that is more natural rather than less (on the assumption that T's semantic properties may occupy such an *explanans* role at all).[294] This is the principle of reference magnetism: that more natural semantic assignments should be preferred for theoretical terms.

[294] Sider notes (2012:30, n.16) that T's *causal* profile might play a similar explanatory role on a causal semantic theory. But he cautions (2012:33) that a purely casual theory is 'likely to be insufficiently general'.

Sider's reference magnetism is a *metametasemantic* viewpoint that rests upon broadly *externalist* approaches to semantics. It is, as noted, directed against the challenge of radical semantic underdetermination, and is therefore not *intended* to be a solution to the fitting problem as I have presented it. Indeed, it *leaves room for* a solution to that problem, at two levels. Firstly, the assumption that the semantic profile of T, externally construed, should *explain* aspects of the use of T at all, requires that semantic profile to have some traction in *guiding* T's use.[295] Secondly, the very problem of semantic underdetermination - the problem of fixing an interpretation for T between a range of candidate assignments that differ in a known way with respect to naturalness - requires a certain grasp of that very range of candidate assignments. To be sure, one might point out that the externalist character of reference magnetism leaves room for these elements - the explanatory traction of T's semantic profile, and the variously natural candidate assignments for T - to reside beyond our cognitive access or grasp. This is true, but the extent to which reference magnetism constitutes an *epistemic gain* will vary with the degree to which these elements do, in fact, so reside. My point is not that Sider's reference magnetism is false - but rather, that we should seek to maximise the epistemic gains that, *if correct*, it enables us to make.[296]

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[295] It is by virtue of such a sort of guiding, explanatory integration, that a relatively natural assignment *comes to be* a preferable assignment for T. Thus, reference magnetism does not merely leave room for, but arguably *requires* a solution to the fitting problem. Of course, one might insist here that a more natural assignment will be a better explainer of T's use *directly*, without recourse to any appeal to our *grasp* of it. But it is not clear why this should be so. Consider, for example, the notion of the *boiling point of water*, in the context of a very theoretical pursuit: the determination of fixed points on a temperature scale (discussed by Chang 2004). It is not at all clear how the proposed claim would pan out, concretely, in such a case.

[296] An underlying thought here is that the fruit of good metaphysical enquiry should be epistemically enriching in a *broad* sense. See Chang (2009) for discussion.

1.2 Lowe: Ontological Form

According to Lowe, metaphysics is *the science of essence*. Such an outlook might appear, at first glance, to be orthogonal to Sider's structuralism at best. But I argue that it is not.[297] Rather, the two approaches are both *continuous* and *complementary* to each other, in respect of both their subject matters, and the tools that they employ.

For Lowe, metaphysical enquiry encompasses - *inter alia* - enquiry into the structure of reality, and into the limits of possibility: how things *are*, how things *must* be, and how things *could* be. But these forms of enquiry all come, at bottom, to enquiry into *essence,* since what is actually the case must be antecedently possible, and "essence is the ultimate ground of all possibility" (2008b:278). Hence, metaphysics is the science of essence - but not in any spooky sense. Rather, enquiry into essence is, to a large degree, enquiry into the *ontological form* of what there is - a kind of enquiry more comparable to mathematics than to alchemy (2008b:278-9).

Ontological form is a basic notion. One way to elucidate it is by contrast with the notion of ontological *content*. Consider the way in which reality appears to have a *qualitative structure*: it contains instances of *red* here, *blue* there, *roundness* elsewhere, and so on. How should these appearances be explained? A *content-based* explanation might posit *tropes* - property instances whose existence explains the appearance of red here, blue there, and so on. On such a view, the occurrence of say, redness here, is explained by the

[297] One rather obvious indication that it is not comes from Lowe himself, who also describes metaphysics as "the study of the most fundamental structure of reality as a whole" (2008b:278). Of course, this does not mean that what Lowe means by 'structure' is readily translatable into structure in Sider's sense.

existence of an entity - a red trope. On a *form-based* explanation, one might posit the existence of an object - *here* - and a *formal relationship* of instantiation in which it stands to a *red* universal. Or one might posit a whole *class* of objects that are the red things in virtue of their mutual (formal) relationships of resemblance. What unifies these form-driven explanations is their reliance on features of entities that are *real*, but which do not consist in the *existence of distinctive entities* themselves. Elements of form are, as Lowe (2006) puts it, features of reality that are rooted directly in *how things stand*, and only indirectly in *what things there are.*[298]

This conception of ontological form through its contrast with ontological content stands for further clarification. I have already offered such a clarification (in Section 2.2 of Chapter 1), so I will not repeat it here. The point, as I say in Chapter 1, is that I will be relating Lowe's notion of ontological form to Sider's notion of structure thus: I will be taking ontological form to be an *entity-centred* correlate of structure, as *essence* is an entity-centred correlate of *necessity*.

Genuine ontology - the science of being *qua* being - has a theory of ontological *categories* at its heart (2008b:280). Categories are categories *of* being, and are not themselves beings: they are basic types of entities (2008b:281-2). The ontological factors (to borrow an expression from Peter Simons) that distinguish the categories, for Lowe, are "the distinctive *existence and identity conditions* of the entities belonging to them" (2008b:282),

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[298] *Distinctness* is a paradigm example of a formal relationship: two objects' being distinct does not consist - on pain of vicious circularity - in the existence of a further entity, a distinctness *relation*, which is itself distinct from them both. Another case is *instantiation*, on pain of Bradley's well-known regress.

as well as the formal relationships - including, prominently, the relationships of ontological dependence[299] - that hold between them.[300]

What does Lowe say about the fitting problem? A central component of Lowe's view here appears to be that we have a certain *faculty* for grasping essences (2008b:284, 2012b:946). The puzzle about how such a faculty might be possible is, to a degree, counterbalanced by the fact that our reliance on such a faculty seems to be *inevitable*.[301] For as Lowe points out (2008b:284-5), deflationary attempts to reduce our grasp of essences to a grasp of something else - say, concepts - themselves rely upon an essential grasp of *those* domains in turn (see also Lowe 1998 Ch.1). Thus, for Lowe, we are able to grasp essences *directly*, if not completely. This grasp of essences involves, in particular, a grasp of *generative principles* that capture *what it is to be* a thing of this or that sort (2012b:935).

But Lowe's argument here leaves room for doubt. To see why, consider again the claim that our apparent grasp of essences is really a grasp of concepts. Let us assume, for illustration, that our grasp of concepts is in turn rooted in a grasp of *language*. Now, there is more than one way to displace Lowe's focus on essences in favour of a focus on language. Lowe's claim is that any such move will simply shift the focus of realist metaphysics onto a

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[299] Formal relationships both *go beyond*, and also *constitute*, relationships of dependence. On Lowe's view, dependence relationships may play the theoretical role of securing *categorial uniqueness* (see Lowe 2006 and 2011).

[300] I have argued in other work that it is these underlying ontological factors that supply the ultimate grounds for the demarcation of ontological categories. Here, though, I will continue to assume that the relevant factors are simply existence and identity conditions.

[301] In conversation, Lowe has emphasised that we should expect this faculty to be constrained by, and remain in the vicinity of, common sense. Ontology should not proceed by setting common sense aside and starting from scratch; it should, rather, take common sense as a starting point and not revise it gratuitously. This is one reason why Lowe's (2006) ontology contains more fundamental categories than most.

restricted class of essences - in this case, the essences of linguistic entities. But it is not clear why this *must* be so. Indeed, the global expressivism of Huw Price (2013) offers one way in which a grasp of essences might be written out altogether. As Michael Williams summarises, in his own discussion: "In sum, we get global anti-representationalism with functional pluralism, thus metaphysical quietism without philosophical quietism. And that is what we wanted" (2013:144).

Now, it is one thing to hold that such anti-representational views are possible, and quite another to hold that they are *inevitable,* the best that can be achieved. To this latter kind of worry, Lowe's response is worth giving in full:

> As for the second question that I raised a moment ago - what, then, would it be to do metaphysics 'directly', and how *could* we do it that way? - this has, in my view, a very practical answer. The answer is to be found by taking courage and simply *trying it for yourself*. […] You will, in all probability, soon find yourself beginning to think of some possible answers to [the question of what causation could *be*] and beginning to find arguments for or against various of these answers. My advice is: *Just pursue these arguments and see where they lead you*. There is absolutely no guarantee that you will be led to an indisputable final answer to your question, but even so you will learn much during the quest. We should not expect metaphysics to be able to produce such final solutions, any more than we should expect them in mathematics or any other intellectual discipline. It was, indeed, Kant's unreasonable expectation that we *should* be able to arrive at certainty in metaphysics that led him to distort it into an examination of the structure and content of our *thought* about reality rather than of the structure and content of reality itself. (2008b:277)

My earlier claim - that realist metaphysics should proceed on the methodological conjecture that the fitting problem can be well resolved - is intended to be fully in line with Lowe's outlook. Here, as before in the case of Sider's reference magnetism, my point is not that Lowe's confident outlook is *wrong* - it may, indeed, be true that we *do* have a direct and partial grasp of essences. Rather, my point is that there is room for a further

explanation of *how* we have such a grasp - that is, in part, of how the elements of ontological form that we posit are *tractable* to our understanding. My aim is not to doubt that metaphysics and ontology in a Lowean mode are possible, but again, to amplify the epistemic gain that their successful pursuit may constitute.

1.3 Chang: Active Realism

I have discussed the fitting problem in relation to the metaphysical outlooks of Sider and Lowe. In both cases, I have argued that those outlooks stand for *supplementation* in a way that amplifies the *epistemic gains* that they enable us to make. In saying this, I am appealing to a broad conception of epistemic gain. In particular, I have in mind ways of improving knowledge and understanding that go beyond simply coming to know *more*.[302] Here is Hasok Chang with the basic idea:

> As already indicated, I want to orient the whole discourse on realism away from disputes about truth, and turn it back toward the idea of *reality*, by which I mean whatever exists 'out there' that cannot be controlled by one's own will. What better focus for *real*-ism can there be, than exposing ourselves as much as possible to reality and learning as much as possible from that experience? (2012:217)

Chang is talking about *scientific* realism, so his talk of experiential exposure to reality has a quite direct meaning drawn from scientific practice.[303] However, this is not to say that metaphysical enquiry should not be based on a similar notion of exposure, more indirectly

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[302] Whatever that means. As Nick Treanor (2013) points out, the notion of a measure of knowledge is hardly clear.

[303] In drawing upon literature in the philosophy of science, I am treating metaphysical and scientific enquiry as, in some sense, interrelated. However, I am *not* thereby steering close to the outlook of 'scientific metaphysics' advocated in Ladyman and Ross (2007). I intend, on the contrary, *not* to go that way.

conceived.[304] The core thought here is that when enquiry is understood this way, the increase of truth and truthfulness turns out to be only one among many possible epistemic goals, and a relatively inoperable one at that.Various further epistemic goals may be listed, which are both worthy epistemic goals in their own right, and also deserving of pursuit as means for the *indirect* pursuit of the epistemic goal of truth. Thus Chang:

> While I accept that many realist *philosophers* take ultimate truth ('with a capital T') as the aim of science, such truth does not often guide actual scientific practice, because it is not an operable aim. Truth, in the standard conception of realist philosophers, comes down to a correspondence between what our statements say and how the world is. But what are the methods by which we can judge whether this correspondence obtains in each situation? […] The burden of argument is on those who claim or assume that there are methods of judging statement-world correspondence, since there are no obvious ones. Just consider what a useless piece of methodological advice it would be to tell a scientist to 'try to make true theories'. The standard realist strategy is, of course, to get at truth indirectly; we can pursue truth via other theoretical virtues, if they are truth-conducive. (2012:219-20)

Let me set aside, for now, the question of *precisely* how Chang's point transfers from scientific realism to metametaphysical realism (the view not only that there is an objective reality for metaphysical theories to get at, but that metaphysical theories do indeed get at it). There is, however, a problem. If truth is inaccessible, then so is truth-conduciveness:

> But I think here we are inescapably locked in a vicious circle: if we are not able to judge whether we have truth in each situation, how will we be able to tell which methods have a tendency to lead us to truth? Whether this circularity is really inescapable is the main point of contention in the scientific realism debate. (2012:220)

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[304] This is not to say that I see metaphysical enquiry as continuous with science and *only* science. As I will discuss later in this chapter, *alethic monism* forces metaphysics to be as much concerned and continuous with enquiry in *any* domain, as with scientific enquiry even broadly construed.

Chang's solution is to sidestep the issue entirely:

> […] I would like to find a conception of realism which will allow us to avoid getting into [the vicious circle] altogether. For a moment, let's try taking 'realism' in a very literal sense, as a commitment to engage with what is real, with *external reality* (or, *reality*, for short). In the context of inquiry (scientific or otherwise), that ought to mean a commitment to maximise our *learning* from reality. […] But what is reality? What do we mean by external reality, and what is involved in learning about it? Instead of entering into serious metaphysics, I want to give you an *operational* definition of reality. I propose to think of external reality as whatever it is that is not subject to one's own will. (2012:220)

The basic tension, which generates Chang's 'vicious circle', is a trade-off between a theory's traction on *reality* and its traction on *thought*. The demand for externalism - epistemic or semantic - in accounting for a theory's contact with reality, competes against the demand for a broadly internalistic account of our grasp of a theory, and the epistemic gains that we make through it. Chang's rather elegant solution is to trade in both problematic kinds of traction for a third, more tractable kind: *pragmatic* or *operational* traction.

Chang frames his move as a way of *sidestepping* serious metaphysics. I will frame it, instead, as a *prelude* to serious metaphysics. As a guiding principle for scientific enquiry, the point need not go further than Chang takes it: scientific enquiry is well guided by a pluralistic spread of attempts to maximise learning from reality. But Chang's 'active realism' is a project which *can* be taken further. In particular, it admits of extension - by means of Chang's notions of *epistemic activities* and *epistemic iteration* - into a project of serious metaphysical enquiry.[305] I return to this discussion in Sections 3 and 4.

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[305] This point is orthogonal to Chang's claim that active realism admits of extension into a whole *ideology* (2012:217).

1.4 Integration

The Siderean and Lowean outlooks are *continuous* with and *complementary* to each other.[306] They are continuous in the sense that the Siderean quest for joint-carving terms, and the Lowean quest for an account of ontological form, are both projects of enquiry into the fundamental structures of reality, albeit in apparently different senses of 'structure'. They are complementary in the sense that they investigate structure at two levels that complement each other: Siderean metaphysics may be roughly understood as enquiry into reality's *global* structures, while Lowean metaphysics may (equally roughly) be understood as enquiry into reality's *local* structures - that is, those structures which are directly rooted in the natures of entities of various kinds.

These relations of continuity and complementarity are *static* relations. But I also claim that the Lowean and Siderean projects are continuous and complementary in a more *dynamic* sense: they are two continuous and complementary stages of a single *process* of enquiry. Indeed, as I will ultimately argue, they are also continuous and complementary, in this dynamic sense, with Chang's active realism.

In particular, we may regard the three projects of enquiry - those of Chang, Sider, and Lowe - as ranging between two extremes, one at which enquiry is at its most operationally concrete (that is, where the demands for grasp and understanding are primarily met), and another at which enquiry occurs in its most theoretically articulated form.

[306] At least, the versions of them that I am presenting are. I only claim that these views are broadly Siderean and Lowean, not that they are, as presented, Sider's, or Lowe's.

To say that these projects of enquiry form a succession of stages in a process is not to say that each stage is *left behind* as the next commences. It is, rather, to say that each stage acts as an *enabling foundation* for the next. Thus, to begin with 'active', operative enquiry into reality is to begin with a project of enquiry that we can properly grasp - which lays a *foundation* for the grasp of structures in a more abstract, more general, and more theoretically articulated (broadly, Siderean) way.[307] Siderean enquiry, in turn, allows us to discuss structures *themselves* - and in particular, to discuss *which structures obtain in virtue of other structures*. For Sider, this is tied with the notion of a *metaphysical semantics*, as I will discuss in the next section. In my own view, it is tied with the distinction between *explanandum* and *explanans* roles that structures may play (an approach modelled in several previous chapters). The aim of this Siderean stage of enquiry - which takes place not *instead of*, but *alongside* Chang's operative kind of enquiry in a mutually informing way - is to supply a set of structures in a *foundational* role - that is, a set of structures that stand as *explanans* to other kinds of structure.

I contend that it is *here* that Lowean ontology enters the picture. Directly *ontological* posits, in the Lowean sense - posits of categories of being and their associated elements of ontological form - are posits of the kinds of entities whose ontological form *underwrites* the Siderean 'book of the world'. To be sure, this does not mean that *every* element of Sideran *global* structure is explainable in terms of the ontological form of some kind of entity: that quantifier expressions carve at reality's joints, for example, should not lead one to think that there are *quantificational entities*. Precisely how one gets from Siderean

[307] Chang's notions of resistance, epistemic activities, and epistemic iteration all serve to cash out what 'foundation' here means, as I will explain in Sections 3 and 4.

structures to their best Lowean explanations is, of course, an open question that will be settled differently on a range of different ontological theories.

Siderean-Lowean metaphysical enquiry, then, is an integrated undertaking that aims to articulate both the fundamental structures of the world, and also how these structures are underwritten by a system of ontological categories, and ontological form. The posits that this involves are very much *realist* posits, whose traction on reality may remain beyond our cognitive grasp. But they need not be too *far* beyond it: this is the epistemic benefit that Chang's active realism is intended to supply. Indeed, the kind of pragmatic grasp of our posits, at which active realism aims, challenges the very dichotomy between traction on thought and traction on reality - between the epistemically and cognitively *internal* and the *external* - as, following Chang, I have already indicated.

2. Further Motivation: The Challenge of Equivalent Fundamentalia

The fitting problem is not the only reason for my proposed pragmatic focus. A further reason comes from a problem that faces Sider's structural outlook.[308] Sider's discussion of this issue appears in his 2012 book (p.217f), and also in his forthcoming book *The Tools of Metaphysics and the Metaphysics of Science* (in particular, Chapter 5). In what follows, I base my discussion on both sources.

On Sider's view, structure is captured by theoretical terms that carve at reality's joints. Different terms may carve at reality's joints more or less closely - but it is also possible for distinct sets of terms to carve at the *same* joints of nature - for them to be good for saying

[308] It affects Sider, not Lowe. But insofar as my proposal is an integration of Siderean and Lowean themes, it affects both parts of my own view.

the *same things* about the world. In such cases, the terms in question are *equivalent.* The terms *centimetre* and *inch*, for example, are equivalent in the sense that any truth stated in terms of *centimetres* may be translated into a truth in terms of *inches*, and vice versa.[309]

What *is* equivalence? On Sider's view, an explanatory answer to this question is desirable. While it is possible to leave the facts of equivalence brute - to 'quotient by hand' the equivalences between theories, statements, and so on - it leaves an unsatisfying residue of *unexplained explainers*.

Sider's explanation of equivalence appeals to his notion of fundamentality. For two sets of terms to be equivalent is for there to be a further set of terms, more fundamental than either, into which statements in terms of both equivalent sets receive an *identical* translation. Thus, equivalence holds between statements or sets of terms in virtue of their *identity* of content at a more fundamental level.

In order to work, Sider's approach requires that equivalent expressions always admit of identical translations at a *more* fundamental level. Sider faces a problem, then, in cases where there *is* no such further level to which to descend. Here are three such cases. First, there are equivalences between *connectives*: everything expressible in a language with & and ~ is expressible in terms of Sheffer's stroke, and vice versa (and so on). Second, there are equivalences between the universal and existential *quantifiers*: anything expressible in terms of one admits of paraphrase into the other, with appropriate substitutions of *Q1* for *~Q2~*. Third, there are equivalences between fundamental *mereological* notions of

[309] At least, on the face of it, which suffices for my purpose of illustration. Closer scrutiny, however, shows the establishment of fixed scales to be a fascinatingly complex affair: see Chang (2004) and Quinn (2011) for some discussion.

parthood and *overlap*. In each case, it is implausible that there should be a more fundamental level of structure to which to appeal.[310] These examples are not exhaustive, but they suffice to illustrate the problem.

If Sider is committed to his analysis of equivalence in terms of fundamentality, then he faces a trilemma: in hard cases like these, either *all,* or *some,* or *none* of the equivalent terms are, in fact, fundamental.

Suppose that *none* of them are. Then there is some more fundamental set of terms into which the problematic equivalent terms may be identically translated. But this is just to deny that there *are* such problematic cases of equivalent fundamentalia in the first place. Such a position is simply implausible, unless one can come up with some good candidates for such fundamental levels in the cases already mentioned (what would they be?).

Suppose that *some* of them are. In that case, the equivalences become unproblematic, since they simply provide what Sider calls a *metaphysical semantics* for the less fundamental expressions in terms of the more fundamental ones. The problem with this is that it involves arbitrary-looking decisions to privilege certain terms over others when those terms *ought* to be equivalent. Consider the case of truth-functional connectives, for example. One might well *say* that Sheffer's stroke is fundamental while, say, a combination of & and ~ is not - but on what *grounds?* To say that the stroke's fundamentality is *brute* does not help, since it does not explain why we should think that expressively complete

[310] It is possible, of course, to be surprised by such a level: see Denyer (1994) for a delightfully odd case.

sets of truth-functional connectives are anything other than co-fundamental in the first place (to say that Sheffer's stroke is expressively complete *by itself* hardly clarifies much).

Suppose, then, that *all* of the equivalent expressions in a hard case are fundamental. This is an open option, and Sider appeals to its possibility to lend plausibility to his fundamentality-based account of equivalence (against the brute 'quotienting' view). On this horn of the trilemma, we get brute equivalences between fundamentalia, with Sider's fundamentality approach kicking in to explain equivalences *further up* - that is, between *non fundamental* terms.

This third horn remains problematic for Sider, but it is important to be clear about why. The *wrong* objection to raise here concerns explanatory redundancy: if equivalence is brute for fundamentalia, why not let it be brute all the way up? The objection is wrong because equivalence just might not *be* brute all the way up. In particular, it may be that expressions admit of a well-founded ordering in which equivalent sets of terms at each level ultimately *depend for their equivalence* on fundamentalia that occupy the bottom level of that ordering precisely *because* they do not depend for their equivalence relations on anything further.

The *right* objection, I suggest, is that on the third horn, one of Sider's foundational notions - the very notion of *carving reality at the joints* - becomes obscure. The point here runs parallel to a well-known objection to naive operationalist accounts of conceptual content. In that context, we may put the point as a dilemma: either conceptual content is *exhausted*

by an operational analysis, or not. If it is, then operationalism is guilty of *overfitting*[311]: its account of conceptual content will be too closely tied - even reduced - to operations, and will not generalise well. If it is not, then some *further* account is needed of conceptual content.[312] Likewise, then, in the case of Sider, we may ask whether theoretical terms *exhaust the loci of joint-carving*.

What do I mean? It is a hard thing to make entirely precise. Consider the claim that a certain term T carves reality at the joints. Minimally, this means that there is some structural feature of the world that is articulated or captured by T. To say that T carves, then, is to rule out views from one extreme of a spectrum, according to which T has *no* involvement in carving at the joint in question. At the opposite extreme of the spectrum is the view that T carves at the relevant joint *all by itself*, with no help at all: no background conditions or underlying relational features of T contribute to T's carving at the relevant joint of nature. Call T, along with such a base of background conditions and contributing factors, which support T's carving reality at the joints, a *locus* of joint-carving - vague as that notion is. Now we may say, at the first kind of extreme, that T is *excluded* from the relevant locus of joint-carving, while at the second kind of extreme, we may say that T is *exhaustive of* that locus. With this rough idea in mind, let us return to the question: do theoretical terms exhaust the loci of joint-carving? Either they do, or they do not.

Suppose that they do. Then our account of structure, understood in terms of joint-carving theoretical terms, becomes *overfitted* to those terms. Structures captured by different sets of

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[311] I borrow this term from the field of machine learning, where 'fitting' does not have the sense that I have given it in the present chapter.

[312] As already noted, one can nevertheless get some epistemic benefit from operational analyses by noting that they may help to delimit how *much* of a further (non-operational) account one needs.

terms will be, *by that token*, different structures: no room remains for substantive claims of equivalence. On this horn, we fail to accommodate even *brute* equivalences.

We had better, then, suppose that theoretical terms do *not* exhaust the loci of joint-carving.[313] If they do not, then we may - and indeed, should - seek some further account of what *else* goes into the relevant loci. On Sider's view, the answer might begin with the Lewisian naturalness of the joints in question, and their resulting explanatory traction on the use of the terms that carve them. This is, indeed, not very far off Chang's conception - as we saw - of reality as whatever exerts a coercive (and hence, to some degree, explanatory) constraint on practice.

Drawing all this together, I suggest that the way for Sider to deal with the challenge from equivalent fundamentalia is to adopt, and give a further account of, a conception of the loci of joint-carving in which theoretical terms are included,[314] but *de-centered.* Centrally, as I have already suggested, such a further account should focus on the *activities and practices* that underlie our *use* of joint-carving terms. In short, I suggest shifting the focus, in our

[313] Indeed, this appears to be Sider's own view. Consider, for example, the connection between Lewisian naturalness and explanatoriness that underwrites Sider's reference magnetism.

[314] Their inclusion is, of course, crucial. This is not just because metaphysics is a theoretical pursuit, but also because they are needed in order to prevent the aforementioned overfitting problem from afflicting the *operations* that are involved in the loci of joint-carving. Operations and theoretical posits here serve to alleviate the risk of overfitting *from each other*.

conception of the loci of joint-carving, from theoretical terms to the activities and operations involved in our *use and grasp* of those terms.[315]

3. Joint-Carving in Practice

I have argued that my integrated, Siderean-Lowean outlook should be supplemented by Chang's active realism. I have argued, too, for a practice-centered conception of the loci of joint-carving. To unpack this latter claim in more detail, we turn again to Hasok Chang's work, this time on *epistemic activities* and *epistemic iteration*. For reasons of space, my discussion will aim to be *illustrative* of what is possible here, rather than exhaustive. Specifically, I will limit myself to two points of illustration. I will discuss how the notion of an epistemic activity is tied to the grasp of structure, and I will discuss how the notion of epistemic iteration may give us some grasp of central and primitive theoretical terms such as *structure* itself. (Insofar as my interest in illustrating rather than exhausting the possibilities leads, in this way, to the imposition of a certain false neatness upon the subject-matter; that neatness should be disregarded as an artefact of my discussion.)

3.1 Epistemic Activities

The relationship between epistemic activities and worldly structure is a theme developed through several iterations in Chang's work (see Chang 2001, 2004, 2008, 2009, 2011, 2012). Recall from 1.3 above, that Chang's active realism recommends *maximising our learning from reality*. Reality is understood as whatever *resists* our attempts to act 'upon it'

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[315] Here is another way to motivate the idea that something is amiss with Sider's loci. One might imagine a language in which it is possible to insert truth tables directly as subsentential expressions. In that case the worry about equivalent sets of expressively complete connectives disappears. Of course, a truth table is not a theoretical term, as normally understood - but the problem begins to look very much like an artefact of Sider's assumption that it is at the level of theoretical terms, as normally understood, that joint-carving occurs.

as we will; I have noted that such a conception of reality sits well with the grounds for Sider's reference magnetism. An epistemic activity is, roughly, any activity through which we enact such learning about and from reality.

One simple example of an epistemic activity is *counting*. This is a fairly *mid-level* activity: it is *realised* by various further activities (such as *individuating*, perhaps), and may itself be a part of broader epistemic activities (see Chang 2012 §1.2.1.1). I will assume that theorising in terms of such unreduced *mental* activities is not problematic in principle (see Burge 2010 for a firm defence of this kind of approach).

Epistemic activities are often *realised* by further activities, some of which are themselves epistemic activities. In such cases, we may as a matter of terminological convenience use 'epistemic activities' for these higher level actions, and 'operations' for the lower-level acts that realise them. However, as Chang points out, this distinction between activities and operations is relative and mobile: there need be nothing *fixed* about which acts are activities, and which operations. In particular, we should not think that for an epistemic activity to be realised by such-and-such operations entails that the operations in question are specifiable in *more basic* terms than the epistemic activity that they realise: realisation here is not a *reductive* relation.

Moreover, since epistemic activities may be specified in unreduced mental terms, it is quite possible for the *individuation* of epistemic activities to be laden, to a greater or lesser degree, with theoretical commitments. These contributions, of mental and theoretical categories to the individuation of epistemic activities, render epistemic activities somewhat *flexible* - indeed, multiply realisable - with respect to their most concrete underlying

operations. (This flexibility, in turn, is what enables epistemic activities to extend the loci of joint-carving in a way that accommodates equivalences between fundamental theoretical terms.)

Consider again the epistemic activity of counting. Suppose that one is set the task of counting in a world consisting entirely of undifferentiated atomless *stuff.* As Chang points out, such an activity is *unintelligible*, in a specific sense. Chang's point is not that it is suddenly unintelligible, *in general,* what the task of counting is a task to do.[316] Rather, it is unintelligible how that task should be implemented *in the particular case*. In an undifferentiated world, counting is unintelligible because it is *impracticable*. The undifferentiated stuff-world lacks a certain structural feature without which counting is impracticable: it lacks *discreteness*.[317] The lack of discreteness is a structural feature of the world which *resists* one's efforts to count in that world. The epistemic activity of counting, then, depends for its intelligibility - its practicability - on the assumption that reality has a discrete structure.[318] Call discreteness in this context a *metaphysical* or *ontological*

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[316] This does not entail that we have a direct, Lowean grasp of the nature of counting - only that we have acquired our ability to count, by some means other than counting worlds of undifferentiated stuff. Precisely *how* one acquires such a capacity is a hard question, the hardness of which is brought to light in some work on rule adoption by Saul Kripke and Romina Padro (see Padro 2015).

[317] To be sure, one could imagine a stuff-world that is *not* undifferentiated - say, one which comes in discrete *portions of stuff*. In such a world, counting becomes possible again.

[318] Discreteness is arguably not the only structural feature that counting presupposes. Along more Lowean lines, we might also suppose that counting presupposes that reality has a *sorted* structure. For suppose - *per impossibile* - that a world might have a discrete structure *without any sorts*. It is plausible to think, along broadly Fregean lines, that counting would remain impracticable in such a world, since one would lack any sorts *under which to count*. It is no objection to the example, that discreteness is necessarily accompanied by sortedness, since discreteness and sortedness are *distinct* structural features, even if not really separable. Nevertheless, one might resist the example by insisting that sortedness is crucial to counting only *because* it is a necessary condition for discreteness.

principle.[319] Then Chang's point is that the epistemic activity of counting depends, for its intelligibility, on the metaphysical principle of discreteness.

Beside counting and discreteness, Chang discusses several other pairs of epistemic activities and metaphysical principles, which vary in their persuasive force. One of Chang's further examples stands out as being both especially persuasive, and also of particular interest in the context of this thesis: the link between *attempted overdetermination* and the *principle of single value*.

Consider the following example. Suppose that I want to predict the number of degrees by which I will raise the temperature of some water by burning a certain amount of wood. Suppose I investigate all the relevant facts and laws, and calculate an answer: thirty degrees. Suppose that I then burn the wood, and measure the increase in the water's temperature with a thermometer. Suppose that my thermometer indicates an increase of only ten degrees, and suppose that this falls outside the margin of error of my prediction. We should say, in such a case, that my prediction and my observation are in conflict. Such a conflict might lead me on various lines of enquiry: I might have miscalculated, made some false assumption, or used a poorly-calibrated thermometer, and so on. I would *not* be led to suppose, however, that my conflicting results might be explained by the water's having risen by *both* thirty *and* ten degrees (on the same scale). I would not be led, in other words, to assume that the temperature of the water might have had *more than one value* at

[319] Chang uses these terms more or less interchangeably.

the same time.[320] This is not because the single-valuedness of the temperature of the water is simply a *deeply held* assumption of mine, but rather, because the very epistemic activity in which I am engaging - the (dis)confirmation of a theoretical prediction, in this case - would be unintelligible (impracticable) if the world did not obey the principle of single value.

The (dis)confirmation of a prediction is one among many epistemic activities, involving the determination of one value in multiple ways, which is undergirded by the principle of single value. Indeed, the principle of single value is not specific to physical magnitudes at all: to say that reality obeys a principle of single value is just to say, in my terms, that it exhibits a *determination structure.*[321] The range of epistemic activities underwritten by single-valuedness, then, goes far beyond epistemic activities connected with measurement: as I have argued in previous chapters, predication and instantiation structures are also varieties of determination structure. Indeed, this wide-ranging appearance of determination structures, brought to light by epistemic activities that rely on single-valuedness, is a core reason for positing *dimensions* as a fundamental category of being.

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[320] I am, of course, simplifying. In determining the boiling point of water, for example, it makes a difference whether one places a thermometer *in* the water the temperature of which one is measuring (and if so, how deep), or in the *steam* that the water produces, and so on. See Chang 2004 for discussion.

[321] Single-valuedness is, indeed, a feature that distinguishes determination structures from function-value structures in general. Consider the argument, discussed by Fraser MacBride (2004), that we know perfectly well what it is for a universal to be wholly in multiple places, since we understand the *location-of* function and we know what it is for a function to be one-many. Arguably, the success of this argument will hang on whether location structure is a kind of determination structure.

What is the status of these metaphysical principles? According to Chang (2009:69), their validity is grounded in the requirements of practice. In particular, the principle of single value is grounded in the requirements of *testing* and related epistemic activities (where, as noted, 'related' covers a very wide range of activities). It is not so much that the success of testing activities requires the that reality *be* single-valued in its structure, but rather, that our *commitment to undertake* testing activities involves a commitment to *treat* reality as being single-valued in the relevant respects. Metaphysical principles reveal more about the nature of our epistemic activities than they do about how reality is: the world may *be* as it likes; so long as it *impinges* on our epistemic practices *as if* it were relevantly single-valued, it will provide no resistance to those practices going on. Thus, metaphysical principles on Chang's view have a distinctly Kantian flavour: they are commitments that arise on account of, and do not extend beyond, our pragmatic immersion in the world.

Chang (2012:227f) builds a powerful case against the notion of a *general* link between the success of science - whatever that means - and the truth of its theories. But the case is somewhat different in our case. For in the present context, we are not interested in a general link between the success of science and the truth of its theories; rather, we are after a piecemeal link between *operations* and the *explanatory worth* of *metaphysical theories*. Here is Chang:

> Here we should start with an unbiased look at what does tend to be lasting in science: all indications are that lasting success in science has been achieved most credibly in two inter-related realms: various material techniques and technologies, and the empirical adequacy or phenomenological laws […] I think there are good prospects of retaining operational successes that have already been achieved (*modulo* the problem of induction). The security of achievements already made is a piecemeal thing, a motley collection of successful practices in various parts of science, from which it is going to be very difficult to infer anything about the general character of science. (2012:229)

Operations can succeed, but operations - and the instruments with which they are performed - are not truth-bearers, so there is no *general* link between success and truth to be built there. Nevertheless, the success of an operation might be well explained by the truth of the metaphysical principles on which its intelligibility depends.[322] True, the world may be any old way and yet *appear* to satisfy the relevant metaphysical principles. But this is no obstacle to our best posit being, in a fallible and defeasible way, that the world *is* indeed as it appears to be.

One might doubt this claim by noting that epistemic activities, and their underlying operations, are fairly high-level features of the world. Earlier, it was in virtue of this that they helped to accommodate Sider's equivalent fundamentalia. But here, the point becomes problematic: if these are *high-level* goings on, then there is a very real possibility that reality might, at bottom, be merely *appearing* to satisfy the relevant metaphysical principles. On the other hand, the fact that we are dealing with high-level phenomena also leaves plenty of room to *check* how reality is constituted 'lower down', so as to appear to satisfy those principles at the higher level. Consider the following analogy. My experience, when I watch a film, appears - to me - to be an experience of smooth surfaces and continuous movement. The fact that my visual experience is a relatively high-level and coarse-grained feature of the world leaves plenty of room for illusion lower down - yet by the same token, there is plenty of room for investigation. I might find, by looking more closely, that what appear to be smooth surfaces turn out to be composed of discrete pixels, or I might, by getting behind the projector, find that what appear to be continuous movements turn out to be grounded in a fast succession of discrete frames. In each case,

[322] As Chang (2012:231) points out, motley disunity among the *explananda* here may result in motley disunity among the *explanans.* But I do not see why this should be a problem.

what distinguishes *these* illusions from the kinds of illusions that radical *sceptics* worry about is the room that they leave for being *empirically found out*.

So too, in the case of our metaphysical principles: insofar as one's reason for scepticism about those principles arises from the high-level natures of the epistemic activities that require them, there will - at least potentially - be room to find out empirically that one is mistaken. Such mistakes may be found out empirically precisely when they involve the breakdown of the epistemic activities that depend on them. Thus, suppose I were to think that *names* exhibited determination structures - that the name of any individual could only take a single value. Sooner or later, I might be told that a certain man's name is 'Cicero', *and* that it is 'Tully'. Now I *might* then conclude that my informants are mistaken or lying. But I might - and indeed ought to - conclude instead that the epistemic activities in which I had attempted to engage - discovering names through operations that rely on single-valuedness - were not fit for purpose. Of course, a failure to *dis*confirm a metaphysical principle in this way does not entail that such a principle is true. But it does leave the metaphysical principles concerned in good standing.

Let us return now to the question of the status of metaphysical principles. Chang (2009:69) holds that their validity arises from the requirements of their associated epistemic activities, because they are neither empirical generalisations, nor logical truths. However, there are reasons to qualify both of these claims.

First, Chang points out that single-valuedness could not be an empirical generalisation because we could not make any sense of *testing* it; indeed, it is a principle presupposed by empirical testing. But the fact that reality, in some domain, offers no (insurmountable)

resistance to a range of epistemic activities that presuppose single-valuedness, is itself an empirical generalisation as good as any other. It is by no means inconceivable that a domain of enquiry should resist attempts to learn about it through such methods - the domain of proper names being an example - and while this does not confirm the principle of single-value directly, it does offer some indirect, abductive grounds for holding it about particular domains. Indeed, it is not hard to specify what it would take for single-value based enquiry to fail in the case of say, temperature: it would fail if, for example, thermometers were to give two readings rather than one, in a way that robustly resists explaining away.[323]

Second, Chang points out that single-valuedness could not be a logical truth, since "one can imagine variables that have multiple values, especially in the realm of non-physical quantities and designations: for example, names of persons or places, or multivalued functions in mathematics." (2009:69). Now, I do not say that the principle of single value is a logical truth on *every* conception of logical truth out there. But on conceptions of logical truth that are tied closely to ontological form (see e.g. Lowe 2013), this is less clear. In particular, there is room for the principle of single value to be underwritten *by metaphysical posits*, where the manner in which, and extent to which, it is so underwritten will depend on whatever turns out to be the right metaphysical theory. In particular, if reality supports a distinction between *determination structures* and *function-value* structures, as I think it does, then Chang's examples do not show that single-valuedness,

[323] To be sure, this is hard to imagine. But if that is so, it is so in a way that seems to *support* single-valuedness - namely, in virtue of (say) the *volume* of mercury in a thermometer also being single-valued. There is, indeed, no point at which one may step out of these mutually supporting operations to observe the *truth* of the principle of single value directly, but this is just to say that the epistemic ground for single-valuedness does not have a foundationalist structure. Its structure is, rather, a kind of *progressive coherentism* (2007:5).

where it does occur, is not grounded in the natures of things. This is a point that Chang seems to acknowledge:

> Still, where we do recognize it as valid, the principle clearly seems to have a necessity about it. What could be the source of this necessity? In terms of conceptions that are commonly known, I think the closest to ontological principles as I conceive them is the Kantian synthetic *a priori* […] what we must conclude is that the *necessity* of the principle of single value is not universal but *conditional*, holding only in some situations. […] To summarize, we need to subscribe to the principle of single value *if* we want to engage in testing-by-overdetermination. In other words, the *necessity* of the principle of single value springs from our commitment to testing-by-overdetermination. Or, single validness is necessary for enabling the activity of testing-by-overdetermination. What we have is a pragmatic necessity - a necessity arising from the requirements of action, not some kind of hypertruth that pertains to a proposition. (2009:69-70)

Chang's formulations of the point here seem to shift between a certain *doxastic* orientation - that *belief* in single-valuedness is necessary for *commitment* to testing by overdetermination - and a more *ontological* focus, that *single-valuedness* is necessary to *enable* testing by overdetermination. Overall, his point seems to be twofold. His first point, as we saw before, is that the relationship between operational success and a metaphysical principle is not one between the success and truth of *the same thing*, since operations are not truthbearers and so leave any truth content in a success-truth link underdetermined. His second point is that the success of a given epistemic operation does not support the truth of its associated metaphysical principle(s) in general, but only (defeasibly) as they pertain to its particular domain of enquiry.

Both of these points can be accommodated by metaphysical realism. For realism need not proceed on the basis of the general sort of success-truth link that Chang rightly rejects. What is needed, instead, is an initially piecemeal link between operational success and the

explanatory value of metaphysical - structural and ontological - posits. Here we needn't jump from operational success directly to the truth of some ultimate theory, but should proceed *gradually*, by stages, through explanatorily useful and theoretically unifying posits of structure (in both *explanandum* and *explanans* roles, as discussed) and ontology. Moreover, such explanatory posits need not focus *only* on preserving the appearances - the success of this or that epistemic activity - but may aim also to tell a systematic grounding story about a *range* of structural features of reality that are presupposed by our empirical epistemic activities[324] (*modality* and *material constitution* being two examples).

3.2 Epistemic Iteration

The success of epistemic activities, then, provides a way into explanatory posits of structure. This is no good, however, if no serviceable, realist conception of structure can be had. I have already noted Sider's overall response to this point: the notion of structure is primitive, and should be elucidated by the theory that we build upon it. In the present section, I propose an understanding of how this might be done. I begin by an *obstacle* to structural realism, drawing again on an argument from Chang. I then discuss the role of epistemic iteration in overcoming it.

Chang's argument against structural realism takes the form of a dilemma (2012:244-6). The argument pertains to the preservation of structures across theoretical change - that is, the claim that structures are not theory-bound. Chang presents the horns of his dilemma thus: "either the structure identified is observable (in which case trust in the structure only amounts to empiricism), or the preservation of the structure is willful (in which case there

[324] To reiterate: I am using 'empirical' very broadly here, to include far more than just the core activities of science.

is no warrant for taking it as an element of external reality)" (2012:245). To illustrate the first horn, Chang gives an example:

> […] consider […] Fresnel's optical equations that are saved in the subsequent Maxwellian theory. […] Fresnel's equations […] are phenomenological laws, as they are mathematical relations between observable variables, namely the intensities of the incident, reflected and reflected light beams and the angle that these beams make with the reflecting surface. One would expect this sort of thing to be preserved going from one theory to the next, or even from one paradigm to the next as long as the incommensurability is partial as Kuhn allowed. Here we are ultimately only talking about the structure of data-sets, which anti-realist empiricists would be very happy to accept. […] All this goes to show that structuralism does not necessarily fall on the realist side of the standard realism-antirealism divide. (2012:245-6)

I am happy to accept Chang's conclusion here. Chang continues:

> The other horn of the dilemma is conveniently illustrated by the case of Copernicus and Ptolemy […] Even though Ptolemaic and Copernican theories were very different from each other, uniform circular motion was an essential structural part of both theories […] Is this structural continuity impressive? Yes, but only in terms of how the obsession with uniform circular motion could have lasted from Ptolemy thorough to Copernicus. The rigidity, obstinacy or uniformity of scientists' way of thinking, by itself, reveals nothing about the nature of external reality. Instead, the constancy of structures may only be an indication of what we *hold* fixed because of our mathematical or esthetic preferences. (2012:246)

Moreover:

> My reservations about structural realism should not be mistaken as a denial of the structural continuity that we often do observe […] nor as a negative assessment of the value of such continuity. It is only that I do not think we should imagine that structuralism will save the realist argument from the success of science. There is no general warrant for regarding the structural aspect of a successful scientific system to be solely or even mainly responsible for its success. An inference from success to structure is going to be just as unsafe as the troubled inference from success to truth. (2012:246)

Chang's motivating thought here is a Duhemian, holistic one, that it is hard in principle to pick out the 'success-generating' elements of a successful system even when a clear notion of success - one worth explaining - can be articulated. This applies to the success of whole theoretical systems, but since *parts* of systems are interpenetrated and laden with theoretical content, the point extends, arguably, to individual theoretical terms.

Is there any way out? Recall, from previous discussion, the circularity generated by the pursuit of truth: truth is an inoperable epistemic goal, but other epistemic goals cannot be *checked* directly for truth-conduciveness. Chang's solution there was to shift our focus from *theories* to *practice* - from theoretical representations of reality to pragmatically oriented and informative engagements with it. Since practices are not truthbearers, the question of truth thus drops out - but I have tried to reintroduce standard realism by drawing an explanatory link between successful operations and structure. Chang's further point, however, is that this kind of correspondence between operations and structure is *itself* something that cannot be directly checked.

The remedy, I suggest, is to adopt a *progressive coherentist* model of justification for these posited links between structure and practice. The questions of *which* structures to posit, and *whether* those structures have any traction on reality, cannot be answered from a *transcendental* standpoint that allows their answers to be directly observed. Rather, they are to be answered from an *immersive* point of view, through an ongoing, *iterative* process of enquiry.

The notion of an immersive standpoint differs from both the *transcendental* standpoint of the naive realist (from which everything is clear), and what one might call the *benthic*

viewpoint of the hard-nosed sceptic (from which everything is mud).[325] Enquiry from an immersive point of view does not assume an unmediated and direct grasp of reality which dispenses with any need for pragmatic, operational engagement with the world. Nor does it assume that such engagement must be epistemically opaque, revealing nothing about the reality with which we are engaged.[326] If such an outlook wants a name, let us call it *immersive realism*.[327]

Central to realist enquiry, immersively oriented, is *epistemic iteration*. Processes of epistemic iteration are, broadly speaking, processes in which successive stages of iteration of epistemic activities serve the pursuit of certain given epistemic goals.[328] The thought is that an epistemic goal that may not be achieved directly, or entirely, may nevertheless be *approached* by such successive stages by justificatory means that are both progressive and coherentist. Thus, suppose that one has set the epistemic goal of determining an absolute temperature scale. One might have to begin with crude, sensory measurements of temperature, and proceed from there to the construction of *thermoscopes* (roughly, instruments that measure temperature on an ordinal scale). Sensory resources are needed here to *set up* thermoscopes, but the resulting thermoscopes - through iterative

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[325] Appropriately, marine habitats above the benthic zone vary widely, from demersal to littoral zones, encompassing everything inbetween. This is very much in keeping with the exploratory spirit of my proposed view.

[326] Dialectically, the benthic point of view takes realist metaphysics to owe an account of how it can overcome a certain in-principle *barrier* to knowledge of the world. By contrast, I take the benthic sceptic to owe a defence of the notion that there should *be* such a barrier.

[327] This label is not supposed to set my view up in opposition to Chang's active realism. Its purpose is simply to emphasise the immersive element.

[328] As Chang points out, epistemic iteration differs from iterative methods in mathematics, since in the epistemic case there is usually no guarantee that iterative methods will converge on a result, and no independent way to calculate such a result. Epistemic iteration works in a *coherentist* setting.

improvements in precision[329] - can be used to *correct* the very sensory faculties through which they were set up. Likewise, the availability of thermoscopes enables the construction of *thermometers* as we know them, which in turn enables the establishment of an absolute temperature scale (the details of this three-stage iterative process are given in Chang 2004). At no point in this 'bootstrapping' process does one escape immersion altogether, to bring about this retrospective correction from a transcendental point of view. Rather, what enables backward correction is the progressive accumulation of a greater weight of greater coherence, and other epistemic virtues, at each iterative stage. The commitments at each stage remain *fallible*, but it is nonetheless the case that epistemic iteration is a progressive tendency toward being *better informed* about reality.

Chang's case studies show that the notion of epistemic iteration can help us to make sense of scientific practice. Can it also help in the case of metaphysics? A full answer to this question would require detailed case studies into metaphysics that I hope to pursue at a later point. Here I will only mention debates about the metaphysics of personhood, mind, causation, material constitution, emergence, truth, truthmaking, and representation, as eight broad areas that are obvious candidates for such case studies.

To make this claim less abstract, let me consider a 'toy' example. The example is not intended to resemble any actual episode in the history of metaphysics, or to exemplify iterative process that actually occurs in metaphysics; its aim is simply to offer one schematic way that iteration in metaphysics *might* go, in order to make the placement of iteration in metaphysics plausible. One might imagine metaphysics beginning with a

[329] Precisely how these iterations take place will be a *technical* matter that depends on the details of the case. There is no reason to expect, or want, a *general* account of epistemic iteration at this level of concreteness.

broadly *phenomenological* (in both experiential and operational senses) stage of enquiry at which our chief epistemic goal is to identify and articulate *patterns* in reality. At its most primitive, such a stage of enquiry would simply seek to identify how things *go together*. One might imagine a further stage of enquiry at which basic *structures* are posited, and then precisified. At this stage, rather than saying that (for example) *colour* and *red* go together in a similar way to *shape* and *square*, we might identify various kinds of structures - specification relations, conjunctive or otherwise, determination structures, function-value structures, and so on - that reality appears to have. This structural stage of enquiry has the characteristically iterative capacity to retrospectively correct the deliverances of the first stage of enquiry: one might, for example, distinguish determination structures from function-value structures, and therefore correct a prior inclination to group *individuals and their names* along with *objects and their shapes*, say. We might, moreover, imagine a further stage of enquiry at which *ontological* posits - posits of categories of being and their ontological form - are made and precisified. Again, these posits have a capacity for retrospective correction. Consider, for example, my posit of *dimensions* in an earlier chapter, and the implications that I drew from this for the *explanandum* structures in the debate over determinables: there, it was because dimensions were - I argued - the best explanation for the debate's *explanandum* structures overall, that certain elements of those *explanandum* structures - such as the assumption that determinable-determinate hierarchies are ontologically uniform all the way up, or that determinables are less fundamental than their associated determinates.[330] These pervasive relations of mutual information and adjustment between stages of enquiry, as well as between a system of enquiry and our

[330] One example that showcases these mutual relationships rather clearly is the discussion of *truthmaking*. See Lowe (2006, Ch.11), for an illustrative discussion.

broader knowledge and understanding as they develop, are characteristic of enquiry in an iterative mould. I take it, then, that iteration is not out of place in metaphysical enquiry.

Finally, the iterative stages of metaphysical enquiry lend a dynamic element to Sider's claim - mentioned before - that while 'structure' is primitive and not definable, a theory built upon it can amount to an implicit definition of that notion. We may add, in light of our discussion, that the iterative process of developing a theory in terms of the notion of structure offers an *increasingly clear* grasp of that notion.

4. Alethic Monism

One might wonder whether this progressive, coherentist obsession with constant feedback between levels of enquiry might undermine our overall commitment to a robust metaphysical realism. After all, how feasible is it for a realist project of metaphysical enquiry to keep even *common sense* in the loop?

My response to this is a little circumspect. The aim of my proposed approach is not to show, in some direct sense, whether reality *is as common sense takes it to be* - whatever that means. Rather, it is to give an account of the structures of the world, and an account of how the operations accessible to common sense fit among them, and engage with them so as to reveal them to us. While this *sounds* like a transcendental project of enquiry, it is not intended to be; rather, it is intended to take place wholly within the iterative, immersive framework adumbrated above. Such enquiry takes place within a coherentist framework, but coherentism from a practice-oriented point of view - as I have argued above - need not raise the problem of isolation that is usually levelled against it.

However, one might expect such coherentism to raise problems of *plurality*. These worries may be of two sorts. One, which I will call the problem of *fragmentation*, is the worry that reality might at bottom come in *isolated pockets* rather than a single fabric. The other, which I will call the problem of *alternatives*, is the worry that there are multiple, equally good outcomes that iterative enquiry of the proposed sort may reach. To close the discussion of this chapter, I will briefly discuss the broad ways in which each problem might be addressed.

To get a handle on the problem of fragmentation, consider the law of non-contradiction (LNC). LNC supplies one powerful ground for thinking that reality comes as a unified whole: given that *p*, it simply *cannot* be the case that ~*p*.[331] Now, suppose that *p*, and suppose also that ~*p*. Given *p*, where should we *place* the fact that ~*p*? Presumably the facts that *p* and ~*p* could not occupy, as it were, the same *portion of reality*. So one might posit fragmentation, in the sense outlined above, in order to support the truth of *p* and ~*p* in different fragments of reality (whatever that means: I will not worry here whether the fragmentation thesis can ultimately be cashed out in the first place). But this is problematic. For one thing, the very same thing - the proposition p - will be affirmed in one fragment of reality, and denied in the other. Thus, our supposed fragments overlap in respect of *p*: this is monism all over again. Indeed, monism reasserts itself whether these supposed fragments overlap or not. For insofar as they do overlap,[332] the reappearance of monism is obvious. Insofar as they do not overlap, there is no sensible sense in which they

[331] The point is made well by Lowe (2006 §11.6).

[332] By 'overlap', I mean - in a vague sense - that they concern *the same things*. I take it that the whole question of whether fragments overlap (the way, say, that Carnapian frameworks do) is a question that only arises within a view that supports the fragmentation thesis *at all*. The use of fragmentation, in this context, to support the affirmation and denial of a single thing - the very same proposition *p* - should suggest that *some* notion of overlap is in play.

may be said to *exclude* each other, so there will be a monistic standpoint from which one may simply accept the *conjunction* of them. I suggest, then, that there is no sensible interpretation of the fragmentation thesis that might challenge monism.

One might suppose that the problem of alternatives admits of a similar solution: if there are multiple, equally good, complete standpoints resulting from iterative enquiry, can we not accept them *all?* It is not obvious how we can. For the problem with alternatives is not the existence of alternatives as such, but the threat of *relativism* that they pose.

However, the threat of relativism is only real if one can say, from a *transcendental* standpoint, that multiple theoretical systems are equally *and entirely* accurate, at the end of enquiry. Our proposed immersive mode of enquiry, however, cannot purport, even in principle, to result in multiple understandings of reality that are fully and equally adequate in this transcendental sense. To be sure, this is to acknowledge certain limits to the ambitions of realist metaphysical enquiry: we forgo any ambition to reach such transcendental certainty. But this is no cost, since - as immersed enquirers - such a transcendental viewpoint was never available anyway. (As Sider notes (draft), even metaphysicians cannot know everything.) The possibility of multiple, fully elaborated and epistemically adequate metaphysical systems represents, then, a limit to realist metaphysical enquiry - but one that it would be a significant achievement to reach.

Conclusion

In the introduction to this thesis, I set out a main claim, and a fallback claim, that I would aim to defend. The main claim was that dimensionism is the best ontology to adopt in relation to issues pertaining to the metaphysics of properties. The fallback was that dimensionism is, at the very least, a challenging and worthwhile competitor that offers a fruitful alternative to its more familiar, established rivals. The reader who has read the thesis, and not skipped here directly, should now have a much fuller sense of what is meant by these claims, and why I have taken the trouble to defend them.

I offer no further arguments for either claim in this concluding part of the thesis. This conclusion will not be, in any sense, a last-ditch attempt to persuade the reader of anything that I have already said. Rather, I will use this concluding space for two ends. First, I will *conclude*: I will draw together some of the main take-home messages from the arguments of the thesis. Second, I will look forward to *prospective* areas of work that arise from the discussions of previous chapters.

The obvious place to begin, for take-home messages, is the category of *dimensions* itself. I have defended *dimensionism*, which sets that category into a particular ontological theory. I have defended it, in part because I think it is the *best* dimension-based ontology, and also in part because it is *minimal.* I have aimed to showcase the explanatory work that dimensions can do, with the least possible help from other categories of being. But dimensionism is not the *only* ontology in which a category of dimensions might be set. My discussion will, I hope, have highlighted dimensions - and the distinctive *factored*

determination relationships that accompany them - as a rich explanatory *resource* for ontological theories other than my own.

Relatedly, I hope to have shown that *respect structure* deserves a focal position in ontological theorising. The notion of respect structure has, I suggest, been obscured from mainstream discussion by a confluence of factors, not least the three interrelated assumptions that respect structure can be entirely and *straightforwardly* captured in terms of determinable-determinate structure, that determinable-determinate structure is an ontologically uniform structure that relates *properties,* and that respect structures can be straightforwardly be accounted for in terms of relationships between properties. This thesis has challenged that standard paradigm about respect structure. I have argued that respect structure is not as easy to obscure as it is widely taken to be, and that giving it a focal role brings a rich and distinctive range of fresh ontological resources to light.

I have argued, moreover, that these fresh resources lead to challenges and surprises for a number of widespread assumptions in a range of discussions in metaphysics.

In relation to discussions of determinable-determinate structure, dimensionism entirely overturns the standard assumption that determinable-determinate hierarchies are *ontologically uniform*. In doing this, it takes up a theme that has become increasing prominent in recent discussion (especially in connection with Wilson 2012), that determinables *need not always* be ontologically posterior to their associated determinates. It takes up that theme, and takes it further: the fundamental entities - objects and dimensions - sit at the two *extremes* of a determinable-determinate hierarchy. Properties -

insofar as they enter into the picture at all - are introduced *between* these extremes in a way that shows them to be derivative from *resemblance structure*.

In relation to the problem of universals, I have presented first an answer to Campbell's B-question (about *shared* properties), and only then an answer to the A-question (about the individual possession of properties).[333] My account here is distinctive in its use of a Fregean-style abstraction principle for properties, but even more so in eschewing any use of a notion of *imperfect resemblance*. In doing this, I have avoided commitment to the claim that resemblance is *by degrees*. I have, moreover, avoided claiming either that *overall resemblance* (as employed by Rodriguez-Pereyra - see Chapter 6) is a primitive and unanalysable notion, or that *resemblance in a respect* is (as Funkhouser (2014:64) suggests). For this reason, my proposed view is not merely an improvement over resemblance that trades parsimony of one sort (the avoidance of modal realism) for parsimony of another sort (a further category of dimensions), as I have argued in Chapter 6.

In relation to instantiation structure, I have argued against the commonly held view that instantiation structures are binary, copular structures. I have argued, instead, that they are ternary *determination* structures. On this point, I have argued that dimensionism captures the common thread that runs, in the background, through various ontologies based on *facts*. I hope that dimensionism may, then, provide some much-needed clarity about what many fact ontologies are aiming at.

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[333] I have offered a conception of objects as qualitatively thick, but in saying that objects *possess properties*, I mean something further: the *explanandum* in that case is an object's possession of the sort of thing that is generated by an answer to the B-question - its possession, singly, of a property that it *has in common* with other objects.

In relation to nomic (recall, law*like*[334]) governance, I have defended a dimensionist account of governance that is structurally similar to Armstrong's and Lowe's accounts, but which, unlike theirs, follows Tugby (2016) in rejecting a principle of instantiation - albeit for dimensions, not universals. Thus, my view qualifies as a kind of Platonism - but not of a *strong* sort. My view does not entail that dimensions are *necessary* beings, or that they inhabit some transcendent domain. My view differs from more standard varieties of Platonism in that I am not a Platonist about *properties*, standardly conceived, but *dimensions*. This avoids, I suggest, some of the *sheer implausibility* attached to believing in an abundance of Platonic *determinate* properties.[335]

In addition to my discussion of dimensionism itself, in Chapter 7 I have set out the metametaphysical framework that I call *immersive realism*. I have tried to show, there, that the outlooks of Ted Sider and Jonathan Lowe may be understood as *complementary* and *mutually supportive* rather than as competing. Moreover, I have argued that the resulting, staunchly *realist* outlook may, despite its realism, borrow a great amount from the pragmatically oriented view of Hasok Chang. While this combination of ideas risks offending the sensibilities of both realists and pragmatists, I have argued that realist commitments stand to *benefit from*, and are not compromised by, the use of pragmatist resources.

Finally, the work of W.E. Johnson - in particular, his discussion of determinables - has featured prominently in much of this thesis. Although the dimensionist ontology that I have

[334] I have not defended my account as an account of *laws*, but the account that I have offered stands well, in any case, to be an account of *functional* laws.

[335] That is, of course, *if* one thinks that such an abundance *is* implausible.

advanced here is my own, the core notion of a dimension - as I have argued in Chapter 2 - is much closer to Johnson's own discussion than standard readings of Johnson might suggest. This is not to say that Johnson held, implicitly, any commitment to dimensions as I have conceived them.[336] But it is to highlight the richness of Johnson's discussion from an ontological point of view.

That concludes the retrospective part of the present discussion. From here on, I turn to some directions for further, prospective research, that have arisen from the discussions of this thesis. I will not aim, of course, to be exhaustive, and I will ignore cases that involve 'merely' filling in a detailed account where I have given a sketch, such as the account of mid-level determinates in Chapter 3. I will briefly focus on seven directions for further research.

First, and most obviously, there are questions of what parallels to my dimensionist proposal may be found at other times and in other philosophical traditions. I have mentioned Johnson's work (especially in Chapters 2 and 4) as a likely precursor, but I simply have not looked further afield. One obvious starting point for such enquiry is Descartes, whose argument for a real mind-body distinction has some dimensionist resonances (see Hawthorne 2007).

Second, there are questions of how dimensionism relates to topics in the philosophy of science. In Chapter 5, I offered an account of governance which I said *could* be construed as an account of governance by laws. Much more work is needed here, in relation to the

[336] In any case, my notion was not *based* on a close reading of Johnson: see the Acknowledgements section of this thesis.

literature on laws.[337] An important assumption, in this connection, is that dimensions are closely related to *magnitudes*. This is an assumption that I have made throughout the thesis - for example, in offering *mass* and *charge* as examples of dimensions[338] - and is a core reason for my choice of the term 'dimension' in the first place. I have *assumed* that every magnitude is a dimension (though not every dimension is a magnitude), but this assumption would need to be supported in detail. A further thing to pursue, in this area, would be an account of the metaphysics of *measurement*.

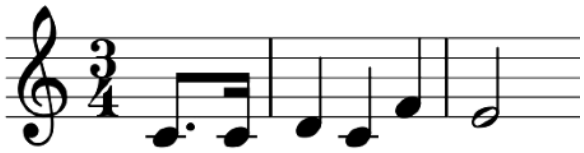
Third, the treatment of universals offered in Chapter 3 stands for extension in a range of directions. One such direction is that of *kinds*. Questions in this area have been discussed by Funkhouser (2014) and Gärdenfors (2000, 2014), and it is an open question how easily dimensionism - which cannot straightforwardly draw on the notion of a *region* of quality space - might avail itself of the sorts of approaches developed there. For simplicity's sake, I have kept out of view, throughout the thesis, the thought that some dimensions may be more ontologically basic than others. This is not to say that the category of *dimensions* is not a fundamental category, but that its members may admit of some *further* priority ordering that cuts across the priority ordering of categories. It is quite easy to suppose, however, that some dimensions may be *mind-dependent*, or *projectively related* to (and in that sense, dependent upon) other dimensions. I have not discussed these possible further

[337] And not only in relation to the obvious nomic realist positions. The outlook presented in Chapter 7, for example, arguably lends itself well to a meta-theoretic conception of laws, along the lines of Roberts (2008). Further details also remain to be spelled out - for example, in connection to the possible account of *ceteris paribus* laws mentioned in Chapter 5. Much work will also need to be done, in particular, on the way in which *quantities* feature in laws. See Sider (forthcoming, Chapters 2 and 3 for discussion).

[338] Alongside examples like *colour* and *shape*. This issue of naturalness remains an open question, as I mentioned in the Introduction. As I mentioned there, a further discussion worth having is whether dimensionism has distinctive resources for answering it.

resources in this thesis. Accordingly, I have left as an open question whether these resources might enable dimensionism to supply an ontological framework for understanding *social* kinds, or *chemical* or *biological* kinds.

Fourth, I have not discussed how dimensionism - in particular, the notion of a determination structure as opposed to an instantiation structure, and the operational angle on that notion suggested in Chapter 7 - might pan out in relation to issues of *perception* and *time*. One might wonder, for example, how actual *operations* of determination are realised perceptually and cognitively, and how they take place over time. An example here will illustrate the kind of thing I have in mind. Consider the following snippet from a familiar tune:



It is sometimes said, in discussions of musical experience, that one's experience of earlier notes may *colour* one's experience of later ones.[339] For example, the brevity of the second C in our snippet serves to emphasise the occurrence of the next note on the first beat of the bar. But it seems equally the case that later experience may retroactively colour earlier ones. The excerpt above provides two examples to consider.

Consider, first, the anacrusis. One's experiencing of the two notes that it comprises *as* an anacrusis depends, plausibly, upon one's *later* experiences of the beat falling on the D, and

[339] I owe this way of putting the point to a recent talk by Robin Le Poidevin ('What Was McTaggart's C-Series?', 11th September, 2017) at the conference 'Time in Twentieth and Twenty-First Century Philosophy', held at Durham University.

arguably, also again on the E. These later experiences of the *metric* features of the melody retroactively colour one's experience of the first two notes as an anacrusis.

Consider, second, the last minim in our phrase. Suppose that we are dealing with a bare melody up to that point, and consider different harmonies that one might introduce there. Consider, in particular, the effect of writing, under the E, a C major chord on the one hand, and a C minor chord on the other (both in first inversion, and flattening the E accordingly). It is very plausible to say that these harmonies fix not only the key of the chord itself, but of the whole phrase - and not only the key, but the *mood* of the phrase. What one writes 'vertically' under the E, again, retroactively determines both the key and the mood of the whole phrase that precedes it.[340]

It seems fair to say, then, that later experiences in such cases are colouring earlier ones - but how? One might have independent reservations about reaching for *backward causation* here. Dimensionism, however, has a ready answer - drawing on the operationalised notion of determination - that I will sketch here.

My proposed answer draws on a notion that has appeared at various points in the thesis: the notion of a *determination profile.* To briefly recap: the idea is that various *kinds* of object can be individuated by the sets of dimensions that they essentially determine. Thus, as Wittgenstein (*TLP* 2.0131) reminds us, a speck must have *some* colour, an object of touch must have *some* degree of hardness, and - lo - *musical notes must have some pitch*.

[340] From the point of view of music theory, this is arguably a bit simplified. But I doubt that it is very much simplified from the point of view of musical *experience*, at least for most.

Wittgenstein's point here might be generalised beyond notes to other musical objects, such as - in our present case - *melodies*. Now, among the dimensions that any melody will determine, by virtue of its being a melody, are *key*, *mood*, and *metre*.[341] My proposal is that one may experience a melody *as* a melody will be an experience of something *as having* a key, a mood, and a metre - but that one may have such an experience that *precedes* any experience of a *determinate* key, mood, or metre.[342]

To go further than these bare bones of a proposal would exceed the scope of this (after all, concluding) discussion. The account that I am gesturing at here is not strictly and rigidly tied to dimensionism: it neither entails, nor is entailed by, my dimensionist ontology. But it is the sort of account that one might *expect* to give, if dimensionism is true. Moreover, I suggest that the structural parallels between a dimensionist *ontology,* and the account suggested here of retroactive colouring in musical *experience*, may provide a fruitful avenue of investigation in relation to issues pertaining to the *cognitive penetration* of perceptual experience, especially in connection with *veridicality*.

Fifth, the fourfold conception of objects that I offered in Chapter 1 - in which the notion of a *determination profile* plays a crucial role - raises questions of its own. One question worth exploring is whether the notion of a determination profile can shed any light on issues pertaining to *material constitution.* A further question is whether that same notion might offer a way to make sense of the individual necessitation relationships that are

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[341] At least, this is true in certain musical traditions and up to a certain point in history. Since these points threaten to greatly complicate things, I will ignore them here.

[342] This proposal echoes proposals by Stazicker (2011) concerning visual experience, and Wilson (2013) concerning the open future.

supposed to hold together the nuclei of Simons' (1994a) trope bundles.[343] Moreover, while I have discussed the abstraction of properties, the abstraction of *objects* is something that I have left undiscussed in this thesis. However, it is a theme touched on by Hawthorne (2007) in relation to Cartesian substance dualism, in a way that draws on similar ideas to those that I have proposed.

Sixth, in this thesis I have avoided engaging, in any involved way, with certain further fields of enquiry. In particular, I have avoided discussing dimensionism in an involved way in relation to *quantum mechanics*, and in relation to *theism*. In part, this is due to my ignorance - especially in relation to quantum mechanics. Each of these connections raises further questions, and standards for adequacy, that dimensionism should aspire to meet. I have argued elsewhere[344] that dimensionism offers a way to defend the Doctrine of Divine Simplicity while rejecting the so-called 'Identity Thesis' - that God is identical with His attributes. These are trajectories of enquiry that I hope will be taken up further.

Seventh, and lastly, the outlook advanced in Chapter 7 is one that stands to be developed into a project in its own right. Such a project would have to be brought into closer engagement with the mainstream literature in contemporary metametaphysics. It would also need to be substantiated, to some degree, by some *case studies* that illustrate, in real metaphysical enquiry, the sort of iterative enquiry that my proposal recommends.

More could also be said, in this connection, about certain components within the proposed view. Let me mention two.

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[343] This would, of course, involve a different set of commitments from Simons' own, but I suggest that the view may be worth exploring.

[344] 'God and Other Things', a conference paper delivered at Tyndale House, Cambridge, June 2017.

First, I have said relatively little *explicitly* in this thesis about how my use of the notions of *explanandum* and *explanans* roles relate to the framework of Chapter 7. I have assumed, throughout the thesis, that *explanandum* and *explanans* roles involve *real* explanatory relationships, where the targets for explanation are the world's either *having,* or *appearing* to have, the structures that occupy *explanandum* roles. However, the notion of a *role* suggests the possibility of a further, distinct understanding of these roles as *metatheoretic,* in the sense discussed by Roberts (2008). I leave it an open question how such an account of *explanandum* and *explanans* roles can be adumbrated in a way that preserves the fundamentally realist commitments of this thesis.

Second, an outlook that gives a central role to *epistemic activities*, as mine does, faces a set of questions about the possibility of an *alternative* set of epistemic activities, especially where the *adoption* of such a set of activities may face in-principle problems.[345] How might such a plurality of epistemic activities be squared with a *realist* understanding of the deliverances of metaphysical enquiry? The *immersive* part of immersive realism is intended to hold things together on this point. It will be the task of further work to deliver a detailed account of *how*.

This thesis has undertaken to advance a dimensionist ontology. A thesis of this nature could hardly aim to settle every question, as the preceding discussion in this Conclusion indicates. However, I hope that the arguments in this thesis have shown the dimensionist position to be an appealing one. I have tried, in this thesis, to show that dimensionism is a view that is distinctive and worth discussing, not only because of its intrinsic plausibility,

[345] I have in mind the sort of problem discussed by Padro (2015).

but also because of the challenges that it poses, in several areas, to widely held points of view. Chief among these has been the widespread assumption, in contemporary metaphysics, that *respect structure* - especially in relation to property structure - should be always the *explanandum* and never the *explanans*. I hope that this thesis has shown the fruitfulness of giving respect structure the respect that it deserves.

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