

# GROUND AND EXPLANATION

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*Forthcoming in the Routledge Handbook of Metaphysical Grounding, ed. Mike Raven. London: Routledge.*

Metaphysical ground, like other topics in philosophy, is the subject of intense disagreement. What is it? What principles govern it? How can we know anything about it? Controversy surrounds these and other questions about ground. But if there is one *uncontroversial* claim in this area, it is that ground is deeply linked with a certain form of explanation, what we will call *grounding explanation*. This link, and this form of explanation, are the subject of this chapter.

For its enthusiasts, grounding explanation is both ubiquitous in ordinary life and central to many of philosophy's biggest questions. In ordinary life, we offer grounding explanations of why this chess player is victorious (because her opponent's king is in checkmate), of why this coffee is hot (because its molecules have a high mean kinetic energy), or of why these two nations are at war (because they are bombing each other). And in philosophy, grounding explanation has been thought to be what is at issue when we ask whether this or that phenomenon 'reduces' to something else. Kit Fine, for instance, writes:

What is it to explain the appearance of a world with minds in terms of a mindless world or the appearance of a world with value in terms of a purely naturalistic world? My own view is that what is required is that we somehow *ground* all of the facts which appear to presuppose the reality of the mental or of value in terms of facts which do not presuppose their reality.<sup>1</sup>

This chapter surveys the philosophical literature on grounding explanation and its connection to metaphysical ground. I begin by discussing explanation in general (§1) before turning to grounding explanation in particular (§2). I then take up the question of whether and how this form of explanation relates to reality (§3). I turn finally to ground (§4).

## 1. EXPLANATION

In daily life, as well as in more theoretical pursuits, we seek and offer explanations of facts. Here are some examples, or potential examples, of explanation.

- (1) The window shattered because Suzy threw a rock at it.
- (2) Jones went to the post office in order to mail a package.
- (3) Since Meghan Markle is married to Prince Harry and Harry is the queen's grandson, Markle is a member of the royal family.
- (4) Billy's taunt hurt Jimmy's feelings and that's why it was wrong.
- (5) What explains why nothing has ever traveled faster than light is that the laws of nature prohibit that.

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<sup>1</sup>Fine (2012, 41).

- (6) The reason why Anaxagoras failed in his attempt to square the circle is that it is impossible to do that.
- (7) Arthritis is a disease of the joints and so no one can have arthritis in the thigh.

We should distinguish the *act* of explaining something from the *explanation* that such an act aims to convey.<sup>2</sup> For example, I might perform an act of explaining by saying to my friend, ‘The window shattered because Suzy threw a rock at it.’ The aim of this act is to convey to my friend a certain explanation—namely, that the window’s shattering is accounted for by Suzy’s throwing a rock at it. My main concern in this chapter will be explanations, not acts of explaining.

Which act conveys, or best conveys, a given explanation might be thought to be somehow relative. Suppose, for example, that someone asks me why I was late to the NYU colloquium. With some questioners, it might be enough to answer that I took the express train. But if my questioner is unfamiliar with New York’s subway system, this answer is liable to be puzzling: how could I be late on account of taking the *express* train? To remove this puzzlement, I will need to explain that although the express train is generally quicker than the local, it does not stop near NYU’s philosophy department and so I had to walk several blocks. One might take this to show that which act best conveys the explanation of my tardiness is relative to what my interlocutor knows and perhaps relative in other ways as well.

But even if this is right, it does not show that the explanations *conveyed* by such acts are relative. Even if which act best conveys an explanation depends on what certain people know or expect or find intelligible or care about, that does not show that what explains what depends on these things. Explanation *might* turn out to be a relative matter, but it might also be perfectly objective.<sup>3</sup>

We began this section with a list of examples. These examples show that the category of explanation is quite diverse. Some explanations, for instance, concern what causes what, while others do not.<sup>4</sup> But there are nonetheless certain features common to all explanations. Every explanation, for instance, has both a fact that is explained, called the explanandum, as well as one or more facts that do the explaining, called the explanans. Thus in the first example on the list, the explanandum is the fact that the window shattered, and the explanans is the fact that Suzy threw a rock at it. (Technically, the plural of ‘explanans’ is ‘explanantia’, but I will not use it, and at any rate I will mostly confine myself to cases in which the explanans consists of only one fact.)

Our concern in this section has been the explanation of one fact in terms of some other facts. There may be forms of explanation that involve things other than facts. Consider, for instance, Socrates’ singleton set. There is a sense in which we may explain what this object is by saying that it is the set whose sole member is

<sup>2</sup>This distinction is familiar from the literature on explanation in the philosophy of science, e.g. Bromberger (1965, 104) and Strevens (2008, 6–7). Although that literature has focused largely on causal explanation, many of the considerations raised there apply equally to grounding explanation. This literature, I believe, constitutes an invaluable resource for philosophers of ground that has only just begun to be exploited.

<sup>3</sup>Thompson (2016) and Dasgupta (2017) consider views on which grounding explanation possesses a kind of relativity.

<sup>4</sup>Some explanations, then, are *noncausal*. It is true that some philosophers, such as Lewis (1986), have held that the explanation of events is always causal. But this thesis is not so popular today, and even Lewis did not extend the thesis to explanation in general.

Socrates. One might view this as an explanation, not of a fact, but of an object.<sup>5</sup> In this chapter, however, we will set such ‘nonfactual’ forms of explanation aside.

## 2. GROUNDING EXPLANATION

The focus of this chapter is a particular form of explanation which we will call *grounding explanation*. Some potential examples of grounding explanation were given in the chapter’s introduction; here are a few more.

- (1) What makes it the case that the Golden Gate Bridge is red is that it is this particular vermilion shade.
- (2) Bowser is big and Bowser is bad, and that’s why Bowser is big-and-bad.
- (3) Since Socrates is a philosopher, there is someone who is a philosopher.
- (4) Because snow is white, it is true that snow is white.
- (5) The reason why this figure is a regular pentagon is that it has five sides of equal length and five angles of equal measure.
- (6) There is a table here in virtue of there being wood arranged here in a certain ‘tablewise’ way.
- (7) There is a hole in this piece of paper because it is perforated.

Like the category of explanation in general, the category of grounding explanation displays considerable diversity. There are explanations which are logical in character, explanations concerning the relationship between determinates and determinables, explanations involving parts and wholes, explanations involving the dependence of what is true on what the world is like, and still others besides.

Despite this diversity, however, philosophers have tended to think there are certain claims that hold of grounding explanation in general. Some of these they have taken to follow simply from the fact that grounding explanation is a form of explanation. For example, explanation of *any* form is irreflexive, antisymmetric, and transitive, and so grounding explanation must be irreflexive, antisymmetric, and transitive as well.<sup>6</sup> And in a grounding explanation, as in any explanation, the explanans must be relevant to the explanandum. This entails, among other things, that if *A* has a grounding explanation in terms of *B*, then *A* will not in general have a grounding explanation in terms of *B* together with some arbitrary additional fact.

If these claims hold of grounding explanation in general, then this category has at least a certain ‘formal’ kind of unity. But philosophers have taken the category of grounding explanation to be unified in other ways as well.<sup>7</sup> For example, many have thought that grounding explanation can be characterized in general as that form of explanation in which we explain some fact by citing other facts that ‘constitute’ it.<sup>8</sup> The fact that the Golden Gate Bridge is red, for instance, is constituted by the fact

<sup>5</sup>Compare Fine (2015, 297).

<sup>6</sup>These properties are defined as follows. Irreflexivity: nothing has a grounding explanation in terms of itself. Antisymmetry: if *A* has a grounding explanation in terms of *B*, then *B* has no grounding explanation in terms of *A*. Transitivity: if *A* has a grounding explanation in terms of *B*, and *B* has a grounding explanation in terms of *C*, then *A* has a grounding explanation in terms of *C*. Irreflexivity has been challenged by Jenkins (2011) and Wilson (2014), asymmetry by Wilson (2014), and transitivity by Schaffer (2012). I discuss Schaffer’s challenge further below; for discussion of related issues see Naomi Thompson’s contribution to this handbook.

<sup>7</sup>Not all philosophers have taken grounding explanation to be unified; skeptics about unity include Wilson (2014, 2016) and Koslicki (2015). See Koslicki’s and deRosset’s contributions to this handbook for further discussion of this issue.

<sup>8</sup>Dasgupta (2017), for instance, offers such a characterization. I hasten to add that some philosophers, such as Audi (2012, 709), disagree with the constitutive characterization.

that it is vermilion. Or again, perhaps the existence of this table is constituted by the tablewise arrangement of certain pieces of wood.

But even if this constitutive characterization is correct, is it illuminating? Do we have a good grasp of the notion of constitution?

It is at least clear that constitution is different from causation. The constitutive relationship between the Golden Gate Bridge's being vermilion and its being red is different from the causal relationship between Suzy's throw and the window's shattering. But beyond this contrast with causation, how is the notion of constitution to be understood?

One option is to understand it as simply a form of identity. On this understanding, the constitutive characterization of grounding explanation requires the explanans and explanandum of such an explanation to be identical. However, most philosophers have thought that these must be distinct, and so they have tried to spell out the constitutive characterization in other ways.<sup>9</sup> Fine, for instance, gives the following gloss:

[I]t is natural in such cases to say that the explanans or explanantia are constitutive of the explanandum, or that the explanandum's holding consists in nothing more than the obtaining of the explanans or explanantia.<sup>10</sup>

And in a similar vein, Rosen writes:

Metaphysical grounding is often distinguished from other explanatory relations by the metaphorical thought that the grounded fact is 'nothing over and above' the facts that ground it; that it is not really a 'further fact' or an 'addition to reality'.<sup>11</sup>

Fine's and Rosen's glosses suggest a broadly 'lightweight' conception of constitution. Although the explanans of a grounding explanation is not strictly identical to the explanandum, the difference between them is somehow insubstantial.

But other philosophers have glossed the notion differently. According to Schaffer, for instance, claims of grounding explanation 'have the feel of concerning the constitutive generation of a dependent outcome'.<sup>12</sup> Does Schaffer's talk of 'generation' mean he rejects the idea that the explanandum of a grounding explanation is no addition to reality? Is his conception of constitution more 'heavyweight' than that of Fine and Rosen? It is not clear. Whether these different glosses reflect genuinely different conceptions of grounding explanation, and if so, whether this difference can be stated precisely, remains a matter for further research.

Philosophers have offered other characterizations of grounding explanation that do not involve the notion of constitution, but these are more controversial. For example, it is sometimes suggested that a grounding explanation is one in which the explanans and explanandum are connected as a matter of metaphysical necessity: necessarily, if the explanans obtains, so does the explanandum. But this is

<sup>9</sup>Jenkins (2011) and Wilson (2014) have suggested that there may be certain grounding explanations in which the explanans and explanandum are identical. But even if this is so, there will presumably be other grounding explanations in which the explanans and explanandum are distinct. For example, the fact that the Golden Gate Bridge is red can be given a grounding explanation in terms of the distinct fact that it is vermilion. Thus if grounding explanation is to be characterized in terms of constitution, the latter cannot be understood as a form of identity.

<sup>10</sup>Fine (2012, 39).

<sup>11</sup>Rosen (2017, 280).

<sup>12</sup>Schaffer (2017, 303).

not universally accepted.<sup>13</sup> And there may be other forms of explanation, such as mathematical explanation, that also obey this condition.<sup>14</sup> Or again, it is sometimes suggested that a grounding explanation is one that is not diachronic. But mathematical explanation is non-diachronic as well, and it may even be that certain grounding explanations *are* diachronic.<sup>15</sup>

One also sees grounding explanation characterized simply as ‘metaphysical’ explanation. Sometimes this is just a matter of terminology: some authors use the phrase ‘metaphysical explanation’ to mean grounding explanation.<sup>16</sup> But in some cases it may be more than merely terminological, since it may stem from an assumption that grounding explanation is the only distinctively metaphysical form of explanation. This assumption is controversial. One might think, for instance, that if something is a certain way by its very nature, then this explains why it is that way,<sup>17</sup> and this might be thought to be a metaphysical explanation that is not a grounding explanation.<sup>18</sup> Or one might think that if something *must* be true, then this explains why it *is* true,<sup>19</sup> and perhaps this too is a metaphysical explanation that is not a grounding explanation.

### 3. THE QUESTION OF REALISM

Given any form of explanation, whether it is grounding explanation or some other form, we may ask how it relates to reality. To see what I mean by this, let us look at a passage from Carl Hempel, one of the most important theorists of *scientific* explanation. Describing his influential deductive–nomological account of such explanation, Hempel wrote:

[A] D-N explanation answers the question ‘*Why* did the explanandum-phenomenon occur?’ by showing that the phenomenon resulted from certain particular circumstances, specified in  $C_1, C_2, \dots, C_k$ , in accordance with the laws  $L_1, L_2, \dots, L_r$ . By pointing this out, the argument shows that, given the particular circumstances and the laws in question, the occurrence of the phenomenon *was to be expected* . . .<sup>20</sup>

There are in fact two opposing views of explanation suggested by this rich passage.

The first is realism.<sup>21</sup> On this view, explanation is ‘backed’ by real or worldly determination. Something in the world makes something else exist or happen (or

<sup>13</sup>Leuenberger (2014) and Skiles (2015) are notable opponents of this thesis. For further discussion see Skiles’s contribution to this handbook.

<sup>14</sup>Steiner (1978) is a classic discussion of mathematical explanation.

<sup>15</sup>Rosen (2017, 280), for instance, considers the fact that a given utterance of ‘arthritis’ means *arthritis*, and he suggests that the grounding explanation of this fact will appeal to facts about the behavior of speakers at various times.

<sup>16</sup>I myself did this in Glazier (2016).

<sup>17</sup>Kment (2014, 163).

<sup>18</sup>Glazier (2017).

<sup>19</sup>Thus van Inwagen (1996, 95) writes, ‘If showing that it is impossible for a certain state of affairs to obtain doesn’t count as answering the question why that state of affairs does not obtain, I don’t know what would count.’

<sup>20</sup>Hempel (1965, 337).

<sup>21</sup>This explanatory notion of realism is discussed by Kim (1988, 1994), Ruben (1990, ch. 7), and Taylor (2017), among others. It should be distinguished (despite this section’s winking title) from the metaphysical notion of realism discussed in Fine (2001), although the two are not wholly unrelated. For further discussion of metaphysical realism see Olla Solomyak’s contribution to this handbook.

one thing ‘results’ from another, as Hempel puts it) and this determination or making underwrites an explanation of whatever it is that is determined or made. For example, if the shattering of this window is causally explained by Suzy’s throwing a rock at it, a realist about causal explanation will take this explanation to be backed by some form of real determination, perhaps the fact that Suzy’s throw *made* the window shatter.

On the antirealist view, by contrast, explanation is not backed by determination. It is not possible to say much more than this about antirealism in general, for there are many different versions of the view with little to unite them apart from their rejection of realism. On one version of antirealism, suggested by the passage from Hempel, explanation is simply a matter of expectability. One fact explains another just in case, given the first, the second is to be expected. Another version of antirealism is ‘unificationist’: *A* explains *B* just in case there is a deductive argument from *A* to *B* that fits into a pattern of arguments that best unifies or systematizes the facts.<sup>22</sup> A third version is ‘pragmatic’, rendering explanation a contextually sensitive matter.<sup>23</sup> The commitment common to these and other antirealist views is simply that explanation is not backed by real determination. (The antirealist may allow, of course, that the explanans and explanandum of an explanation are themselves perfectly real.)

Just as there are realist and antirealist views of scientific explanation, so there are realist and antirealist views of grounding explanation. But in the case of grounding explanation, antirealist views have so far seen little discussion. On one such view, grounding explanations hold in virtue of psychological dispositions.<sup>24</sup> (In calling this view antirealist, I do not mean to suggest that psychological facts are unreal. The view is antirealist because psychological facts, even if they are real, are not standardly taken to constitute a form of determination.) Another version of antirealism is unificationist.<sup>25</sup> And it is perhaps also possible to develop a pragmatic view of grounding explanation. What other antirealist views there might be is a matter for further research.

In light of the relatively undeveloped state of antirealism, let us turn now to realism. On one popular realist view, grounding explanations are backed by determination relations of a certain sort, what might be termed relations of constitutive generation or production.<sup>26</sup>

But what do these generation relations *relate*? Defenders of this relationalist form of realism differ on this question. Some, for instance, take generation relations to hold between properties: vermilionness generates redness. Others take the relations to hold between facts: the fact that snow is white generates the fact that it is *true* that snow is white. Still others think that generation relations can hold between entities of any category—between one object and another object, or between

<sup>22</sup>Kitcher (1981) gives an influential unificationist account of scientific explanation.

<sup>23</sup>Van Fraassen (1980) and Achinstein (1984) develop pragmatic views of scientific explanation, though their focus is perhaps on acts of explaining as opposed to explanations themselves.

<sup>24</sup>Miller and Norton (2017, n. 8).

<sup>25</sup>Dasgupta (2017, 80–1); Kovacs (2017, 2942).

<sup>26</sup>Versions of this view are discussed in Audi (2012), deRosset (2013), Schaffer (2016), Dasgupta (2017, 80–1) and Kovacs (2017, 2935–46). Such determination relations are often called relations of ground, but I wish to leave discussion of ground, and of the term ‘ground’, until the final section.

a fact and a property, and so on. It might be thought, for instance, that Socrates generates his singleton set.<sup>27</sup>

These generation relations, according to the relationalist realist, back grounding explanations. But this view raises two questions. First, what *is* backing? Second, which generation relations back which grounding explanations? (Analogous questions apply to the other forms of realism we will discuss, though we will not address them.)

Let us take the first question first. One possibility is to understand backing itself in terms of explanation. For a grounding explanation to be backed by generation relations, on this view, is simply for it to be explained in some way by those relations.<sup>28</sup> Another possibility is to take backing to be a matter of information content. On this view, a grounding explanation is backed by generation relations in the sense that it contains information about generation relations.<sup>29</sup> Yet a third possibility is to understand backing in terms of mereological or part-whole relations. Suppose one takes an explanation to be a complex whose parts are an explanans, an explanandum, and some generation relations that serve to connect the two. Given this view of explanation, one might then say that an explanation is backed by those generation relations that are parts of it.

What about the second question? Which generation relations back which grounding explanations? The answer to this question depends in part on what these relations relate. Do they relate facts? Properties? Entities of arbitrary category? If the relata are facts, then a simple answer to our second question is available: the grounding explanation of one fact *A* in terms of another fact *B* is always backed by *A*'s being generated by *B*, and conversely, *A*'s being generated by *B* always backs a grounding explanation of *A* in terms of *B*.<sup>30</sup> (Matters are less clear if the relata are something other than facts. If Socrates generates singleton Socrates, for example, exactly which grounding explanations does this back?)

The simple answer faces an objection from a case due to Jonathan Schaffer. To understand the objection, notice that the generation relation, whatever it is, is naturally taken to be transitive. If the fact that *A* generates the fact that *B*, and the fact that *B* in turn generates the fact that *C*, then it is natural to think that the fact that *A* will generate the fact that *C*. And grounding explanation, according to the simple answer, corresponds one-to-one with generation. So since the latter is transitive, the former must be too.

Yet Schaffer presents a case in which grounding explanation might be thought *not* to be transitive. The case concerns a sphere with a small dent. That the sphere has this particular dent, he suggests, in part explains why it has the exact overall shape that it does—namely, dented here and spherical everywhere else. And that it has that exact overall shape in turn explains why it is more-or-less spherical. Yet it may seem that the sphere's having this particular dent does not explain, even in

<sup>27</sup>On a related realist view, the facts that back grounding explanations are properly stated by means of a sentential operator rather than (as we have done) by means of a predicate. The distinction between these two forms of realism is related to the distinction between the operational and predicational views of ground. See the introduction to this handbook for further discussion.

<sup>28</sup>Compare Kovacs (2017, 2934).

<sup>29</sup>This view requires an explanation to be something that can contain information—i.e., something like a proposition. Lewis (1986) defends a propositional view of causal explanation.

<sup>30</sup>This answer must be generalized to accommodate cases in which one fact is explained in terms of a plurality of facts. I will suppress this and related complications.

part, why it is more-or-less spherical. For as Schaffer observes, ‘the presence of the dent makes no difference to the more-or-less sphericity of the thing.’<sup>31</sup>

One response on behalf of the simple answer is this. Distinguish an immediate or direct form of generation, which is not transitive, from a mediate or indirect form, which is.<sup>32</sup> Just as one gets a relation of ancestorship by chaining together parent-child relations, so one gets a relation of mediate generation by chaining together relations of immediate generation. Now say that what backs grounding explanation is *immediate* generation. This would accommodate Schaffer’s case, for now neither grounding explanation *nor* generation is transitive.

But this response goes too far. Even if grounding explanation is not transitive in general, there are surely many cases in which chaining occurs. For example, because the Golden Gate Bridge’s being vermilion explains its being red, and because its being red in turn explains its being colored, it follows that its being vermilion explains its being colored. But there is no reason to think that the bridge’s being vermilion immediately (as opposed to mediately) generates its being colored. This response to the simple answer, then, has difficulty accommodating such cases.

Should this answer therefore be abandoned? Stephan Krämer and Stefan Roski have recently argued that it should.<sup>33</sup> On their view, in order for a fact *A* to explain another fact *B*, *A* must not only generate *B* but must also *make a difference* to whether *B* obtains. This difference-making requirement means that grounding explanation need not correspond one-to-one with generation, and so even if the latter is transitive, the former need not be. For Krämer and Roski, Schaffer’s dented sphere is a case of generation without difference-making—and so of generation without explanation.

There may, of course, be competitors to the simple answer other than the kind of difference-making answer that is suggested by Krämer and Roski’s argument. In fact, these answers may not even be in competition. One might admit multiple notions of grounding explanation, each of which obeys a different answer to the question of which generation relations back which explanations. Perhaps one notion of explanation obeys the simple answer, while another obeys the difference-making answer, so that there is no need to choose between them.

Let us now turn to a second form of grounding-explanatory realism, which we will call ‘nomicist’. For the nomicist realist, grounding explanations are backed by laws of metaphysics.<sup>34</sup> Laws of *nature* are familiar: it is a law of nature, for example, that like charges repel. But some philosophers have also recognized the existence of laws of *metaphysics*. One might take it to be a law of metaphysics, for instance, that everything vermilion is red. Suppose now that one explains why the Golden Gate Bridge is red by saying that it is vermilion. The nomicist realist can take this explanation to be backed by the law that everything vermilion is red.

Views of laws of *nature* are standardly classed as Humean or anti-Humean. On Humean views, the laws are mere summaries of independently existing regularities

<sup>31</sup>Schaffer (2012, 127). Schaffer’s response to the problem is to take both generation and grounding explanation to be contrastive. So understood, he argues, both can be seen to be transitive after all. I will not discuss this response here.

<sup>32</sup>For further discussion of the mediate/immediate distinction see the introduction to this handbook.

<sup>33</sup>Krämer and Roski (2017). Their view builds on Strevens’s (2008) account of scientific explanation.

<sup>34</sup>Laws of metaphysics have been discussed by Rosen (2006), Sider (2011, 274–80), Wilsch (2015a, 2015b), Glazier (2016), and Schaffer (2017), among others. See Wilsch’s contribution to this handbook for further discussion.

in nature. On anti-Humean views, by contrast, the laws play an active role in determining the course of events or in making events happen. Maudlin describes this sort of nomic determination this way: ‘The universe started out in some particular initial state. The laws of temporal evolution operate, whether deterministically or stochastically, from that initial state to generate or produce later states.’<sup>35</sup>

The distinction between Humean and anti-Humean views of laws of nature is familiar. Far less familiar is an analogous distinction between Humean and anti-Humean views of laws of *metaphysics*.<sup>36</sup> On Humean views, laws of metaphysics are mere summaries of independently existing regularities in the facts, such as the correlation between vermilionness and redness. On anti-Humean views, by contrast, the laws play an active role in determining the facts or in making the facts obtain.

An anti-Humean view appears inevitable once one adopts the nomicist form of realism. A realist, after all, is someone who takes grounding explanations to be backed by real determination. But Humean laws do not determine the facts; they merely summarize them. Only anti-Humean laws provide the kind of determination or ‘making’ that realist explanation requires.

Turning now to a third realist view, the *essentialist* realist takes grounding explanation to be backed by the essences or natures of things.<sup>37</sup> Suppose, for example, that one explains why singleton Socrates exists by pointing to the existence of Socrates himself. One might then take this explanation to be backed by the fact that singleton Socrates is essentially the set whose sole member is Socrates.

But will this kind of essentialist backing be available in every case? A number of philosophers have explored views on which the answer is ‘yes’. On these views, whenever there is a grounding explanation of *A* in terms of *B*, there will be some items involved in *A* or *B* (or both) whose essences require there to be some kind of link between *A* and *B*.<sup>38</sup> A defender of the essentialist form of realism might take grounding explanations to be backed by these links.

The most developed version of essentialist realism, due to Kelly Trogon, is inspired by the mechanistic view of causal explanation.<sup>39</sup> That view takes causal explanation to be backed by causal mechanisms, understood as complex systems or as physical processes. In an analogous way, Trogon takes grounding explanation to be backed by what he calls *grounding mechanisms*: relations whose essences require certain determination relations to obtain. Set formation, the relation holding between a set and its members, provides a good illustration. For Trogon, it is essential to this relation that, if some objects exist, then their existence determines or makes it the case that a *set* exists that contains exactly those objects. Set formation, then, turns out to be a grounding mechanism. As such, it backs various grounding explanations, such as the explanation of the existence of singleton Socrates in terms of the existence of Socrates himself.

We have now considered three broad kinds of grounding-explanatory realism: relationalism, nomicism and essentialism. We should bear in mind that these may not be exclusive, for some may turn out to reduce to or be otherwise compatible

<sup>35</sup>Maudlin (2007, 174).

<sup>36</sup>It is briefly discussed in Wilsch (2015b, 3306–7).

<sup>37</sup>Much of the contemporary discussion of essence stems from Fine (1994).

<sup>38</sup>Rosen (2010) and Fine (2012) develop views of this kind; see also Dasgupta (2014b).

<sup>39</sup>Trogon (2018).

with others. Nor are they necessarily exhaustive, for there are further realist views that we have not yet considered.

One such view is primitivist. The realist views considered above are all committed to the claim that what backs a given explanation is something other than that very explanation. But this might not be true. Perhaps grounding explanation need not be backed by some distinct, underlying form of determination. Perhaps it is *itself* a form of determination. (Objection: this is no longer realism, since by definition realism requires grounding explanations to be backed by real determination. Reply on behalf of the primitivist realist: grounding explanations can be backed by themselves.)<sup>40</sup>

It may even be possible to hold a ‘semiprimitivist’ form of realism along the following lines. Some, even most, grounding explanations are backed by a distinct form of determination: generation relations, laws of metaphysics, or whatever you like. But certain grounding explanations are, in primitivist realist fashion, backed by themselves.

One potential motivation for semiprimitivist realism arises from logical grounding explanations. One can give a grounding explanation of why Bowser is big and bad by saying that he is big and he is bad. But some philosophers have thought it impossible to understand this case, and other cases of logical grounding explanation, on the nonprimitivist realist model. Even if one is willing to say that *many* grounding explanations are backed by a distinct, underlying form of determination, how could this be true of the logical cases? What could possibly underlie them? To such philosophers, these cases have seemed to involve utterly basic explanatory relationships. These considerations might move one to adopt a version of semiprimitivist realism. Thus one might hold that while nonlogical grounding explanations are backed by a distinct form of determination, logical grounding explanations are backed by themselves.<sup>41</sup>

#### 4. GROUNDING EXPLANATION AND GROUND

Grounding explanation, at least by that name, has seen far less discussion than something called ‘ground’. But what is ground, and what does it have to do with grounding explanation?

These questions are ambiguous, because philosophers have used the term ‘ground’ in two different ways. Some have used it simply to mean grounding explanation.<sup>42</sup> On this usage, to say that *A* grounds *B* is simply to say that *A* provides a grounding explanation of *B*. But other philosophers have used ‘ground’ in a different way, to mean a relation of constitutive determination, or generation, or production.<sup>43</sup>

In the first, explanatory sense of ground, the relationship between ground and grounding explanation is simply identity. But matters are less simple if ground is understood in the second, determinative sense. What one says about the relationship between ground in this sense and grounding explanation will depend in part on one’s views on grounding-explanatory realism.

<sup>40</sup>Schaffer (2016, 84) offers a brief argument against primitivist realism.

<sup>41</sup>Compare Kovacs (2017, 2942). For discussion of related issues see Michaela McSweeney’s contribution to this handbook.

<sup>42</sup>Examples include Litland (2013), Dasgupta (2014a) and Wilsch (2015a).

<sup>43</sup>One might also use ‘ground’ to mean a determinative *operation*. However, I am not aware of any philosopher who has used the term this way.

Consider first the relationalist realist. Ground as a determination relation finds a natural place in her view of grounding explanation. For since the relationalist realist takes grounding explanation to be backed by determination relations, it will be natural for her to take these relations to be nothing other than relations of ground. As Schaffer, himself a relationalist realist, writes:

One should distinguish the worldly relation of grounding from the metaphysical explanations between facts that it backs, just as one should distinguish the worldly relation of causation from the causal explanations between facts that it backs.<sup>44</sup>

For the relationalist realist, then, it is natural to take the relationship between ground (in the determinative sense) and grounding explanation to be one of backing: the former backs the latter.

Consider next the primitivist realist. Ground as a determination relation also fits naturally with her view, though in a different way than with that of the relationalist realist. For the primitivist realist, grounding explanation itself is a form of determination. And so for her (and her alone) it will be natural to take the two uses of ‘ground’ to have one and the same referent. There is the explanatory use, which refers to grounding explanation. And there is the determinative use, which, for the primitivist realist, will also refer to grounding explanation. For her, then, the relationship between grounding explanation and ground, in either the explanatory or determinative sense, is one of identity.

Ground in the determinative sense perhaps fits less straightforwardly with other forms of realism, though the combination can usually be made to work. Consider Trogdon’s mechanistic version of essentialist realism, for instance. For him, grounding explanations ‘are representations of grounding relations [i.e., relations of ground in the determinative sense] as being instances of grounding mechanisms’.<sup>45</sup> His view of grounding explanation therefore preserves a place for ground as a determination relation.

Finally, what about the antirealist? For her, grounding explanation requires no form of real determination to back it. And so it will be natural for her to deny that there is any such thing as ground in the determinative sense. For her, ground in this sense simply does not exist, and so there is no relationship at all between it and grounding explanation.<sup>46,47</sup>

<sup>44</sup>Schaffer (2012, 124); see also Audi (2012), deRosset (2013) and Trogdon (2013).

<sup>45</sup>Trogdon (2018, 1290).

<sup>46</sup>The philosophical terrain charted in this section has been partitioned differently by some other authors. Raven (2015) distinguishes ‘unionist’ views, on which ground and grounding explanation are identical, from ‘separatist’ views, on which they are distinct. But from the present perspective this distinction is ambiguous owing to the ambiguity of the term ‘ground’. The relationalist realist, for instance, will be a unionist if ground is understood in the explanatory sense but a separatist if it is understood in the determinative sense. However, we should not go as far as Dasgupta (2017, n. 8) in characterizing Raven’s distinction as largely verbal. For if ground is understood in the determinative sense, then the debate between unionists and separatists will turn largely on the *substantive* question whether grounding explanation itself is a form of determination.

<sup>47</sup>I would like to thank Kit Fine, Daniel Fogal, Mike Raven, and Olle Risberg for their written comments on earlier drafts of this chapter. I am also indebted to Kevin Richardson, Erica Shumener, and the participants at a workshop on metaphysical grounding at the University of Hamburg. I am grateful for the support of the Deutsche Forschungsgemeinschaft and of the Program of Postdoctoral Fellowships at the Universidad Nacional Autónoma de México.

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