

Against explanatory realism

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Abstract Explanatory realism is the position that all explanations give information about whatever metaphysically determines the explanandum. This view is popular and plays a central role in metaphysics, but in this paper I argue that explanatory realism is false. In Sect. 1 I introduce explanatory realism in its weak and strong versions, and discuss the argumentative work that explanatory realism is used for in contemporary metaphysics. In Sect. 2 I present a series of problem cases for explanatory realism, including explanation by analogy, explanations involving rules, reduction ad absurdum explanations and certain statistical explanations. In Sect. 3 I consider and reject two modified versions of explanatory realism: the position that explanatory realism is true only of explanation in metaphysics, and the position that determinative explanation is the most complete form of explanation. In conclusion I consider explanatory antirealism and explanatory pluralism as alternatives to explanatory realism.

Keywords Explanation · Metaphysics · Causation · Grounding

1 Introduction

Imagine hurling a rock at a glass window, and watching the window shatter. Now consider a simple causal explanation of the event of the window's shattering:

A rock was thrown at the window with some force.
And that is why the window was broken.

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This explanation proceeds by identifying the cause (the rock throw) of the explanandum event (the window shattering). Now consider an explanation of the fact that a certain ball has a disposition to roll down inclined planes:

The ball is spherical.

And that is why the ball has the disposition to roll.

This explanation proceeds by identifying the metaphysical ground (the fact that the ball is spherical) of the explanandum (the fact that the ball has the disposition to roll).

These *determinative explanations* explanations are similar in that they both explain by identifying whatever *metaphysically determines* the explanandum. Determinative explanations are familiar, and the claim that there are explanations like this (at least in the case of causation if not of grounding) is uncontroversial. *Explanatory realism* is the position that *all* explanation is determinative. This view is popular and plays a central role in metaphysics, but in this paper I argue that explanatory realism is false.

In Sect. 1 I introduce explanatory realism in its weak and strong versions, and discuss the argumentative work that explanatory realism is used for in contemporary metaphysics. In Sect. 2 I present a series of problem cases for explanatory realism, including explanation by analogy, explanations involving rules, reduction ad absurdum explanations and certain statistical explanations. In Sect. 3 I consider and reject two modified versions of explanatory realism: the position that explanatory realism is true only of explanation in metaphysics, and the position that determinative explanation is the most complete form of explanation. In conclusion I consider explanatory anti-realism and explanatory pluralism as alternatives to explanatory realism.

2 What is explanatory realism?

Explanatory realists believe that explanation relies upon metaphysical determination, and so in order to understand explanatory realism we must first work out what metaphysical determination is.¹ A number of philosophers have recently engaged with this question. For example, Jonathan Schaffer writes, “there is a unified general notion of directed determination (connected to explanation-backing), of which causation and grounding are distinct species.”² He argues that causation and grounding are similar because they both are “productive”, both are partial orders, and both are backed by non-accidental generalizations.³ Paul Audi argues that determination has nine features: a relation of bringing about or being responsible for; closely related to explanation; worldly as opposed to conceptual; irreflexive; asymmetric; singular (a relation between particulars); different from dependence;

¹ Henceforth I will shorten “metaphysical determination” to “determination”.

² Schaffer (2016, p. 96).

³ See Schaffer (2016, section 1) for detail about these similarities, and p. 59 for a summary.

factive (if one thing determines another, then both in fact obtain or occur); non-monotonic (it does not follow from x 's determining y that x and z together determine y).⁴ Jaegwon Kim writes that determination (unlike Audi he takes "determination" to be interchangeable with "dependence") is objective, asymmetric and transitive, and that "dependence relations of various kinds serve as objective correlates of explanations."⁵ Tobias Wilsch argues that determination is nomological, and defends a deductive-nomological account of metaphysical explanation based on the deductive-nomological model of scientific explanation, with metaphysical laws in place of scientific laws.⁶

For the purposes of engaging with a variety of explanatory realists, I will adopt the combination of these features that makes the most charitable sense of explanatory realism. Different explanatory realists have different views on the nature of determination, but the following six features roughly capture the common ground between them:

1. Generative: When a determines b , a is metaphysically responsible for b .
2. Objective: Determination is worldly, and not context-dependent or mind-dependent.
3. Asymmetric: If a determines b , b does not determine a .
4. Irreflexive: a cannot determine a .
5. Non-monotonic: When a determines b , it does not follow that a and c together also determine b .
6. Backs explanation: Explanations can succeed by representing information about determination.

I remain open about the relation of determination as this will depend on the particular relations that meet these six conditions. On this view causation and grounding are species of determination, as are realization and certain mereological relations. Supervenience is not determinative, however, as it is not generative and does not back explanation, and identity is also excluded.⁷ Most explanatory realists focus on causation and/or grounding among the different forms of determination, however, and the following discussion will reflect that.

There are different versions of explanatory realism. One version is the view that to explain is to give some information about whatever metaphysically determines the explanandum, and this is typically restricted to causal explanation of events.⁸ David Lewis and Brad Skow hold this view, and they both adopt a very broad conception of what it is to offer causal information about an event. According to Lewis to give *any*

⁴ Audi (2012, section 2).

⁵ Kim (1994, p. 67).

⁶ Wilsch (2015, 2016).

⁷ Most authors agree that supervenience is not explanatory, but Kovacs argues against this consensus in Kovacs (unpublished ms).

⁸ Lewis's view is, *to explain an event is to provide some information about its causal history*. Lewis (1986, p. 271) Skow's view is, *A body of fact partially causal explains E iff it is a body of facts about what causes, if any, E had, or it is a body of fact about what it would have taken for some specific alternative or range of alternatives to E to have occurred instead*. Skow (2014, p. 5).

information about an event's causal history, even information about what the causal history does *not* include, is to explain that event.⁹ For example, Lewis points out that if an ambassador dies at a reception attended by a CIA agent, the fact that the agent's presence at the reception was a mere coincidence (at least partially) explains the death, as it tells us that the causal history of the death does not include the actions of this particular agent.¹⁰ Skow also argues that giving negative information about an event's causal history is explanatory, and holds that to describe laws is also to give causal information, because in doing so we describe constraints on what can happen.¹¹ Although these authors focus specially on the causal explanation of events, we can broaden the position to encompass other forms of determination. On this modified view, to explain is *to give some information about whatever metaphysically determined the explanandum*. Following Skow and Lewis, this can include negative information about causal history of the explanandum, or information about facts that do not ground the explanandum, or information about constraints on possible causes, such as laws. I will call this view *weak explanatory realism*.

Another version of explanatory realism is the view that to explain is to describe whatever positively metaphysically determines the explanandum. On this view, the explanation must identify a cause or ground of the explanandum and so giving negative causal information, or information about constraints on causes, is insufficient for explanation. The position that the explanans must identify whatever *entirely* determines the explanandum is unfeasibly strong, and so in this discussion I will consider a more moderate version of the view. On the modified version, to explain is to *identify something positively metaphysically responsible for the explanandum*. This rules out cases of purported explanation that proceed by offering negative causal information about the explanandum, and also rules out purported explanations that identify background conditions, or causal constraints. I will call this view *strong explanatory realism*.

A number of metaphysicians endorse strong explanatory realism, including Kim and Audi. According to Kim, what it is for an attempt at explanation to succeed is for that explanation to correctly depict some instance of determination. Where E is the explanandum that some event e occurred, and C is the statement that event c occurred, "C is an explanans for E in virtue of the fact that c bears to e some determinative objective relation R. Let us call R, whatever it is, the explanatory relation... The explanatory relation is an objective relation among events that, as we might say, 'ground' the explanans relations, and constitutes its 'objective correlate'. On the realist view, our explanations are 'correct' or 'true' if they depict these relations correctly, just as our propositions or beliefs are true if they correctly depict objective facts, and explanations could be more or less 'accurate' according to how accurately they depict these relations."¹² Kim argues that explanatory realism is a

⁹ Lewis (1986).

¹⁰ Lewis (1986, p. 220).

¹¹ Skow (2014, p. 4).

¹² Kim (1988, p. 226) This view applies only to the explanation of events, but elsewhere Kim argues that there could be non-causal forms of determination that support non-causal explanations in which the explananda need not be events. See Kim (1994, p. 67).

natural corollary of causal realism, because the combination of causal realism with explanatory irrealism would cut an intuitive tie between causation and explanation,¹³ and Kim also holds that explanatory realism vindicates the unifying and simplifying aspects of explanation.¹⁴

For Kim, strong explanatory realism also plays a central argumentative role. He bases his explanatory exclusion principle on a combination of strong explanatory realism and the denial of causal overdetermination (often known as the “causal exclusion principle”). On this view explanations exclude each other such that a full explanation of an event precludes any other full explanation of that event.¹⁵ Kim uses this principle of explanatory exclusion for various purposes in metaphysics of mind, including his defense of reductive physicalism. Explanatory realism also plays a role in Kim’s work on supervenience. He argues that supervenience is not explanatory, because supervenience only identifies a non-determinative relationship between sets of properties, and determination is required for explanation. Supervenience plus determination, on the other hand, is explanatory.¹⁶

According to Audi, “... one job of explanations is to report underlying relations of determination. The idea that they do is a form of explanatory realism. Broadly, realism is the view that explanations (a) can be correct or incorrect, and (b) that their correctness or incorrectness is not solely a matter of how well they tend to produce understanding or reduce mystery to some audience. Rather, according to realism, (c) their correctness is a matter of how well they track certain non-explanatory relations, relations that obtain whether or not we know about them or conceive them in any particular way.”¹⁷ Audi uses strong explanatory realism in his argument for grounding:

1. One fact explains another only if the one plays a role in determining the other.
2. There are explanations in which the explaining fact plays no causal role with respect to the explained fact.
Therefore
3. There is a noncausal relation of determination.¹⁸

David-Hillel Ruben is another explanatory realist, according to whom explanation is made possible by a structure of metaphysical dependence and determination relations, which include causation but also certain non-causal forms of dependence.¹⁹ As he puts it, “we explain something by showing what is responsible for it or what makes it as it is.”²⁰

¹³ Kim (1988, pp. 231–232).

¹⁴ Kim (1994, p. 68).

¹⁵ Kim (1988).

¹⁶ See Kim (1990, p. 24).

¹⁷ Audi (2015, p. 212).

¹⁸ Audi (2012, p. 688).

¹⁹ Ruben (1990, Chapter 7).

²⁰ Ruben (1990, p. 233).

Although Lewis, Skow, Kim, Audi and Ruben have different views (not least because Lewis and Skow restrict their versions to explanation of events), they share a broad commitment to the idea that explanation succeeds by tracking, picking out or giving information about determination.²¹ Explanatory realism also features prominently in recent literature on grounding. As we have noted, explanatory realism appears as a premise in Audi's argument for grounding, while Koslicki points out that explanatory realism illuminates the role of grounding in metaphysics.²² Other grounding theorists hold modified versions of explanatory realism, such as the view that determinative explanation is the most complete form of explanation.²³ Explanatory realism is also supported by the success of grounding, because without grounding as a potential support for certain non-causal explanations explanatory realism would be less plausible.

There are some alternative versions of weak explanatory realism. For example, consider the view that an explanation is *successful* because (or partly because) of a supporting determination relation. This is different from weak explanatory realism because it does not require that explanations depict determination, or give information about it. This view focuses on successful explanation rather than explanation itself. Alternatively, consider the view that explanatory realism (of either kind) is an account of what it takes for an explanation to be true, rather than completely successful. Explanatory realists are themselves sometimes unclear about which variety of explanatory realism they endorse. For example, Kim, one of the most prominent explanatory realists, in some places suggests that all explanations depict instances of determination, but in other places suggests that determination merely grounds explanation.²⁴ This leaves some room for interpretation, and the best interpretation will be the one most charitable to the explanatory realist. However, these two alternative formulations of weak explanatory realism are not as charitable as the formulations given above.

The first alternative, the view that an explanation is successful because (or partly because) of a supporting determination relation, is extremely weak. Assuming that reality is structured by determination relations, as Kim et al. suggest, it is hard to distinguish this view from the position that the explanans and explanandum of a successful explanation must be *true*. In so far as the explanation must be true, and true facts about the world will obtain at least partly in virtue of determination, explanation will always have *something* to do with determination. But an explanatory anti-realist who holds that explanations succeed in virtue of epistemic

²¹ Audi also groups his own view together with those of Kim and Ruben in Audi (2015, p. 4).

²² Koslicki (2012) *Varieties of Ontological Dependence* in Correia and Schneider (2012, p. 213) and footnote 27.

²³ For example, Fine describes grounding as *the ultimate form of explanation* in Fine (2001, p. 16).

²⁴ Kim writes, *On the realist view, our explanations are 'correct' or 'true' if they depict these relations correctly, just as our propositions or beliefs are true if they correctly depict objective facts, and explanations could be more or less 'accurate' according to how accurately they depict these relations.* Kim (1988, p. 226). But he also writes, *According to "explanatory realism", when something is correctly invoked as an explanation of another thing, the explanatory relation must be grounded in some objective relation of dependence or determination holding for the explanans and the explanandum.* Kim (1993, p. xiii).

factors could endorse this, so long as they agree that the explanans and explanandum of a successful explanation must be true. As explanatory anti-realism cannot be used for the same argumentative purposes as explanatory realism, this is not an effective or charitable characterization of explanatory realism.

The second alternative, the view that explanatory realism is an account of what it takes for an explanation to be true, rather than for an explanation to be successful or legitimate, is similarly problematic. There are two versions of this position. One permits non-true explanations (which may be successful for other reasons), while another does not. The first option is a form of explanatory pluralism rather than explanatory realism, because it permits explanations that do not display this close connection to determination. As I will show in Sect. 2, explanatory pluralism cannot perform much of the argumentative work that explanatory realists use their position for in contemporary metaphysics, and so this version is not a charitable interpretation of explanatory realism. The second option *is* a form of explanatory realism, but will be equally subject to the counterexamples that will be discussed in Sect. 2. Those counterexamples will include successful, legitimate explanations with true explanans and explananda that do not give information about determination, and so will challenge this idea that a “true” explanation must give information about determination. Accordingly, although there are other ways to interpret weak explanatory realism, I will stick to the definition that to explain is to give some information about whatever metaphysically determined the explanandum.

Explanatory realism (in its strong and weak versions) is a view about what explanation is and why explanation succeeds. As such it is a position about explanation in general, not a special subset of explanations, so if there are legitimate explanations that are not determinative then these are counterexamples to explanatory realism. In the following section I will argue that there are legitimate non-determinative explanations. One way to pick out these counterexamples would be to use an account of explanation, but this paper is part of an exploration of the nature and boundaries of explanation, and is not driven by a particular account of explanation. Instead of using an account of explanation to identify counterexamples, I will find them in our explanatory practices. It will not be enough to simply find something that is occasionally called “explanation” in an extremely limited context, or in an informal, everyday context. Instead, I will look for a robust pattern of use across a variety of different areas of enquiry and activity, including scientific practice, other areas of academia including the humanities and social sciences, and professional practice, such as law and medicine. If a non-determinative form of explanation is used consistently across a variety of areas of scientific, academic and professional practice, then I will take that pattern as evidence for a counterexample to explanatory realism. Those who reject this strategy face the challenge of explaining away these apparent patterns in our explanatory practices.

Many of the counterexamples involve forms of explanation that have been discussed in detail by philosophers of science, particularly in the literature on non-causal explanation, and my goal in presenting these is not to make a new contribution to the literature on different forms of scientific explanation. Instead, my goal is to show that these cases are not just interesting forms of explanation from the perspective of a philosopher of science but that they also present problems for the

explanatory realist, and particularly those who use explanatory realism to support metaphysical claims.

3 Problem cases

In this section I will present some counterexamples and problem cases for both forms of explanatory realism.²⁵

3.1 Analogical explanation

One group of counterexamples to both forms of explanatory realism is the group of cases in which we explain through analogy. For example, I may explain a poorly-understood mechanism through analogy with a well-understood mechanism, such as using an analogy between an intentional agent and a furnace to explain the workings of the furnace to someone unfamiliar with furnaces. In doing so, I may describe the furnace as “wanting” to return to a particular temperature, and about setting the thermostat as setting the furnace’s “desires”:

The furnace is analogous to an intentional agent.

The furnace’s thermostat settings are analogous to an intentional agent’s desires.

An intentional agent will always aim to promote its desires.

By analogy, the furnace will aim to maintain the temperature set for the thermostat, which is 68F.

And that is why the furnace maintains a temperature of 68F.

This case presents a counterexample to strong explanatory realism because the analogy does not identify anything that determines the explanandum.

Explanation through analogy is common in scientific practice. For instance:

- Charles Darwin used an analogy between natural selection and the artificial selections made by animal breeders to explain certain features of natural selection, focusing specifically on the case of the domestic pigeon.²⁶
- The kinetic theory of gases uses an analogy between gases and collections of billiard balls to explain various behaviors of those gases.²⁷
- Wave and water flow analogies have played a significant role in scientists’ explanations of phenomena such as sound, light and electricity.²⁸

²⁵ Weak explanatory realism faces problems beyond these counterexamples. One concern is that weak explanatory realism has such a tenuous connection to determination as to not deserve the title “explanatory realism”. Sober argues that the view of causal explanation as providing any causal information about the explanandum *trivializes* causal explanation in Sober (1983, pp. 202–203). (Skow discusses Sober’s view in Skow (2014) footnote 4.) Finnur Dellsén also discusses some problem cases for Skow’s account of explanation in Skow in Dellsén (2016).

²⁶ Darwin (1859, Chapter 1). See discussion in Theunissen (2012).

²⁷ Lipton (2004, p. 24).

²⁸ See Holyoak and Thagard (1995, Chapter 8) for discussion of wave and water flow analogies. Hempel also mentions these cases in Hempel (1965, p. 430), and Hesse discusses them in Hesse (1966, p. 11).

- Economist Bill Phillips used an analogy between the UK economy and a hydraulic machine to explain different features of the flow of money throughout the economy.²⁹

Explanation through analogy is also common in clinical contexts, where practitioners may explain the progress of a disease or the function of an organ to a patient through analogy with more familiar processes. For instance, some physicians use a comparison between the thyroid's regulatory role in the body and a thermostat's regulatory role in a building to explain thyroid function and dysfunction to patients.

Analogical explanation has been discussed extensively in philosophy of science. Carl Hempel and Michael Friedman, for example, both note that certain explanations rely upon analogies between the unfamiliar explanandum and a familiar explanans.³⁰ As Hempel puts it, "Undeniably, many scientific explanations effect, in a sense, a 'reduction to the familiar'. This might be said, for example, of the wave-theoretical explanation of optical refraction and interference, and of at least some of the explanations achieved by the kinetic theory of heat. In cases of this kind, the concepts and principles invoked in the explanans bear a more or less close resemblance to concepts and principles that have long been used in the description and explanation of some familiar type of phenomenon, such as the propagation of wave motions of the surface of water or the motion of billiard balls."³¹ Both Hempel and Friedman argue against the view that reduction to the familiar is either a necessary or sufficient condition for explanation, but both also acknowledge that certain explanations make use of analogies.³² N.R. Campbell and Mary Hesse also both argue that analogy plays a central role in scientific practice, and in scientific explanation.³³ None of this shows conclusively that analogies are explanatory, but it provides the kind of evidence we have been looking for to support a counterexample: there is a robust pattern of using analogies in explanations in a variety of scientific, academic and professional contexts, as well as in everyday life, and there is philosophical precedent for recognizing at least some analogies as explanatory.

One could argue that whatever is going on in these cases it is not explanation, because the primary goal is to help another person to understand some phenomenon, rather than to give information about whatever metaphysically determines that

²⁹ See https://en.wikipedia.org/wiki/MONIAC_Computer.

³⁰ Hempel (1965, p. 430) and Friedman (1974, pp. 9–11).

³¹ Hempel (1965, p. 430).

³² See discussion in Hempel, C. & Oppenheim, P. "Studies in the Logic of Explanation" in Hempel (1965). Section 4. They argue that reduction to the familiar cannot be necessary for explanation because so many explanations do not reduce to the familiar, and that reduction to the familiar is not sufficient for explanation because such explanations lack testability and also do not involve general laws. The second point should not worry us because their influential conception of all explanation as involving general laws has long been rejected, and there is good reason to be hesitant about the first point. There are interesting questions about what makes for a successful analogy, but it is possible to specify some dimension along which two entities are similar, and then draw an analogy on the basis of that similarity, as we often do when using argument from analogy. Then the specified notion of similarity could be testable.

³³ Hesse (1966) Section on *The Explanatory Function of Metaphor*; Campbell (1920).

phenomenon. In taking this strategy the explanatory realist makes a principled distinction between those senses of the word “explanation” that they intend to capture and those that they do not, and the proposal here is that their target does not include cases of “explanation” where the primary goal is to help another person to understand the explanandum. If this is the case, then explanatory realism is safe from purported counterexamples where the primary goal is to help another person understand, as the account was never intended to cover such cases. The explanatory realist cannot stipulate that they only want to target cases of explanation that give information about determination, as doing so would result in a trivial account of explanation, but this strategy is formulated without reference to determination, and so avoids this problem.

However, it is not clear that the explanatory realist can use this strategy to avoid the analogy counterexample. Many determinative explanations are formulated and used primarily to help others to understand a phenomenon, and yet for the explanatory realist they count as “explanation”. Consider, for instance, the causal explanation of the broken window in the introduction, which is a simple, everyday kind of explanation that we use to help people understand why certain events happen, and yet is also determinative. The explanatory realist could then reply that they intend to exclude only those cases that *merely* aim at promoting understanding. However, many determinative explanations are formulated with the intention of merely promoting understanding, and may just happen to give information about determination in the process. Without a principled basis for excluding analogical explanations, the only response available is to argue that such cases are not counterexamples *because they do not give information about determination*. This strategy, however, is ad hoc. When giving an account of *x*, one cannot then reject a counterexample because it is an instance of *x* that does not meet the defended definition. Instead, one must provide a principled reason why this instance of *x* is not part of the target of the account, and the restriction to cases of explanation that do not merely aim to promote understanding does not achieve this, because many determinative explanations are formulated purely with the aim of promoting understanding.

An explanatory realist could perhaps argue that the analogical cases *are* explanations, but they are not *the kind of* explanation that explanatory realists are interested in, because explanatory realists are specifically interested in *metaphysical* explanation. There is a version of this response that amounts to a kind of explanatory pluralism, according to which some explanations are determinative while others are not. Explanatory pluralism, as I will discuss later, is a viable alternative to explanatory realism. However, this is not an option that many explanatory realists can take, and especially not strong explanatory realists, because strong explanatory realism plays a central argumentative role that explanatory pluralism cannot play. For example, if strong explanatory realism is true, then wherever there is an explanation, we can reasonably look for the instance of metaphysical determination that is picked out by that explanation. If strong explanatory realism is true, then we have good reason to think that complete explanations exclude each other. If strong explanatory realism is true, then we have an explanation for why supervenience is not explanatory, because it fails to provide information about determination. If we endorse a kind of pluralism about explanatory realism, on the other hand, then these inferences will be

unsuccessful. If there are non-determinative explanations, then the presence of an explanation does not require the presence of a determination relation, complete explanations may not exclude each other, and the absence of information about determination does not automatically suggest the absence of an explanation. So, while explanatory pluralism may be a sensible option, it cannot play the same argumentative role as explanatory realism.

An explanatory realist could perhaps argue that these analogical explanations are genuine explanations, but that they are not counterexamples because they are determinative explanations that give information about what caused the explanandum. They could argue that, although the analogy does not offer a full causal description of the explanandum, it does identify the major causal factors in each case. For instance, in the Darwin case, the analogy between natural selection and artificial selection tells us that there is a process analogous to a human being's choosing which is causally significant for the development of certain features in plants and animals. In the furnace case, the analogy tells us that the thermostat's settings and the information the thermostat gets from the environment are causally relevant to the furnace's temperature. However, in each case the causal mechanism in the analogy and in the explanandum case are extremely different, which challenges this claim that the explanation explains by giving causal information. The causal mechanism that gives rise to the furnace's behavior (involving the circulation of heated air or water) is completely different from the causal mechanism that gives rise to the agent's behavior (involving far more complex mechanisms in the brain), and the causal mechanism that gives rise to the pigeon-breeder's selective choosing (involving processes in the individual's brain) is completely different from the causal mechanism that gives rise to natural selection (which does not operate through the brain of a choosing human agent).

An explanatory realist could argue that in each case of analogical explanation the explanation involving the analogy is dispensable, as typically there is also a determinative explanation available. They could then reason that the availability of this causal alternative makes the analogical explanation redundant. For instance, when explaining why the furnace stays at a temperature of 68F, we may offer a fully detailed causal explanation of the furnace's internal workings rather than the explanation involving an analogy with an intentional agent. However, the standard that any legitimate explanation must be the *only* explanation of that explanandum is implausibly reductionist.³⁴ For the most part we accept that there are, for example, legitimate biological explanations of occurrences that also have physical explanations. Similarly, in every case of grounding explanation an alternative form of explanation is available. For example, consider a grounding explanation of the fact that some paint is red. According to certain grounding theorists we can explain the

³⁴ See familiar discussion of this point in e.g. Fodor (1974) As mentioned earlier some philosophers, such as Kim, hold that *complete* explanations exclude each other, but I am presuming that an explanation can be successful without being complete because it may be even impossible to formulate a genuinely complete explanation. As Lewis puts it, *It is, of course, very unlikely that so much explanatory information ever could be known, or conveyed to anyone in some tremendous act of explaining!* Lewis (1986, p. 219).

redness of the paint by citing its metaphysical ground, such as the fact that the paint is scarlet. But we can also explain the redness of the paint by giving a physical description of its light reflectance properties, or even information about the intentions of the designer who created the shade range. The availability of an alternative explanation does not undermine the grounding explanation, and the availability of the grounding explanation does not undermine the alternatives.

3.2 Rule-based explanation

Another group of cases in which there is explanation without information about determination is the group of explanations that are based on rules. Rule-based explanations come in many different forms, including explanations that appeal to mathematical or statistical rules, explanations that appeal to social or institutional rules, explanations that appeal to the rules of particular games or activities, and legal explanations that appeal to laws of the land. Some rule-based explanations are determinative, but in this section I will describe some non-determinative rule-based explanations.

Some explanations that appeal to statistical rules are non-determinative. Consider, for example, the *law of small numbers*.³⁵ The law of small numbers is the fact that when sampling a population for some trait, extreme results (either very high or very low incidence of that trait) are more likely to be found in small samples than in large samples. Daniel Kahneman discusses the example of rates of kidney cancer across different counties in the US.³⁶ Counties in the US in which the incidence of kidney cancer is lowest are mostly rural, sparsely populated and located in traditionally Republican parts of the Midwest, South and West. However, counties in the US in which the incidence of kidney cancer is highest are also mostly rural, sparsely populated and located in traditionally Republican parts of the Midwest, South and West. These results are not explained by features of the counties that cause the respective cancer rates—instead they are explained by the law of small numbers. These counties are all sparsely populated, and incidence of kidney cancer is more likely to be unusually low, or unusually high, in a sparsely populated county. If we examine the case more closely, we can see that this is a case of non-determinative rule-based explanation. Where the explanandum is *the fact that sparsely populated counties exhibit both the lowest and highest incidence of kidney cancer*, the explanans is *the fact that extreme results are more likely to obtain in smaller samples*. The explanans does not give information about either causes or grounds of this particular distribution of kidney cancer, which would include factors such as physical mechanisms in the bodies of the denizens of each county, their lifestyle, their exposure to carcinogens and so on. So this is a non-determinative rule-based explanation.

Other similar rule-based explanations can be found in the use of statistics in the social sciences. For instance, explanations involving the *central limit theorem* have a similar structure. According to the central limit theorem, the sample mean of a sufficiently large sample has a normal distribution. The fact that a sample mean has

³⁵ Daniel Kahneman discusses this example in Kahneman (2011, Chapter 10).

³⁶ Kahneman (2011, Chapter 10).

a normal distribution when the sample is sufficiently large can therefore be explained simply by citing the central limit theorem. The central limit theorem plays an extremely important role in the practice of statistics, and so this is another example of a well-established pattern of using a form of non-determinative explanation in scientific practice.

We often use rule-based explanations in games. For example, consider explaining why a particular player, who committed a deliberately harmful late tackle, was sent off during a game of football. The explanandum is: *Player a, who committed a deliberately harmful late tackle, was sent off.* The explanans is: *The rules of football dictate that any player committing a deliberately harmful late tackle must be sent off.* In response, an explanatory realist could argue that this must be only an incomplete or partial explanation, because there is a causal explanation available of the same event, like this: *The rules of football dictate that a player committing a deliberately harmful late tackle must be sent off. The referee enforced the rule. And that is why the player was sent off.* However, even if we acknowledge this causal explanation, this does not show that the merely rule-based explanation is partial. We can explain the event of a sending off in a variety of different ways, such as appealing to the cause, or appealing to the rules of the game. This reflects the idea that there may be different kinds of equally legitimate explanation of the same fact or event, and that context may determine which of these is most appropriate. For instance, if I wanted to explain the fact that a particular person was sent to prison, I could offer a full causal explanation of the event of her being sent to prison, or I could offer a legal explanation based on the particular law that she had broken. The mere availability of the legal explanation would not undermine the causal explanation, and indeed, in a courtroom it may be perfectly reasonable to present these different explanations of the same fact one after the other.

The explanatory realist could argue that even if the rule-based explanations are occasionally acceptable in certain contexts, they are merely partial explanations, and furthermore they are partial *causal* explanations. However, if a rule-based explanation is a partial causal explanation then we should expect further relevant causal information to add to the explanation, but there are cases of rule-based explanation where further relevant causal information would not improve the explanation. Consider a case in which we explain why someone who performed a certain act went to jail by pointing out that there is a law against her action. This explanation is not improved by the addition of further relevant causal information, such as the fact that the judge enforced the law, or the fact that she was brought in by the police and arrested. The explanation simply cites the law, and that is sufficient for explanation in this case. In a different context, perhaps a more detailed causal explanation would be required, but in certain contexts this is a perfectly legitimate explanation, and further causal information does not improve it.³⁷

³⁷ An explanatory realist could argue that in cases such as the football case we are explaining *what the game is*, rather than explaining the fact that the player was sent off, by appealing to the rule. However, this would be a roundabout and unnecessarily complex way to explain what the game is, because the explanandum is the fact that the player was sent off, rather than any more general facts about the game of football.

An explanatory realist could argue that these apparent rule-based explanations are justifications rather than genuine explanations, and so the rule may justify the sending-off without explaining it. However, although in certain contexts a rule may offer a justification rather than an explanation of some fact, rules can do either, and context will determine whether a rule justifies or explains the relevant fact. For example, if a member of a football governing body were to investigate a referee's decision, then they might ask the referee to justify a sending-off by describing the rule that was violated. In this context, the appeal to the rule would be justificatory rather than explanatory. On the other hand, a person watching a match who had missed a few minutes of play might ask for an explanation of why a player was sent off, and in that case the rule could explain, rather than justify, the sending-off.

Another set of rule-based explanations is the set of explanations in which we explain the behavior of agents in terms of the norms and rules that they take as reasons for their own action. Understanding such explanations as non-determinative requires us to take a non-causal view of reasons, however, which is controversial and takes us into a long-standing debate in philosophy of action about the nature of reasons. Accordingly, I will leave these cases to one side while noting that, if a non-causal account of reasons is viable, then rule-based explanations of human behavior could present counterexamples to explanatory realism.³⁸

An explanatory realist could argue that rule-based explanations are determinative because *governing* is a form of determination. On this line of thought, rules, much like laws, govern the behavior of systems by constraining their possible behavior. The response to this objection depends on the particular notion of determination at hand, but a key feature of determination as it has appeared in this discussion is that it must be *productive* or *generative*. The kind of governing performed by laws and rules is not productive; instead it constrains the possible ways in which production might unfold. However, some argue that laws are determinative, and even if they are not, according to the weak explanatory realist giving information about constraints on determination is sufficient for determinative explanation.³⁹ The important issue here is the extent to which rules are like laws with respect to their capacity to support explanations. This issue is related to some serious questions about laws and so cannot be settled here, but I will briefly mention some reasons to think that the rules in these cases play a different explanatory role than that played by scientific laws. First, statistical rules, unlike laws, do not govern how the mechanics of causation unfold. This gives us good reason to think that, unlike information about scientific laws, information about statistical rules is not information about causation. Second, the rules of games and the norms that govern behavior do not have the modal force of scientific laws, as they do not *guarantee* any particular outcome (or a probability distribution over a range of outcomes, in the case of statistical laws). Even if information about laws is information about determination, then, it does not follow that information about rules is information about determination.

³⁸ Brennan et al discuss the use of norms in the explanation of action in Part 3 of Brennan et al. (2013).

³⁹ For instance, Wilsch defends a nomological account of ground according to which some truths p_1, \dots, p_n metaphysically explain q just in case there are metaphysical laws that determine q on the basis of p_1, \dots, p_n . Wilsch (2015).

3.3 Reductio ad absurdum explanation⁴⁰

Another set of counterexamples to both forms of explanatory realism is the set of cases in which we explain through reductio ad absurdum. One example of this kind of explanation is the use of the ideal gas laws to explain the fact that the Kelvin scale has an absolute zero. The ideal gas laws tell us that the volume of a gas is directly proportional to its temperature. There is a point at which an ideal gas will reach a volume of zero, and as the gas cannot have a negative volume this is where the temperature scale must stop—there cannot be any temperature lower than this point. This point is 273.15 °C, or 0 on the Kelvin scale. This is commonly thought to be William Thomson's (Lord Kelvin's) own explanation for the inclusion of absolute zero in the Kelvin scale, although that historical claim is slightly controversial.⁴¹ Regardless of what Thomson himself thought, however, this is a standard and widely-accepted explanation of the fact that there is absolute zero on the Kelvin scale.

This explanation proceeds through a reductio ad absurdum. The explanandum is that there is a lowest point, absolute zero, on the temperature scale. The explanation is that if there were no absolute zero then an impossible thing would happen, because a gas would have a negative volume. The impossible thing cannot happen, and so there must be absolute zero. This explanation is not a grounding explanation on either the strong or weak explanatory realist's view. The facts about absolute zero are not grounded by the facts about the ideal gas laws, so this explanation does not give information about the ground of the fact that there is absolute zero. A weak explanatory realist could perhaps argue that the ideal gas laws pose a constraint on possible grounds of this explanandum, and so the explanandum provides information about constraints on possible grounds. This would be an odd move, however, as the facts about the gas laws, although they explain why there has to be absolute zero, are more appropriately seen as implications of the fact that there is absolute zero, rather than grounds or constraints on grounds of that fact. Furthermore, this is not a causal explanation in the strong explanatory realist's sense, because the ideal gas laws do not cause the fact that there is an absolute zero temperature. A weak explanatory realist could argue that this is a causal explanation because it identifies a law, which imposes a constraint on possible causes. However, because the

⁴⁰ Thanks to Ranpal Dosanjh and Marc Lange for helpful discussion about this section.

⁴¹ See discussion in Chang (2004, Chapter 4). Thomson uses similar reasoning in a footnote to the 1848 paper in which he originally proposes his absolute temperature scale ("absolute" meaning detached from the physical details of any actual substances). This was before Thomson included absolute zero on his temperature scale, a detail he didn't add until 1852. Thomson notes that on the air-thermometer scale the value of a degree depends on how high or low up the scale it is taken. His own proposed scale is not like this, as on his absolute scale all degrees have the same value. But Thomson points out in a footnote that it is to be expected that the air thermometer scales are as they are, because if they were not then there would be a point at which the volume of air would be reduced to nothing: *This is what we might anticipate, when we reflect that infinite cold must correspond to a finite number of degrees of the air-thermometer below zero; since, if we push the strict principle of graduation, stated above, sufficiently far, we should arrive at a point corresponding to the volume of air being reduced to nothing, which would be marked as—2780 of the scale (−100/.366, if .366 be the coefficient of expansion); and therefore—2730 of the air-thermometer is a point which cannot be reached at any finite temperature, however low.* Thomson (1882, p. 104).

explanandum is the fact that the temperature scale has a lowest point, rather than an event, a causal explanation is inappropriate for this case.

In defense an explanatory realist could argue that there is a distinction between giving a reason *why* the temperature scale has a lowest point, and giving a reason *to believe* that it is the case, and that the reductio ad absurdum explanation only does the former and so is not a proper explanation, or at least not an explanation of the kind that the explanatory realist is interested in. However, showing that *it would be impossible for things to turn out any other way* is to give a good reason for why the temperature scale has a lowest point. Unless we specifically interpret “why” as necessarily causal, we cannot rule this out as an explanation of why the temperature scale has a lowest point.

Lewis discusses a similar case from Peter Railton, in which a star is collapsing and the collapse stops.⁴² The explanation of the fact that the collapse stops is that any further collapse would be impossible, and would violate the Pauli Exclusion Principle. This has a similar structure to the Kelvin scale case: what explains the stop of the collapse is that if the collapse went any further, something impossible would have happened. Lewis argues that this is a causal explanation, because it provides information about the causal history of the stopping of the collapse. As he puts it “It was the information that the stopping had no causes at all, except for all the causes of the collapse which was a precondition of the stopping (see foot note 42).” Although it is slightly more plausible that this case can be given a causal explanation, as the explanandum is the *event* of the collapse stopping rather than the *fact* that the temperature scale has a lowest point, it is simply more straightforward to understand this case as a non-causal explanation, because the exclusion principle does not cause the collapse to stop. However, even if we do follow Lewis and take this case to be causal, it does not follow that the Kelvin case is also causal.

3.4 Statistical explanations

Other cases that present problems for the explanatory realist are certain cases of statistical explanation. I will focus on cases in which two similar sequences of events lead to two entirely different outcomes, and are described in explanations of those distinct outcomes. These are not counterexamples to explanatory realism, because as we will see, there are interpretations of these cases that would be acceptable to an explanatory realist, and particularly to the weak explanatory realist. They are, however, problem cases, because they challenge the explanatory realist to find a form of determination that could support such explanation, and this is particularly challenging for those who attempt to offer an account of these explanations in terms of grounding.

The cases in question are simplified versions of some cases discussed by Jeffrey in his critique of the view that statistical explanation is inferential.⁴³ Imagine that I

⁴² Lewis (1986, p. 222).

⁴³ Jeffrey (1969) *Statistical Explanation versus Statistical Inference*, reprinted in Salmon (ed.) (1969, pp. 22–23).

toss a fair coin 20 times in a row, and then repeat the procedure. Imagine also that in the first series no coin came up heads, and in the second series at least one coin did come up heads. Stipulate that the coin tosses are statistically independent, and (for the sake of a simple case), that they are genuinely indeterministic, such that there are no hidden variables responsible for the two different outcomes of each series of tosses.⁴⁴

Let us now consider what it would be to explain each of these two different outcomes. The two explananda are

1. The fact that in a series of 20 tosses of a fair coin, no head appeared.
2. The fact that in a series of 20 tosses of a fair coin, at least one head did appear.

Each of these is a “chancy fact”, in that before the toss series there is a non-extremal objective chance that the fact will obtain. The explanation of each outcome would include the number of tosses, the fact that the tosses are statistically independent, and the fact that this is a genuinely indeterministic process. It is stipulated that there are no hidden variables, and so this is a case in which the same explanans explain two different, conflicting explananda. The explanation would look like this in the unlikely case:

The coin was tossed twenty times.

The coin tosses are statistically independent.

The coin tosses are indeterministic.

There was a 50% chance of heads and a 50% chance of tails on each toss.

And that is why no head appeared.

And like this in the likely case:

The coin was tossed twenty times.

The coin tosses are statistically independent.

The coin tosses are indeterministic.

There was a 50% chance of heads and a 50% chance of tails on each toss.

And that is why at least one head appeared.

One interpretation of this case and others like it is that there is *no explanation* available of the low-probability outcome. For instance, a proponent of the Inductive-Statistical model of explanation would not be able to explain the low-probability outcome, a feature that led to the development of other models of statistical explanation that were better equipped to handle the explanation of low-probability outcomes.⁴⁵ However, this is a fairly pessimistic view, and so I will explore some other options on behalf of the explanatory realist.

Most grounding theorists endorse “grounding necessitarianism”, the principle that if A grounds B, then when A obtains B necessarily obtains.⁴⁶ This feature is an

⁴⁴ Those who prefer could follow Jeffrey and present this as a case of radioactive decay to get genuine indeterminism into the case, but I will use the coin toss for the sake of simplicity.

⁴⁵ See Salmon on the discussion of the IS model in the introductory chapter of Salmon (1969). See “Aspects of Scientific Explanation” section 3, in Hempel (1965) for the IS model.

⁴⁶ I owe this locution to Skiles in Skiles (2015).

important element of the role that grounding plays in metaphysics.⁴⁷ On the view that there is explanation in these cases, and that the explanation succeeds because it identifies grounding, the explanans ground both explananda. This presents a problem for the explanatory realist, as it requires them to endorse the position that two identical facts (or sets of facts) ground two conflicting outcomes, contrary to grounding necessitarianism. If this is the case, then the explanation is not supported by grounding, but must be supported by causation. A grounding theorist might argue that this conclusion is too hasty because it appears to suggest that chances cannot be grounded, whereas a good grounding theory should permit the grounding of chances, and can do so without forcing us to abandon grounding necessitarianism. Cases of grounded chances may include cases in which a grounded fact has a certain chance of occurring only because its ground has that chance of occurring. This is the grounding of chancy facts in other chancy facts, and permitting such cases allows the grounding theorist to hold on to the claim that grounding is necessary while permitting the grounding of chances. However, permitting the grounding of chances in this sense will not save the coin toss case as a case of grounding, because in the coin toss case the chancy facts are grounded in non-chancy facts. Another option for the grounding theorist is to abandon grounding necessitarianism in order to permit the grounding of chances, but this would be a drastic move because, as we have seen, necessitation is a distinguishing feature of grounding. Grounding theorists therefore face an interesting problem about how to handle the grounding of chances: they either have to abandon grounding necessitarianism, argue that the only grounded chancy facts are grounded in other chancy facts, or hold that facts about chances do not have grounds.

An alternative for both strong and weak explanatory realists is to argue that these explanations give information about *partial* grounds. If the explanans do not fully ground the explananda, then we should not expect the explanans to necessitate the explananda, and so we can avoid abandoning grounding necessitarianism. In the case of explanation of non-statistical facts, it is reasonable to think that a description of a partial ground can be a partial explanation, because combining all of the descriptions of partial grounds would give a description of the full ground, and hence a full explanation. However, this is not available in the statistical case without abandoning grounding necessitarianism. Arguing that these statistical explanations describe partial grounds does not provide an easier option for either the strong or weak explanatory realist.

A simpler alternative for the explanatory realist who does recognize such cases as explanations is to hold that the explanation in these cases is supported by causation, and that causation can be probabilistic. The explanans (the number of tosses, the fact that this is an indeterministic process, the fact that the tosses are statistically independent, and the chance of a head on any given toss) *cause* both explananda (first, the fact that in a series of 20 tosses of a fair coin, no head appeared, and

⁴⁷ For example, Rosen endorses a necessitarian “entailment principle”, and argues that this is a distinguishing feature of grounding. Rosen also argues for a connection between grounding and reduction that relies upon grounding necessitarianism. See Rosen (2010, sections 7 and 10). For critique of the principle, see Skiles (2015).

second, the fact that in a series of 20 tosses of a fair coin, at least one head did appear). This is a fairly simple and plausible interpretation of these cases. However, the explanatory realist then faces questions, along with all proponents of causal models of statistical explanation, about how statistical explanations represent such causes.⁴⁸ These are not insurmountable problems, but they present a serious set of challenges for the explanatory realist who interprets such explanations as always supported by causation. For the explanatory realist who permits probabilistic causation, these statistical explanations are not counterexamples, but they illustrate some of the difficulties involved in working out a form of determination that can handle chances, and as we have seen, a grounding formulation of these cases is particularly problematic.⁴⁹

Analogical explanations, rule-based explanations, *reductio ad absurdum* explanations and statistical explanations are not the only counterexamples or problem cases for the explanatory realist. For example, *narrative explanation* is an apparently non-determinative form of explanation commonly thought to be important in the practice of history, and there is an ongoing debate about whether or not narrative explanation is causal.⁵⁰ In offering a narrative explanation we (roughly speaking) tell a story about certain events unfolding through time, which places the earlier events in the context of the later events. Not only is this regarded as a central form of historical explanation, but it has also been argued that narrative explanation plays a central role in evolutionary biology, and so this would be a worrying counterexample for the explanatory realist if narrative explanation did turn out to be non-determinative. Certain mathematical explanations may also be non-determinative.⁵¹ I have not discussed mathematical cases here because there is already a substantial literature that focuses on mathematical explanation, and many mathematical explanations can be given a grounding interpretation. However, mathematical explanation is another potential source of problem cases for the explanatory realist. Overall, strong and weak explanatory realists face a number of counterexamples and problem cases, and the list discussed here is not exhaustive.

4 Modified versions of explanatory realism

So far we have examined explanatory realism as a position about *all* explanation, but there are two modified versions of explanatory realism that are also popularly held. The first is the position that explanatory realism is true only of metaphysical explanations. The second is the position that, while explanatory realism is false, determinative explanations are in some sense the most *complete* form of explanation. These both appear to be reasonable alternatives to full-blown

⁴⁸ For discussion see Cartwright (1979).

⁴⁹ This is not the only kind of statistical explanation that poses problems for the realist. Lange argues that *really statistical explanation* is a form of noncausal statistical explanation, including explanations appealing to genetic drift. See Lange (2013).

⁵⁰ For introduction to and discussion of narrative explanation, See Danto (1985) and Velleman (2003).

⁵¹ For discussion of whether narrative explanation is causal, see Richards (1992).

explanatory realism, that preserve some of the intuitive attractiveness of explanatory realism, but in this section I will show that they are also problematic. The only plausible version of the first turns out not to be a form of explanatory realism, and the second is simply false.

A modified version of explanatory realism is a thesis about metaphysical explanation: the view that all *metaphysical* explanation is determinative. On this view there may be non-determinative explanations, but no non-determinative *metaphysical* explanations. In order to assess this position we should first work out what counts as a metaphysical explanation. One plausible hypothesis is that a metaphysical explanation is an explanation offered in the course of the practice of metaphysics. This position is, however, subject to counterexamples. For example, in the practice of metaphysics, we often use analogical explanation.

Consider the case of finkish dispositions.⁵² A finkish disposition is a counterexample to the simple conditional analysis of dispositions. The stimulus condition of a finkish disposition either removes the relevant disposition from an entity, or alternatively provides the relevant disposition to an entity. For instance, Martin describes the case of the electro-fink.⁵³ A dead wire is connected to a device, the electro-fink, and the device detects whenever the wire is in contact with a conductor. Whenever the electro-fink detects that the wire is in contact with a conductor, it reacts by making the wire live for the duration of its contact with the conductor. We can also use the electro-fink to perform a reverse operation on a live wire, in which the electro-fink makes the live wire dead whenever it comes into contact with a conductor.

Finkish dispositions are a little complicated, and so we may use analogies to explain how they work and to deepen our understanding of the problems they pose for the simple conditional analysis of dispositions. For example, we may say that having a finkish disposition in the negative case is rather like having someone follow you around who, just before you are about to speak, immediately gags you. It seems that intuitively you *can* speak, but whenever you are put in a position to speak it doesn't happen. Or in the reverse case, having a finkish disposition is like being gagged and followed around by a person who rapidly un-gags you whenever the moment comes to speak. It seems that intuitively you cannot speak, even though at every opportunity to speak you actually can. We use analogies like this in metaphysics all the time, to explain features of views and to explore the consequences of case studies. And yet this is non-determinative explanation, so it is false that all metaphysical explanations are determinative.

Perhaps, however, we began with too broad a conception of *metaphysical explanation*, as *any explanation* offered in the course of the practice of metaphysics. Perhaps a more appropriate conception of metaphysical explanation is *the kind of explanation that is distinctive of the practice of metaphysics*. If we adopt this narrower definition of metaphysical explanation, then we can acknowledge that metaphysical explanation *is* always determinative without having to deny that

⁵² Martin (1994).

⁵³ Martin (1994, section 2).

metaphysicians sometimes offer non-determinative explanations, even while engaged in the practice of metaphysics. This seems to be a sensible position, and on this view the case of the finkish disposition would not be a counterexample, because it would not be an instance of distinctively metaphysical explanation, even if it were offered in the course of the practice of metaphysics. Let us say for the sake of argument that determinative explanation is distinctively metaphysical. In that case, the position that all distinctively metaphysical explanation is determinative would be both true and sensible, but it would not be a form of *explanatory realism* as it permits a wide variety of non-determinative explanations, even within metaphysics. As such this position is more appropriately characterized as a form of *explanatory pluralism*. To illustrate, consider the claim that all historical explanation is narrative explanation, where historical explanation is the kind of explanation most distinctive to history. We can acknowledge that this is the case while holding that most explanation is not narrative explanation, and that lots of historical explanations are not narrative explanations. This is the view that narrative explanations are highly prized by historians, are central to the historical method, and are distinctive of history. The same may well be true for determinative explanation for the metaphysician, but the view that this is true is a form of explanatory pluralism, not realism.

Another alternative, modified version of explanatory realism is the view that determinative explanation is the most *complete* form of explanation. One motivation for this view is the position that uncovering determination is the overall goal of explanation, and so only explanations that achieve this goal are genuinely complete. But this is to beg the question in favor of the explanatory realist, in so far as it is to decide that determinative explanations are a superior form of explanation, rather than to find some other reason to think that this is the case. As we have seen, the variety of explanatory practices across philosophy, science and everyday life indicates that uncovering metaphysical structure is not the ultimate goal of all, or even most, explanation.

These two modifications of explanatory realism—metaphysical explanatory realism, and the view that determinative explanation is the most complete form of explanation—are apparently attractive alternatives to full-blown explanatory realism, but they both face serious problems.

5 Conclusion

Having seen that there are good reasons to reject explanatory realism, we should now consider alternatives. Where explanatory realism is the position that explanations succeed only by giving information about determination, explanatory anti-realism is the position that explanation does not succeed by giving information about determination. The explanatory anti-realist holds that determination has nothing to do with explanation. If we happen to provide information about a cause or a ground in the course of formulating an explanation, then this is not a feature in virtue of which the explanation succeeds. The explanatory anti-realist understands explanation in terms of non-metaphysical features such as increasing understanding,

or showing that the explanandum was to be expected given the explanans.⁵⁴ Another alternative to explanatory realism is explanatory pluralism. This is the position that, whatever it is explanations do, they sometimes succeed by giving information about determination, and sometimes do not. This is different from explanatory realism because it permits certain non-determinative explanations, and different from explanatory anti-realism because it permits certain determinative explanations. The pluralist holds that *sometimes* explanations succeed because they give information about determination, but not that *all* explanations do so.⁵⁵ I will not attempt to defend one of these options here, but I will suggest that explanatory pluralism is the more promising position. The explanatory pluralist accepts that some explanations succeed by giving information about determination, and so they can hold onto much of the original motivation for explanatory realism without the problems and counterexamples that plague explanatory realists. The explanatory anti-realist, on the other hand, has to explain away the fact that some explanations at least appear to succeed by giving information about determination, including the two simple examples discussed in the introduction.

Explanatory realism is widely-held and often used for argumentative purposes in contemporary metaphysics, but in this paper I have argued that both strong and weak versions of explanatory realism are false. Explanatory realism faces a variety of counterexamples and problem cases, and is based on an implausibly narrow view about the nature of explanation. Accordingly, there is no good reason to endorse explanatory realism.

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⁵⁴ For example, see Achinstein (1983), and Van Fraassen (1980).

⁵⁵ Sometimes the label “explanatory pluralism” is used in philosophy of science for the position that more than one explanation is required to account for a given phenomenon. For example, Carla Fehr argues that this is true of the evolution of sex in Fehr (2006). However, I am using this term in a different way, for the view that some explanations are determinative, while others are not.

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