



Nina Emery

# NATURALISM BEYOND THE LIMITS OF SCIENCE

Reviewed by Jo Wolff

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*Naturalism beyond the Limits of Science: How Scientific Methodology Can and Should Shape Philosophical Theorizing*<sup>5</sup>

Nina Emery

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Nina Emery's book *Naturalism beyond the Limits of Science* is an exciting and much needed contribution to the ongoing debate over naturalistic metaphysics. The return of metaphysics—understood as the philosophical study of what the world is like—has prompted difficult questions about the relationship of this branch of philosophy to science, which is arguably our best way of addressing questions about what the world is like. Are metaphysicians offering an alternative to scientific theories about the world, is their work complementary, or should they feel constrained by our best scientific theories? Emery frames these questions as a dilemma: either metaphysicians and scientists are doing the same thing, in which case, 'what is the point of doing metaphysics at all?' (p. 3); or else metaphysicians are doing something substantially different, in which case, 'metaphysics starts to seem like a pretty mysterious enterprise' (p. 3).

Whether framed as a dilemma or more loosely as questions, these concerns have caused particular unease among metaphysicians who broadly consider themselves naturalists, which minimally involves some commitment to the idea that philosophy should pay attention to our best science. It is these naturalistically inclined metaphysicians who are the primary target of Emery's book. She offers both consolation and challenge for naturalistic metaphysics. On the one hand, she offers a way out of the above dilemma: there is room for metaphysics beyond science, even for card-carrying naturalists. On the other hand, though, adopting her solution to the original dilemma requires substantial changes in how we do metaphysics, which will in turn lead to surprising outcomes in first-order metaphysical debates.

Emery proceeds as follows: First, she argues that if we are what she calls 'content naturalists', we should also be 'methodological naturalists'. Next, she argues—first in the abstract and then by way of three case studies—that adopting methodological naturalism has surprising consequences for first-order metaphysical debates. The final two chapters are devoted to dealing with the challenge of pluralism about scientific methodology and the possibility of doing metaphysics without naturalistic constraints. While Emery's primary aims are to convince the reader (i) of the link between content naturalism and methodological naturalism and (ii) of the impact methodological naturalism has on first-order debates, she does think that content naturalism is in fact the default position in many metaphysical debates and that this is as it should be.

Content naturalists believe that 'we should not accept metaphysical theories that conflict with the content of our best scientific theories' (p. 23). Although Emery does not say so, this view looks like the contemporary successor to what used to be known as ontological naturalism, the view that we are ontologically committed to the entities our best scientific theories quantify over. Content naturalism is not restricted to ontology, however, nor does it require a reformulation of scientific theories in one's preferred logic. As Emery seems to understand it, the content of scientific theories is propositional and can come into direct conflict with claims made in metaphysics, although she concedes that there may be legitimate debate over the content of (some of) our scientific theories (p. 17). A key assumption for her view is that while there may be some room for interpretation when it comes to the content of our best scientific theories, there are nonetheless many cases where there is widespread consensus over the content of our best scientific theories (p. 18). Emery leaves open just how much room for interpretation regarding the content of a given scientific theory there is, but makes it clear that not just any interpretation will do if content naturalism is to be a substantive thesis. She wants to give wriggle room for presentists in the face of special relativity, while denying any all-out relativism according to which scientific theories merely offer one 'perspective' among many (p. 25). Content naturalists, it seems, have considerable leeway in interpreting the content of a scientific theory as well as in inventing metaphysical theories, yet they cannot simply refuse to engage with the relevant science.

Not everyone will be satisfied with this characterization of naturalistic commitments. Notably, radical content naturalists will insist that we are constrained by science insofar as we should not speculate beyond that for which we have good scientific theories. A radical content naturalist says we should not accept metaphysical theories that either conflict with or go beyond the content of our best scientific theories. Emery sets aside radical content naturalism as it is not the default position in contemporary metaphysics (p. 24). This much seems correct—very few contemporary metaphysicians are radical content naturalists, perhaps for somewhat self-serving reasons. Yet it is unclear whether Emery or her fellow metaphysicians have given us good reasons for thinking that it is enough to be a content naturalist in order to do naturalistic metaphysics. In particular, radical content naturalists like Ladyman may wonder whether Emery's reasons for being a content naturalist aren't also excellent reasons for being a radical content naturalist. Her main response seems to be that scientific theories themselves do not contain a totality clause, according to which there is nothing beyond what the theory asserts (p. 23). Science itself, then, does not force us to embrace radical content naturalism. This seems right, but also leaves it wide open whether there might be philosophical grounds for thinking that any argument for content naturalism is in fact also an argument for radical content naturalism.

Emery's argument in favour of content naturalism is brief: Science has been very successful in answering questions about what the world is like. There's no clear demarcation between the domain of science and the domain of metaphysics. Hence we should be content naturalists (p. 46). One immediate worry about this argument is that it seems to suggest that we should be scientific realists if we are content naturalists. Science not only provides empirically adequate theories, but ones that tell us what the world is really like.

Emery, however, denies that scientific realism is strictly required for content naturalism; all that is required is that the goal of metaphysics and the goal of science are aligned. If you believe that science aims for the truth and that metaphysics aims for the truth, then you should be a content naturalist. If, on the other hand, you believe that science aims to produce pragmatically useful theories and you believe that metaphysics aims to produce pragmatically useful theories, you should also be a content naturalist. It is only if the goals of metaphysics and science come apart that you should not be a content naturalist.

This seems too quick. For one, it leaves out of the picture entirely anti-realists about science who aren't also pragmatists. More importantly, it is not clear that Emery's argument works as well for pragmatists as it does for realists. A major pull in favour of content naturalism, both descriptively and normatively, is the thought that metaphysicians must take objections based on conflicts between their preferred metaphysics and our best science seriously. If the aim is truth, then accepting a metaphysical theory that says  $p$  when our best scientific theories say  $\text{not-}p$  means having to reject the scientific theory on pain of accepting a contradiction. If the aim is usefulness, however, conflicting theories are not an immediate problem. Newtonian physics continues to be useful, even if it conflicts with the theory of relativity. But if both theories are merely useful, there is no problem with applying them where and when they are useful. Indeed, this seems to be one of the main selling points of contemporary pragmatism in the philosophy of science: unlike traditional realists, pragmatists can make sense of the common scientific practice of working with a number of different, and indeed conflicting, models.

Instead of trying to stay neutral between scientific realism and anti-realism, then, Emery might have done better simply to embrace scientific realism. Those who think of metaphysics as a mode of inquiry into what the world is like tend to be committed to realism, both scientific and metaphysical (for example, Sider [2011]).

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Setting aside any reservations about content naturalism, what of Emery's novel idea, namely, that if you are a content naturalist, you should also be a methodological naturalist? Here's the argument in full:

P1<sub>T</sub> If you are a content naturalist who thinks that the goal of metaphysical theorizing is to put forward true claims about what the world is like, then you should think that the content of our best scientific theories is true.

P2<sub>T</sub> If you think that the content of our best scientific theories is true, then you should also think that standard scientific methodology is a good guide to the truth.

P3<sub>T</sub> If you are a content naturalist who thinks that the goal of metaphysical theorizing is to put forward true claims about what the world is like, then you should think that standard scientific methodology is a good guide to the truth.

C<sub>T</sub> If you are a content naturalist who thinks that the goal of metaphysical theorizing is to put forward true claims about what the world is like, then you should be a methodological naturalist. (p. 28)

Emery offers several versions of this argument, including a general version for any epistemic feature, *F*, and one for conceptual metaphysicians. The conclusion of the argument is what Emery calls the content-methodology link: 'If you are a content naturalist, then you should be a methodological naturalist' (p. 30). This is the first key novel claim of the book, so this argument is clearly extremely important.

Of the premises, P2<sub>T</sub> is the most contentious. Emery's defence of it is brief: why would you think the content of our best scientific theories is true, yet not think that scientific methodology is a good guide to the truth? Indeed, Emery goes further: 'What is distinctive of the content of our best scientific theories is that they were produced using a certain methodology' (p. 28). This is a substantive and controversial claim, which clearly does a lot of heavy lifting in the argument. First, Emery somewhat surprisingly commits to something like a demarcation criterion for science—what distinguishes science from other pursuits is its methodology. This goes somewhat against both her own tendency to suggest that the boundary between science and metaphysics is vague at best, and more generally against a trend in philosophy of science to give up on any clear demarcation criteria. As such, it would seem to warrant more discussion than is provided here. Emery does offer further discussion of the second surprising aspect of this claim, which is that there is in fact a (sufficiently) uniform 'scientific methodology'. Well aware that this claim has been contested in philosophy of science, Emery devotes an entire chapter (chapter 7) to the defence of the idea that claims of scientific pluralism are overblown and that even where there is pluralism, her argument can survive in modified form. What then is the scientific methodology naturalist metaphysicians should adopt?

One might expect 'scientific methodology' to mean something like the familiar 'scientific method': making observations, formulating a hypothesis, deriving a prediction from the hypothesis, and testing that prediction in a suitably designed experiment. This is not what Emery has in mind, and it is not the scientific method thus understood that metaphysicians ought to emulate in her view. Instead, the 'scientific methodology' of interest to Emery is almost entirely confined to what she calls 'extra-empirical principles' (pp. 72ff). Extra-empirical principles have the following form: 'When choosing between two or more empirically adequate theories, choose the theory that has feature *F*' (p. 73). Traditional examples here might include various theoretical virtues as the relevant features—for instance, simplicity, explanatory power, fruitfulness, and so on. Such extra-empirical principles are needed in scientific theory choice, because scientific theories are underdetermined by empirical data, both in practice and in principle (pp. 66ff). Choosing between scientific theories, then, inevitably involves appeal to extra-empirical principles. Similarly, Emery suggests,

metaphysicians should employ extra-empirical principles in their theory choices and, crucially, metaphysicians should employ the same extra-empirical principles scientists use.

This suggestion builds on a view already widespread in contemporary metaphysics, namely, that metaphysicians should choose their theories by appeal to theoretical virtues, just like scientists do (Sider et al. [2008]; Paul [2012]). Emery's proposal goes substantially beyond this appeal to theoretical virtues, however, in that her extra-empirical principles are both more specific than theoretical virtues, and in that she takes on the task of showing that the principles in question are in fact part of scientific theorizing. Her approach thereby makes good on the claim to engage with scientific practice and offers more concrete guidance in particular metaphysical debates than gesturing at theoretical virtues can achieve.

This becomes especially clear in three cases studies (chapters 4–6), each of which is devoted to a specific extra-empirical principle and its application to a particular metaphysical debate. These three case studies are in many respects the heart of the book, as they show Emery's methodological naturalism in action: here we get a clear sense of how being a methodological naturalist will impact first-order metaphysical theorizing, and of the types of principles Emery hopes to extract from the sciences.

The first case study deals with the debate over laws of nature, and the methodological principle employed is what Emery calls the pattern explanation principle (PEP): 'When choosing between competing empirically adequate theories, choose the theory that does not leave well-established patterns without a metaphysically robust explanation, even if that theory involves the introduction of some type of entity that is metaphysically weird or novel' (p. 109). Emery demonstrates that this commitment is part of standard scientific practice by providing three examples from the history of physics: the postulation of the neutrino, the electromagnetic field, and dark energy. Each of these entities is weird and novel, yet is accepted in order to avoid leaving a pattern in the data unexplained. Emery applies the PEP to the debate between Humean and governing conceptions of laws of nature and argues that PEP favours governing views. This is surprising insofar as Humean views are often considered the more naturalistic option.

The second case study offers a defence of Mooreanism over nihilism about composition on methodological naturalist grounds. The methodological principle involved here is principle of minimal divergence (PMD): 'Insofar as you have two or more candidate theories, all of which are empirically and explanatorily adequate, you ought to choose the theory that diverges the least from the manifest image' (p. 131). Since nihilism seems to depart quite dramatically from the manifest image—where tables, chairs, and other composite objects seem to exist—while Mooreanism does not, Mooreanism is the naturalistically preferred view. While the argument for PEP being a part of scientific practice drew straightforwardly on examples from the history of physics, the argument for PMD is more indirect: Scientists either set aside or do not even consider radical sceptical scenarios like Boltzmann brains, when developing and accepting hypotheses. The best explanation for setting aside such scenarios is a commitment to something like the PMD.

The third case study involves comparing our commitments in two different metaphysical debates: the ontology of time and the ontology of modality. Emery argues that if, as content naturalists, we reject presentism on account of its conflicting with the theory of special relativity, then, as methodological naturalists, we should also reject actualism. The reason for this surprising result is that the principle that rules out privileged reference frames is supported by a methodological principle—the (no) excess structure principle—which also rules out privileged modal perspectives. The excess structure principle (ESP) says:

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'When choosing between empirically adequate theories, do not choose a theory that posits excess structure' (p. 166). Excess structure is then taken to single out one of several descriptions, where each of the descriptions is such that the laws of physics hold (p. 166). Methodological naturalism here requires alignment of our views in two otherwise separate first-order metaphysical debates.

These case studies function both as illustrations of how to extract methodological principles from science, and as proof of concept for the claim that methodological naturalism has surprising impact on first-order metaphysical debates. Of course, many metaphysicians will have quibbles about how Emery applies the extracted principles to the different debates, but I take it she would welcome such disagreement. After all, her main aim is to change the way we do metaphysics, so if we end up debating how this or that methodological principle applies to a particular metaphysical debate, she has succeeded in shifting the terms of the debate.

A more worrisome question raised by these case studies is how we know which principles to apply where, and how to weigh them against each other. Both the pattern explanation principle and the excess structure principle have led to revisions in our ontology that make for a significant departure from our manifest image. How do we know when to resist such revisions to our ontology on principle of minimal divergence grounds? Once again it seems that Emery is leaving those questions to be sorted out by future methodological naturalists. Fair enough—developing an exhaustive, ranked list of methodological principles to be applied in metaphysics would be asking too much for a book that is programmatic in its ambition. The debate over theoretical virtues in the philosophy of science provides a somewhat cautionary tale: perhaps there will be no single list of principles, and perhaps the trade-offs will have to be negotiated case by case. If something similar turns out to be true for the principles employed by the methodological naturalist, we might wonder, though, how effective methodological naturalism will be in settling metaphysical debates. Will disputes simply come down to which methodological principles are considered more important in a given case? But perhaps this wouldn't be a bad thing. After all, if this is how science settles disputes, and science is highly successful in telling us what the world is like, then perhaps we shouldn't be surprised or disappointed if naturalistic metaphysics ends up in a similar place.

At this point, though, the question arises of whether Emery's characterization of scientific methodology is indeed apt. For the legitimacy of appealing to extra-empirical principles, as well as the legitimacy of the particular principles to which the naturalistic metaphysician may appeal, is underwritten by their use in 'standard scientific practice'. To what extent, then, are extra-empirical principles part of standard scientific practice, and how does their use in science legitimize their use in metaphysics?

One apparent difference between science and metaphysics is that scientific methodology involves a great deal more than extra-empirical principles, most obviously empirical methods like observation and experiment. There are two ways this difference may evolve into a concern for methodological naturalism. First, it may be that extra-empirical principles are simply not applicable in metaphysics if metaphysics does not also engage in these further empirical investigations. Emery's response to this worry is three-fold: First, observations do play a role in metaphysics and so the difference isn't as large as suggested (p. 81). Second, not all science is subject to observation and experimental evidence (p. 82). And, finally, why exactly do we think that observation matters for the question of whether an extra-empirical principle is a good guide to the truth (p. 83)?

These responses are worth considering, but only go so far in answering the worry. Even if observations have a role to play in metaphysics—Mooreanism about composition is undoubtedly underwritten in part by

observations of chairs and tables—it is not clear that metaphysics engages in systematic observation, or conducts experiments. As the paradigmatic example of a not-so empirical science, string theory is not only contested, but there seems to be general agreement that it would be better to have empirical evidence, even if it is clear that such evidence might be hard to come by. The third response is by far the most interesting, but Emery's treatment of it seems inconclusive. She seems to concede that the evidential weight of extra-empirical principles may be reduced in cases where there is little empirical evidence to go on, yet maintains that 'methodological naturalism will give us *some* reason for accepting one metaphysical theory over another' (p. 84). Not only does this seem weaker than the conclusions she wishes to draw in the three case studies, it also means we have to wonder what else could help us settle such debates if neither empirical evidence nor extra-empirical principles will do the job.

The second way the difference between science and metaphysics can be turned into a worry for methodological naturalism is more subtle. Content naturalists are supposed to accept the methods of science through Emery's content–methodology link, because the reason we accept the content of science as true is that the methods that produce said content are good guides to the truth (and, indeed, it is these methods that demarcate science from other endeavours!). But the methods taken on by methodological naturalists at best comprise part of the methods used in science, and this raises an important question: are the extra-empirical principles that methodological naturalists ought to take on board responsible for the success of science? Emery is right that a content naturalist should not think that scientific methodology is systematically misleading, but this does not mean that everything scientists do, even standardly, is what makes science successful. It's not a stretch to think that the focus on extra-empirical principles seems to leave out both what makes science distinctive and the most pressing reasons for taking science seriously: systematic empirical investigations.

Emery is right, of course, that scientists appeal to principles and virtues beyond empirical data to argue in favour of particular theories, and that this is inevitable due to underdetermination. But it doesn't follow that the principles and virtues appealed to are thereby particularly epistemically respectable, or indeed responsible for scientific success. In fact, there are reasons to be suspicious when scientists appeal to extra-empirical principles. Scientists might appeal to virtues like simplicity or naturalness, but we should ask whether these virtues are tracking other features that are more obviously truth-conducive (see, for example, the discussion of parsimony in (Sober [2022]) and elsewhere), and whether these appeals are justified. Scientists are notoriously opportunistic in their appeal to philosophical principles when it suits their local concerns, but without the commitment to follow through on the philosophical views. Take Heisenberg's ([1925]) appeal to 'observability' in his famous 'Umdeutung' paper, which provided the first formulation of what would become known as matrix mechanics. Heisenberg took himself to be following in Einstein's footsteps: hadn't Einstein successfully appealed to something like observability to reach special relativity theory? Yet Einstein distanced himself from this appeal to observability in the case of quantum mechanics. Philosophers and historians of science have been debating ever since whether these appeals played any role in the arguments favouring special relativity and matrix mechanics, respectively. This suggests that the appeal to extra-empirical principles, far from being a distinctive good-making feature of science, is instead a place where science comes particularly close to philosophy and is perhaps most in need of philosophical scrutiny. Emery's characterization of methodological naturalism does not seem to leave naturalists much room to exercise such scrutiny. More so than the immediate impact on particular metaphysical debates, this might give us reason to pause before embracing methodological naturalism.

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While Emery's aim is to persuade us of the link between content naturalism and methodological naturalism, she officially leaves it open for metaphysicians to reject content naturalism instead. She offers some speculation as to what such 'unmoored' metaphysics might look like in the final chapter of the book, and it is clear that it, too, would be a significant departure from current metaphysical practice.

Emery has courageously taken on the task of articulating what is a widespread but largely inchoate position among contemporary metaphysicians, namely, the idea that metaphysics is somehow continuous with science and thereby legitimate. In the extant literature, this suggestion rarely went beyond a vague gesture in the direction of theoretical virtues (allegedly) employed in theory choice in science. It is a huge accomplishment of Emery's book that she takes the time and care to spell out what such methodological naturalism might look like in practice. Throughout, the book is clearly written and organized, making it accessible even to advanced undergraduate and postgraduate students. If the resulting view raises more questions than it answers, this may be an unintended but not an unwelcome outcome. It demonstrates that the comfortable, under-explicated 'naturalism' prevalent in much of contemporary philosophy is more fragile than it looks. Contemporary metaphysicians, naturalistic or otherwise, would do well to pay close attention.

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