Abandoning Veritism

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Abstract

Many of our best scientific explanations incorporate idealizations. Philosophers disagree about whether and to what extent we must thus give up on truth as a prerequisite for scientific explanation and understanding. Here I propose reframing this debate. Factivism or veritism about explanation is not an obvious view to be given up only under duress. Rather, it is philosophically fruitful to emphasize how departures from the truth facilitate explanation and, alongside it, understanding. The onus should be on veritists to show why it is philosophically important to sideline the contributions idealizations make to scientific explanation and understanding.

1 Introduction

Many of our best scientific explanations incorporate idealizations, that is, false assumptions. Do the contributions idealizations make to scientific explanations interfere with the facticity or veracity of explanations and the understanding they produce? Some philosophers think so. On the face of it, explanations' reliance on false assumptions seems to require the acknowledgement of ways in which those explanations fall short of complete

truth. Elgin (2004, 2017) argues that "felicitous falsehoods" are central to scientific understanding and thus motivate a rejection of veritism, or "truth-centered epistemology" (2004, 113). On Elgin's alternative nonfactive account of understanding, the posits that contribute to generating understanding need not all be true (nor believed to be true). Batterman (2009) argues that some idealizations are explanatorily ineliminable. Bokulich (2009, 2016) argues that scientific models constitute many scientific explanations and that those models' fictional elements are crucial to the explanation. de Regt (2009, 2017) focuses on the pragmatic aspects of understanding and how idealization can contribute to these. Potochnik (2017) similarly emphasizes the centrality of idealizations to scientific explanations and also concludes that explanations and the understanding they produce may not be, strictly speaking, entirely true.

Others who also afford a central role for idealizations in explanation argue that idealizations do not interfere with explanations' facticity or veracity. Pincock (2021) endorses veritism, which he defines specifically as the view that "truth is a necessary condition on explanation," or that "each genuine explanation will consist of propositions that are true and appropriately related to the target of the explanation" (3). Pincock argues that idealizations contribute to explanation in other ways but are not included among those true propositions. This is similar to the view of Lawler (2019), who argues that idealizations contribute to understanding by enabling it rather than constituting it. Mäki (2011) argues that idealizations contribute to the pursuit of truth and are perhaps even only apparently false. Strevens (2017) in turn argues that idealizations' contribution to explanations consists in showing which factors are not difference makers and which causes are truly difference-makers. Khalifa (2017) defends a somewhat weaker "quasi-factivism" about understanding, which is the view that understanding requires belief

in an approximately true explanation and the role of idealization is simply to scaffold human cognition to achieve these approximately true explanations. Similarly, Sullivan and Khalifa (2019) argue that falsehoods' value to understanding is not epistemic but merely practical. According to these philosophers, truth or approximate truth is a requirement for explanation and understanding, and idealizations thus do not partly constitute explanations but in some other way support the generation of (true or approximately true) explanations.

This debate has progressed to a point where there is a range of nuanced, credible positions on both sides. People on each side—those who think idealized explanations challenge factivism or veritism and those who deny this—grant much of what those on the other side assert. On one hand, idealizations are widely agreed to be of value to the scientific project of explaining, to achieving understanding. On the other hand, there is agreement that there must be some veracity requirement—some requirement of truth, approximate truth, or accuracy—for legitimate understanding. The differences among philosophical positions lie in the details of how each of these ideas is developed and in what is emphasized: the explanatory value of departures from the truth or the residual veracity requirement.

I propose that this juncture is a good opportunity to reframe the debate. So far, the debate has proceeded as if factivism or veritism is the obvious stance, to be given up only if idealizations are sufficient to force that move. Arguments for veritism focus on how one is able to maintain veritism despite scientists' habit of introducing idealizations. I want to challenge this framing. I suggest that the idea that scientific explanations regularly fall short of complete truth and accuracy is highly plausible, perhaps even obvious. Rather than focus on whether and how one is able to maintain veritism in the face of this, I

propose we instead focus on developing the positive implications of this feature of science. I take this tack here.

I begin by arguing in section 2 that idealizations regularly contribute to scientific understanding, and thus scientific explanation, and that this contribution is due to their falsity. In section 3, I motivate the philosophical importance of telling this story, that is, of emphasizing the contribution of idealizations qua falsehoods to explanation and understanding. Then, in section 4, I develop an account of what theorists about science stand to gain by centering the role of false assumptions in supporting scientific understanding. My aim is not to convince the reader that its impossible to maintain a truth-centric account of the role of idealization in explanation and understanding. Rather, I want to show: (1) a strong case has been made that idealizations directly contribute to scientific understanding in virtue of their falsity, and (2) centering this rather than minimizing it is philosophically illuminating.

2 Idealization and Understanding

Here I consider how idealizations contribute to scientific explanation and understanding in virtue of their falsity. Let's start with two preliminaries. First, there are distinct literatures on scientific explanation and understanding and debate regarding their relationship. Nonetheless, in what follows I presume a tight relationship between explanation and understanding. Philosophical discussions of scientific explanation from Hempel onward have suggested understanding follows from successful explanation, and philosophers have debated the contribution of idealization to both. I also want to be as generic as possible in what I say here about the contributions of idealization to explanation and

understanding, so that what I say is relevant for philosophers holding different views about explanation, understanding, and the relation between them. Second, for this discussion, it's important to distinguish between idealizations, understood as false assumptions, from the representations (such as models) those idealizations facilitate. I will refer to the latter as "idealized representations." For example, the ideal gas law is an idealized representation, whereas the assumption that a gas is composed of non-interacting point particles is an idealization. Idealized representations should be approximately true, but idealizations themselves need not be. The ideal gas law approximates the behavior of a variety of gases, but no real gas is actually composed of point particles experiencing no intermolecular forces. My focus here is on the contribution that idealizations, the false assumptions themselves, make to understanding.

So, why think idealizations contribute to scientific understanding? We can conclude this is so simply in virtue of the fact that many of our most heralded scientific explanations involve idealizations. What is more, these explanations are maintained with their idealizations in place, even when more accurate representations, i.e., those that replace one or more idealizations with accurate claims, are available. Such explanations include the ideal gas law as well as van der wals equation for gases, the Hardy-Weinberg law as well as optimality models for evolution, and so on. I take it this much is agreed upon across the parties to this debate. What is more at issue is the question of whether the contribution idealizations make to understanding is in virtue of their falsity. Philosophers who see idealization as compromising veritism think so, while philosophers who want to maintain veritism in the face of idealizations think not. On the face of it, there's something puzzling about the idea that an idealization can support understanding *by* being false instead of *despite* being false.

False posits clearly cannot contribute to a representation's accuracy, at least not in virtue of their falsity. But it takes more than accuracy for an explanation to succeed. An explanation also must have the potential to generate understanding, and understanding is a cognitive state (as well as an epistemic success). For some explanation Y to successfully explain an explanandum X, the relevant subject S must be able to understand that X because Y. This idea is not universally accepted; one who endorses a purely ontic conception of explanation may reject the idea that explanations are governed in part by success conditions bearing on their relation to the subjects of understanding. But I do think this connection to the subjects of understanding—those seeking explanation—is widely accepted, at least implicitly. After all, maintaining any representational requirements for scientific explanation entails that explanations are the sorts of things that are represented to an audience. If we grant that successful explanation requires the proper relationship to the subjects of understanding, then an explanation can be improved not just in its accuracy but also in its ability to generate a cognitive state of understanding. And it is the latter ability to which idealizations might plausibly contribute in virtue of their falsity.

Our world is complex, and any given target for explanation is influenced by myriad factors. Idealizations are used as a way to ignore some of that complexity, to eliminate the practical and cognitive burden of getting those factors right. This is useful for lots of tasks in science, including the task of explaining. In this use, idealizations enable those seeking explanation to home in on how factors of interest bear on the phenomenon to be explained. They accomplish this by enabling the neglect of other factors that are, at least for the moment, incidental to the interests of the explanation-seekers. Put another way, idealizations enable explanations to zero in on patterns in our world that account for

phenomena that we would otherwise find puzzling.

This is what enables scientists to use game theory to explain phenomena ranging from biological symbiosis to international cooperation among governments, to use Mendelian genetics to explain the persistence of sickle-cell anemia, to use the Lotka-Volterra equations to explain spikes and drops in animal populations, the moon's revolution and Newtonian mechanics to explain the tides, and the ideal gas law to explain the pressure of gases in rigid containers and the volume of gases in balloons. All of these explanations employ idealizations: false assumptions to simplify heredity, community dynamics, the laws of physics, and more. The simplified treatments these idealizations facilitate enable the grasp of illuminating patterns (Elgin, 2004), patterns of counterfactual dependence (Bokulich, 2011), perhaps causal patterns (Potochnik, 2017). Grasping such a pattern shows how the occurrence of the phenomenon to be explained depended on the factors of interest, how change in those factors would have altered the phenomenon. Grasping such a pattern reveals how the phenomenon to be explained was to be expected given how things like that tend to go. These accomplishments have variously been associated with successful explanation; see (Hempel, 1965; Woodward, 2003; Strevens, 2008).

Because of the complexity of our world, depicting such a pattern often requires papering over complicating details that would otherwise obliterate the pattern (Elgin, 2004; Bokulich, 2011; Potochnik, 2015a). It's deeply illuminating to grasp how cooperation can maximize benefit to participants in an exchange and the wide range of conditions over which this can occur, from governments to bacteria (Axelrod, 1984). That broad pattern is no longer represented if an explanation of symbiosis incorporates information about the genetic causes of a cooperative trait in place of the idealization that traits propagate to the degree of their success. The explanation is instead more nuanced and

much less broadly applicable in virtue of being less idealized. When the pattern of how cooperation leads to mutual benefit is enlightening, this additional accuracy inhibits understanding by obscuring the enlightening pattern. The key to generating a cognitive state of understanding is to respond to what puzzles those seeking explanation, and this is a task idealizations are tailored to help achieve.

If idealizations are integral to representing enlightening patterns, then the falsity of idealizations can directly contribute to scientific understanding. By artificial simplification, idealizations positively contribute to representing an enlightening pattern. I resist the interpretation of this as mere stage-setting—facilitation or enabling—because I think this role is naturally construed as representational. Idealizations in this use do not just avoid representing complicating detail but instead represent aspects of the world as being other than they are. Game theory explanations for the emergence of cooperation cannot avoid saying anything about mode of inheritance, so they falsely assume that strategies propagate to the degree of their success. This has content. This indicates something about the relationship a phenomenon so represented bears to the enlightening pattern, namely, that its actual system of inheritance does not interfere with it conforming to the pattern of cooperation's benefit. We can expect this pattern to occur (at some level of fidelity) in phenomena that can be represented in this way.[1] This idealization therefore misrepresents the phenomenon in an informative way: it represents it as simpler than it in fact is, thereby communicating that it is within the scope of the pattern that occurs in the ideal of strategies propagating to the degree of their success. This plays out in the same way for idealizations supporting explaining the behavior of real gases with the ideal gas

[1]It follows that there are success conditions to be met by idealizations that play this role in explanation. I don't have the space to go into this feature of the view here, but see (Elgin, 2017) and (Potochnik, 2017) for two approaches to theorizing those conditions.

law, sickle-cell anemia with Mendelian genetics, and other explanations that incorporate idealizations.

In this section, I have motivated a general view of how idealizations may contribute positively to scientific explanations and the understanding thereby produced. This contribution is in virtue of idealizations' falsity, for their falsity eliminates complicating details that, represented more accurately, would interfere with the depiction of the explanatory pattern. Idealizations' contribution does not simply consist in facilitating veridical representation but in *mis*representing the system to reveal an enlightening pattern. The depiction of patterns focal to explanation seekers, to the subjects of understanding, is needed for explanations to generate a cognitive state of understanding. This success relies essentially on idealizations' misrepresentation of the world, a sacrifice of accuracy of the phenomenon for a corresponding gain in clarity for the explainers. Because understanding is an epistemic success, there is thus epistemic value to explanations that sacrifice some accuracy or truth to better achieve a cognitive state of understanding.

3 What Veritism Gets Wrong

Even if the view of idealization's contribution to explanation I've outlined is on the right track or is granted for the sake of argument, veritists still have opportunities to insist that the proper interpretation is not sacrificing truth but rather securing truths that would otherwise be inaccessible. In line with Khalifa's (2017) quasi-factivism, one might emphasize that idealized representations must be at least approximately true of any phenomena they can explain. Or, like Lawler (2019) and Pincock (2021), one may argue that idealizations' role in achieving understanding is non-representational and facilitative

rather than constitutive. These are veritist positions; they are ways of accommodating idealization while maintaining a truth requirement for explanation and understanding. Or, while acknowledging the falsity of idealizations about the phenomena to be understood, one might rehabilitate veritism by emphasizing idealizations' truth about the *patterns* these phenomena conform to.

Here I motivate the idea that, even if one can maintain some version of veritism about explanation, it is better to emphasize the regards in which idealizations compromise accuracy or truth to facilitate understanding. In particular, this conception of idealization's role illuminates three features of scientific explanation that would otherwise remain mysterious.

First, there is the persistence of idealized explanations when more realistic alternatives are available. Ideal gas law explanations persist in a variety of scientific contexts when more realistic treatments would be possible (Woody, 2013). Optimality and game theory explanations are regularly developed in evolutionary ecology even though modeling approaches more accurate of the genetic transmission of traits are available (Potochnik, 2010). On the face of it, veritism renders this practice illegitimate. Even if veritism permits some deviation from truth, it seems this deviation should be minimized. In contrast, the view I sketched in section 2 can make sense of the persistence of more idealized explanations. The continued value of idealized explanations consists in their ability to represent a pattern that is enlightening to those seeking explanation. There are some explanatory jobs that the ideal gas law does best, in virtue of rather than in spite of its misrepresentation of gases as noninteracting point particles. It may be that idealized explanations must be approximately true. But the false assumptions themselves, and their maintenance when it would be possible to eliminate them in favor of more realistic assumptions, cannot be motivated by focusing on truth as an epistemic end.

Second, there often are multiple scientific accounts of a single phenomenon. We see non-competing varieties of understanding, tailored to different research projects. One biologist seeks the game theoretic account of the cooperative outcome, while another seeks the population genetic account of how this came to be (Potochnik, 2010). For some projects, the ideal gas law suffices to account for the properties of a given gas, while for others, the van der Waals equation is apt. Such multiple accounts, different varieties of understanding, are to be expected if idealizations' contribution to explanation is to home in on one pattern among many in a phenomenon, in a way that responds to the cognitive needs of those seeking explanation. This also gives a ready account of the value of this feature of science. Focusing on one pattern makes the resulting explanation more broadly applicable, more exportable, than if researchers worked toward a more accurate, integrated account of the specific phenomenon. The price for this broader applicability is artificial simplification via idealization. In contrast, this multiplicity of accounts is not readily explainable if the epistemic value of the elements of an explanation is always cashed out in terms of approximate truth of the object of understanding. Whenever simplification and exportability are purchased with idealizations, an aim of truth or approximate truth should motivate de-idealization, steps toward an integrated, realistic account. But integrated accounts are an exception that proves the rule in science of simplified, interest-relative accounts.

Third, explanations bear the mark of the particular individuals who develop them—the subjects of understanding—in a way that goes beyond simply uncovering what is true about objects of understanding. Scientists' representational choices, including what to emphasize, what to take into account, and what to idealize, cannot influence what's true of the world. But these are inarguably decision points that bear on the nature of the

explanations scientists generate. In this way, specifics of the research agenda shape the resulting explanation. The choice of what to focus on, what variety of insight to seek, occurs even when the phenomenon of interest is settled on. In North America, mountain bluebirds are early settlers in areas after wildfire, and they are eventually displaced by the more aggressive Western bluebirds. Is it important to understand how changing access to resources leads Western bluebirds to colonize mountain bluebirds' territory? What leads some Western bluebirds to be colonizers and others to stay put? What accounts for the relative aggressiveness of Western bluebirds? Whether interbreeding influences each species when they are colocated? This list just scratches the surface of what could be explained about this phenomenon. Each specific research focus targets different patterns and, accordingly, warrants different idealizations. To account for the features of scientific explanations, we must ask not just about the features of the phenomena scientists wish to explain but also about the features of the scientists who wish to do the explaining. This sensitivity to the features of the subjects of understanding is hard to make sense of if we take the aim of explanation simply to be maximally supplying truth or approximate truth about a phenomenon.

For veritists, truth or approximate truth is a requirement for explanation. I have described three features of scientific explanations that I think are best accounted for by positing the explanatory value of departures from truth. It may be possible to develop a factivism or veritism about explanation that accommodates these features. But the requirement of truth or approximate truth leaves these features unexplained, while positing the value of departures from truth accounts for them. This motivates abandoning veritism or factivism (or quasi-factivism) about explanation. Importantly, this is not to say we should give up on an accuracy requirement for our explanations. Such a requirement

is undoubtedly necessary. But the truth or approximate truth of all contributors to explanation is not the only available option for an accuracy requirement; non-factivists about explanation offer alternatives.

If one follows me this far, in agreement or for the sake of argument, one could still claim the veritist mantle by switching the truth attribution from the targets of explanation to the patterns I have said these targets embody. As Currie (2018) points out, "scientists say an awful lot that is true about patterns (even if... they do not say much strictly true of phenomena)." I wholly agree that idealized representations can be true of patterns phenomena embody even when they are not strictly true of phenomena. But I don't think this amounts to veritism about explanation. When the objects of explanation are phenomena under investigation, veritism is a position about the truth of our explanations *of those phenomena*. It is strictly true that ideal gases are composed of non-interacting point particles, and it is approximately true that gases explained with the ideal gas law behave as if they are composed of non-interacting point particles. But is is simply false that any real gas is so composed. This approach to veritism also has a downside like I described for the more traditional varieties of veritism. Moving straight to how a claim of truth may be preserved in the face of idealization obscures the source of idealization's explanatory value.

In this section, I described three features of scientific explanation that go unaccounted for by veritism about explanation. I have not argued that one cannot maintain veritism about scientific explanation but that there are philosophical advantages to abandoning it. Given what we are familiar with in the everyday giving of reasons, positing the epistemic value of departures from truth may seem counterintuitive. But that in itself is not a reason to hold fast to veritism come what may. As with many aspects of everyday existence, what

we have encountered in science can give us reason to revisit our assumptions, including our assumption that increasing truth is the only way to increase epistemic value.

4 Why It Matters that Idealizations Are False

That idealizations contribute to the understanding achieved through science is an important and rather broadly accepted finding in recent philosophy of science. In the previous section, I described what veritism about explanation misses about scientific explanation by not fully accommodating this finding. Here I develop a positive view of how the epistemic importance of idealization for explanation aligns with other plausible or widely shared philosophical views and the insights that can be gained by taking this to heart.

Granting the importance of principled misrepresentation to successful scientific explanation shows how the epistemic successes of formulating genuine explanations, of coming to understand, are relational achievements. Science is not just about depicting truths, even important truths. Rather, it is an exercise in connecting human agents to the world in ways that are cognitively and often practically useful. Sometimes depicting simple truths provides this connection. Other times, the connection bears more of a mark of the human-agent side of the connection. This can take any number of forms, but one important variety is when artificially simplifying our account of some phenomenon enables subjects to grasp an important feature of that phenomenon, to glean why it should be that way and what would have happened if things had been otherwise. Idealization, using simple assumptions to smooth out some of our world's complexity, is an essential step of many instances of coming to understand, at least in science.

This accounts for why idealizations are present in so many scientific explanations, and it accounts for why such idealizations are voluntarily maintained when more realistic alternatives are available. This also accounts for the proliferation of different explanations in science, explanations that capture distinct features of the same or closely related target phenomena. There is a closely related observation to make here about the world: our world is not one in which there is only one story to give about any given happening. Rather, it is richly complex, and there is room for multiple accounts of phenomena that are individually enlightening. I take it most of these claims are pretty uncontroversial among philosophers of science—or at least, similar claims have been made in many different philosophical debates about science. Rejecting veritism about explanation for something more nuanced that affords a distinctive, central role to idealization (as a departure from truth) fits neatly into such a picture.

Sometimes scientific realism is seen as a motivation for veritism about scientific explanations, but none of what I have said here requires abandoning scientific realism. Rather, the point I made above about scientific explanation as a relational achievement has an allied position regarding realism. Science generates knowledge in response to our cognitive needs. That's uncontroversial, I think. And, it may be that responsiveness to our cognitive needs leads to the generation of scientific knowledge not of phenomena per se but of patterns they embody. It's often been said that science is after laws, regularities, repeat phenomena rather than one-off events. It's not a far stretch to suggest that scientists aim to understand phenomena, the events and occurrences of our world, by generating knowledge of the patterns these phenomena embody. This would eliminate veritism about explanations as a requirement for scientific realism. On this view, there is a deep relationship between scientific understanding and scientific knowledge, but it is

not a relationship of identity.

This view also suggests the importance of epistemic subjects in shaping the content of scientific knowledge. Perhaps more than any other feature of science, idealizations make clear the range of ways in which the practitioners and audiences of science shape the nature of scientific findings. Idealizations enable researchers to focus myopically on exactly what they (or others) care about in a phenomenon. Idealizations can tailor a representation to an audience, which is why their role in textbooks has long been appreciated. Idealizations enable the reapplication of approaches a researcher happens to be familiar with to disparate phenomena. In these ways and others, idealizations help tailor scientific knowledge to our cognitive needs.

We want something that usually does not technically exist: a simple answer to why. So, we lie a little bit. We speak about the phenomena we seek to understand as if they correspond more fully than they do to patterns they exhibit. In doing so, we artificially simplify to gain clarity and control over our world. We represent the world multiply, so that we can represent it as simpler than it is. All of this is as it should be, given that our science is designed to respond to our epistemic needs. Departures from the truth are epistemically important, and it's philosophically fruitful to work out how this occurs and what it accomplishes.

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