

Philosophia
Basic Philosophical Concepts
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Fictions and Models
New Essays
Foreword by Nancy Cartwright

Philosophia

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Nancy Cartwright Foreword

This book contains an admirable collection of papers discussing philosophical accounts of fiction in general and the use of tools from accounts of fiction to understand better the status of mathematical or metaphysical objects and claims and of a range of scientific models that 'do not tell it as it is'. I can praise the collection in good conscience because I have had no hand in it at any stage before receiving the finished volume to read. The papers cover a good range of questions, views and arguments and provide a clear window onto a vibrant and burgeoning philosophical discourse. What then can I add?

It turns out that the central concern throughout, whether intentional or not, is with metaphysics: with ontology and truth-making. What is the ontological status of a set, a possible world, a frictionless plane or Madame Bovary and what makes claims about objects like these true or acceptable? One of my recurring themes is that metaphysics cannot be carried out by itself; it must march hand-in-hand with method and use. The methods we use to find out about objects and to establish claims about them must ground and be grounded in our accounts of the kind of things those objects are and of what claims about them assert. Similarly the use to which we put such claims must be grounded in and make good sense relative to our account of what these claims assert, what makes them 'true' or 'acceptable'. The three must dovetail; in particular it must be clear why the methods we use to accept claims are good enough to warrant the uses to which we put them.

This is an old point in the philosophy of mathematics familiar from Hilary Putnam and Paul Benacerraf on what the numbers are and aren't.¹ Whatever account we give of numbers should be one that allows a conduit for learning about them in the ways that we do and for using them to make the successful calculations about matters in the world that we know we can make. What I can offer here are illustrations from my own work of one direction of this process - from metaphysics to use - in the case of certain kinds of scientific models.² These are 'pen and paper' models that are used to understand some set of target situations and to infer claims about them. Generally these claims are based on derivations carried out within the models. But many assumptions of the model that play an essential role in the derivations are not true of the target situations. Over the last few years philosophers of science have looked to theories of fictions both to provide a metaphysics for these models and to understand their use. The first of these tasks is well illustrated in this volume, not only for scientific models but for mathematics, metaphysics and literature. My examples will be of the second of these tasks.

John Woods suggests that if theories of fiction are really playing a role in our understanding of mathematical or metaphysical claims or of scientific modelling it should be clear that it is treating them *as fictions* that does the work. He remarks in an email to me: 'I suppose a central question for all this fictionalism is whether "is fictional", "is a fiction" and the like are load-bearing predicates in a seriously worked out philosophy of science, philosophy of mathematics and so on. Or are they *façons de parler*?'

Although on some theories of fictions, fictional depictions need not be false to the real world, it is nevertheless characteristic of fictions that they are. This seems to be the central feature literary fictions

¹ Cf papers in Putnam and Benacerraf 1983.

² Unfortunately I don't have any special ideas about how tools from fiction theories can help with the converse problem of how to justify mathematical, metaphysical or scientific claims.

share in common with the claims of mathematics, of metaphysics and of many scientific models. From this starting point Woods' challenge then is to explain how focus on this shared characteristic helps solve the problem in view, which in my case is to understand the use of false models to generate true claims about target situations. That, it seems, can be a tall order.

Consider for instance Mauricio Suárez's influential views³ on how scientific models represent. For Suárez a representation is an inference machine. An acceptable representation generates true (or 'true enough') outcomes. Following on from this Gabriele Contessa describes a detailed structure of implicit and explicit rules for using information about the world in general and the target in particular to construct the model, for making inferences within the model and for constructing claims about the world from facts about the model.⁴

Suárez himself is a fictionist, indeed among the first to introduce talk of fictions into the modelling literature; so too probably is Contessa. But so far as I can see there's nothing in the Suárez answer to my question that depends on treating the models like literary fictions that do not provide true depictions of the world. They may usually be fictions, possibly even always, or have aspects that are best treated using tools from a theory of fictions. But it looks as if we could learn about the world from models in just the ways Suárez, Contessa and others following this line describe even if all the depictions in the model are true of the target. So the question I raise is: Is there a reasonable theory of models and model use where treating models as fictions plays an essential role in showing how they teach about the world?

Surely there is a puzzle here, especially when we remember that deduction is the driving force that generates new results from starting assumptions in mathematics, in metaphysics and in scientific

³ See his paper in this volume and references therein. For his argument that fictions need not be false see the Introduction to Suarez 2009.

⁴ Contessa 2010 and 2007.

modelling. False premises can lead validly to true conclusions. But it is hard to see how false premises *help*, how it can be easier or more likely or more efficient to get true results from mathematical and modelling claims that are fictions rather than facts. Here I review a couple not unfamiliar ways they can help to illustrate the kind of account I am looking for.

First is what, following Gerd Gigerenzer, I call ‘cheap heuristics’.⁵ There is something about the totality of model assumptions that allows them to imply the same, or near enough the same, results about the aspects of interest in the target as do true facts. The advantage to using the false assumptions then could be that the results come more quickly, more cheaply, more easily or whatever, as one sometimes alludes to by calling the false assumptions ‘simplifying assumptions’.

One nice example comes from the work of econometrician David Hendry.⁶ As JS Mill remarked,⁷ economic causes generally shift a lot over even short time periods. A realistic model to predict targeted economic effects might list the causes that obtain at a given time then time evolve the system to obtain the causes at work at the target time from whence the effects are to be calculated. This can be incredibly difficult if not practically impossible. But, argues Hendry, for certain typical kinds of economic situations the time evolution results in what amounts to an intercept change in the predictive curve. Based on this Hendry produces simple forecasting models whose assumptions are not true to the situation at all but that catch up quickly with the change and can be proven to give forecasts fairly close to those of a full time-evolving causal model for these special kinds of situations. Here the false assumptions are just what do the job in producing true enough conclusions practicably. Moreover, improving on the truth of some of them can undermine the very trick that allows them to work, so model results

⁵ Cf. Gigerenzer et. al. 1999.

⁶ Hendry xxx

⁷ Mill 1836.

can go from approximately true of the target to radically false with such ‘corrections’.

A second place where fictionalization is a positive help is for models that serve as Galilean thought experiments. The ideal in a Galilean experiment is to remove all impediments in order to observe what a factor does ‘on its own’. For instance removing all the forces operating on a body except the pull of the earth allows us to measure directly ‘the acceleration due to gravity’. Naturally it is difficult, probably impossible, in a real experiment to succeed in eliminating all impediments and we certainly can never know that we have done so. But we can construct models of a Galilean experiment in which we assume, contrary to the facts of any real Galilean experiment, that no impediments are present. Then we add enough claims into the model to predict how the model system evolves. If these claims are true we will have established what the factor would produce were an ideal Galilean experiment performed. This is what I call a ‘Galilean thought experiment’.

I have long argued that many economic models are Galilean thought experiments, for instance models that study the pure effects of asymmetric information on bargaining outcomes or skill loss during unemployment on future employment levels or of the preference not to be badly racially outnumbered by your neighbours on segregation. Nowadays the usual evolutionary law imported into these models is that people act so as to maximize their expected utility in the face of what other agents do. This is generally deemed true enough to do the job, or true enough once certain bounds are added in on rationality and self-interest.

The point I want to stress about Galilean thought experiments is that fiction matters for them. Impediments always occur in any real Galilean experiment. It is just because that’s not true in the model that the model can do its job.

The aim in a Galilean thought experiment is to establish what would happen if the factor under study operated on its own. This is a counterfactual claim, albeit a counterfactual claim supposed to be

true of the real world. But of what use is it? It may tell approximately what occurs in real Galilean experiments but most of us pass our lives without ever encountering one of these. Why Galilean experiments are important, whether in thought or in reality, is that many factors have a stable contribution to make to an effect. Physics is rife with examples. The force of gravity always contributes the same acceleration to an object no matter where the force acts, inside an experiment or out, or what other forces are present to impede the ultimate outcome; so too does an electromagnetic force. Economics makes the same kind of assumption about factors like asymmetric information - that's the point of studying them so diligently; indeed so too does any scientific discipline that employs the analytic method. I use the label 'stable capacities' to mark out factors that make the same contribution to a given effect across all situations.⁸

The Galilean experiment directly reveals the contribution that a factor makes in one special situation - what happens there just *is* what the factor contributes since there are no other contributions. Where factors have stable capacities the contribution they make somewhere is the same as the contribution they make anywhere. In this case the results of a Galilean thought experiment will be true even in situations where the assumptions of the model are wildly false. Again, the fiction matters. Where stable capacities are involved it is just because the assumptions of the model are very false to the target - but false in just the right ways - that the results in the model are true of targets that look very different from the model.

So here are two kinds of cases where the fact that model claims are false of the target situations we use the model to study is just what underwrites the validity of the use to which we put those claims. But there's a lot more in theories of fiction than issues about the truth or falsehood of fictional claims. Surely accounts of fictions and how they operate can provide us with more tools than that! Let me illustrate with a tool I have found to be useful over the last sev-

eral years in helping to understand more fully our uses of scientific models. This is the theory of the fable by Enlightenment philosopher and playwright Gotthold Ephraim Lessing.

The lessons I take from Lessing are from his account of the relation between the story in the fable and its moral. The moral generally uses far more abstract concepts than those in the fable itself. Consider Aesop's 'The Boy Who Cried Wolf'. The shepherd boy watching the sheep on the hillside shouts 'Wolf' and the villagers rush to save him and the sheep. But there is no wolf; the boy was bored and called out for amusement. He does so a second time. Again the villagers rush to his aid but again there is no wolf. On a third day he shouts once more, this time in earnest, but the villagers do not come and he is eaten by the wolf. The moral: 'A liar will not be believed, even when he speaks the truth'.⁹

We get insight into a couple different kinds of model use if we picture the story told in the model as analogous to a fable and the conclusion to be drawn from the model as the moral. The first has to do with *Anschaulichkeit* - visualizability or graspability. Lessing maintained that abstract concepts are hard to grasp, we understand them fully only when we see them 'intuitively', in concrete instances. Liars will not be believed. What kind of thing might constitute a lie; and what exactly might not being believed be like? Or, I tell my children, 'Don't hurt other people's feelings'. Those are in a sense empty words. But once the children see a case they begin to get it, and interestingly, with only a couple concrete cases they know pretty well how to go on, what hurting someone's feelings might consist in even in very different kinds of situations.

The same can be true in science. Many scientific conclusions are in abstract language. It is hard to grasp what they really amount to 'on the ground'; it is also sometimes hard to see how/why they can be true. The story in the model can help fix that. Consider George Akerlof's famous used-car 'lemons' model in economics.¹⁰

⁸ Or all situations in a specified range.

⁹ Aesop in Jacobs 1889.

¹⁰ Akerlof 1970.

Asymmetric information can lead to significant bargaining inefficiencies. Huh? What does that mean? The model makes this abstract claim intuitive. Sellers know the history of their cars, what accidents they've been in, what troubles there have been. Buyers do not. So buyers are unwilling to offer top prices because they can't be assured that the cars they make offers on are worth it. This inhibits sellers from putting the best cars on the second-hand market.

The second way that the analogy with fables helps understand model use depends on Lessing's dual claims that the abstract exists only in the concrete and that satisfying the more concrete description is what satisfying the abstract description consists in on any occasion. A person cannot just lie. They must do something more concrete, like shout 'Wolf'. Consider how this works in a Galilean experiment. To look for the effect of asymmetric information operating on its own, one can't just take a chunk of asymmetric information and insert it into the experimental context. There has to be something concrete that the information asymmetry consists in, like sellers knowing more about their car's history than buyers. The same is true of Galilean thought experiments.

Now think about the conclusion to be drawn from the model. I urged that in successful Galilean thought experiments where capacities are under study, the contribution that appears in the model should obtain even in circumstances very different from those of the model. But exactly what contribution is that? And to what factor should it be attributed? If the conclusion is couched in the concrete concepts of the model it will be too narrow. It isn't just when a car seller knows the car history and the buyer does not that fewer car sales are made. It is rather (or so the economists say) that (within bounds) whenever there is asymmetric information there will be a positive contribution to market inefficiency.

The relation between the model story and the conclusion then is like the one Lessing maintains between the fable and its moral. The conclusion/moral to be drawn from the model/fable is more abstract than the result described in the concepts of the model/fable

itself. Nevertheless in seeing the concrete result we are genuinely seeing a case of the abstract result as well. That's because satisfying the concrete description is what satisfying the abstract description consists in for the case at hand. It is because the conclusion is appropriately couched in the more abstract concepts that it can travel so widely, not just to used-car markets but to markets for second-hand computers, to on-line dating or to certain insurance situations.¹¹

There is also an issue about truth to be mindful of. Sticking to the concrete can not only narrow the scope of the result dramatically; it can lead to falsehood. There is after all nothing intrinsic to the buying and selling of used cars that leads by its nature to market inefficiency. It is asymmetry of information that has that as a natural consequence. It is then only when used-car interactions involve such asymmetries that they can be expected to contribute to market inefficiency. This is something to be wary of in both real experiments and thought experiments. Consider development economics, where for instance some studies suggest that flip charts have proven effective teaching devices in a development setting.¹² If true, what is the exportable conclusion? My suspicion is that if there is something general to be said it is at a more abstract level. The charts worked where they did because they instanced some general mechanism that needs to be described more abstractly.¹³

By offering these few cases I intend merely to provide some examples of the way in which thinking about claims from mathematics, metaphysics or scientific models as certain kinds of fictions can help underwrite the uses to which we put them. I do not mean to imply that these are the only or the best or the most central examples.

I do though want to stress the importance of the overall task. If this volume, as it seems to me, concentrates on issues of ontology and

¹¹ For a fuller discussion of models and fables see Cartwright forthcoming.

¹² Though other studies counter this. For more discussion see Duflo and Kremer 2003.

¹³ For more on this topic see Cartwright 2009.

truthmakers for mathematical and metaphysical claims, for scientific models and for talk about literary fictions, that's wonderful. For this is an important and difficult task to tackle. But it leaves us with more to do. We still have to make clear how we can learn about these things and why we can use them in the ways we do, and particularly how our methods for learning them justify the uses they are put to. To my mind metaphysics should provide the bridge. It is because claims in models, in mathematics, in metaphysics and about literary fictions are the kinds of things they are that the methods we use are good for finding out about them and the uses we put them to are successful. This then should provide the reader with another perspective – an eye towards future work still to be done – with which to approach the papers collected here.

Nancy Cartwright August 2010

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