# Comments on "Metaphysical 'Models' and the Problematic Comparison with Science"

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L. A. Paul argues that the methods metaphysicians use to make claims about the world and the methods scientists use to make claims about the world are "very similar, *modulo* the change in subject matter," since "[b]oth fields can be understood as relying on modeling to develop and defend theories, and both use a priori reasoning to infer to the best explanation and to choose between empirical equivalents" (2012: 9, original emphasis).

Guilherme Sanches De Oliveira argues that Paul overstates the similarity of methods, since metaphysicians use models mainly to help express complex ideas, whereas scientists also manipulate them to indirectly investigate the world. This difference is supposed to show that the methods of metaphysicians and of scientists are not very similar after all. Although both use models, they use them in different ways.

To put things another way, Sanches De Oliveira gives the following argument:

P1 If metaphysicians and scientists generally do not use models in the same way, then the fact that they both use models is not a reason to think that their methods are interestingly similar.

P2 Metaphysicians and scientists generally do not use models in the same way.

∴ C1 The fact that metaphysicians and scientists both use models is

> not a reason to think that their methods are interestingly similar.

Sanches De Oliveira does not explicitly motivate P1, but it is plausible. I suppose that, at a high enough level of generalization, most intellectual activities have similar methods. But that hardly seems worth mentioning, and Paul clearly has something stronger in mind. If all that metaphysical and scientific methodologies have in common is the use of models for *some purpose or other*, then they are similar in only a modest and uninteresting sense. So I am happy to accept P1 for the sake of argument.

I am less confident about P2. Sanches De Oliveira motivates P2 by giving examples, but he grants that two of his three examples of metaphysical models *are* used by metaphysicians in the same way that scientists use scientific models. Sanches De Oliveira does not take these examples to tell against P2, since he takes them not to be representative of metaphysical models, in general. However, this makes his case for P2 rest entirely on the strength of his third example, neuron diagrams in the metaphysics of causation, which puts him in a dialectically awkward position.

First, we need some reason to think that neuron diagrams *are* representative of metaphysical models, in general, especially since they do much of the same work and occur in many of the same contexts as causal graphs and vector diagrams, neither of which Sanches De Oliveira takes to be representative of metaphysical models, in general. This concern is especially pressing, since Paul only briefly mentions neuron diagrams, and only in passing, and only to suggest that metaphysics, like science, importantly relies on idealization (2012: 14). She gives other examples of models in metaphysics much more prominent and sustained attention, which suggests, at least, that Paul did not take neuron diagrams to be an especially important example of the metaphysical models that she has in mind. Paul and Sanches De Oliveira might, at least to some degree, be talking about different things.

Second, even if vector diagrams *are* representative of the kind of metaphysical models that Paul has in mind, there is still room to doubt P2. As I mentioned earlier, Sanches De Oliveira takes the important difference between neuron diagrams and models in science to be that scientists often manipulate models to indirectly learn about the world, whereas neuron diagrams primarily help metaphysicians express complex ideas. However, I am not sure that the main purpose of neuron diagrams is to help facilitate communication. For contrast, Paul is most interested in a neuron diagram's ability "to represent complex hypothetical patterns of counterfactual dependence and causation" (2012: 14).

And this, I think, gets at the heart of the disagreement between Paul and Sanches De Oliveira. Sanches De Oliveira takes the primary function of models in metaphysics to be communicative and the primary function of models in science to be experimental, whereas Paul takes the primary function of models in both metaphysics and in science to be representational. Her argument is that metaphysics and science have very similar methodologies, since both metaphysicians and scientists construct models to represent the world, relying for these constructions on abstraction and idealization, and both metaphysicians and scientists go on to reason about those representations in the same way, using inference to be best explanation. So, at least as far Paul is concerned, P2 is false: metaphysicians and scientists generally do use models for the same purpose, to represent features of the world.

Thinking through some examples might help bring this disagreement into clearer focus. Sanches De Oliveira takes models to be things like working scale replicas of the San Francisco Bay, computer simulations of communities becoming more segregated, mathematical equations describing population changes, and diagrams of causal interactions. Some of these things help us communicate better; other models help us indirectly learn about the world. Models that do the former serve a *communicative* function, and models that do the latter serve an

*experimental* function. These are not mutually exclusive. A single model might serve both functions, and many more besides.

However, it is helpful to think about *how* models manage to serve their communicative or experimental functions. Again, examples might help. First, a scale replica might help us communicate what a structure looks like. For this purpose, a picture is worth 1,000 words; if the replica accurately represents the structure's appearance, then it serves its communicative function well. Second, a computer simulation might help us indirectly learn about segregation. For example, we might adjust the initial conditions of a simulation that represents a community becoming more segregated over time to see what effect those changes have after the simulation runs. Here, we hope to learn about real segregation by observing simulated segregation; if the computer simulation accurately represents the dynamics of segregation, the it serves its experimental function well.

Notice, in each case, the importance of the model's representational features. A replica cannot help us communicate what a structure looks like unless it represents what the structure looks like; a simulation cannot help us understand how communities become more segregated over time unless it represents communities becoming more segregated over time. In each case, the models serve their communicative or experimental purpose only in virtue of serving a representational one.

The world is big and complex. Trying to describe or study it can be daunting, so we often make simplifying and idealizing assumptions. We abstract away features that we are not currently interested in. And, through modeling, we construct surrogates that represent the parts of the world we want to study, and we study those parts indirectly, by studying the models that represent them. We do this both in metaphysics and in science.

It is the *representational* purpose of models, and not the communicative or experimental work they might help us do in virtue of

their representational features, that Paul emphasizes throughout her discussion of metaphysical and scientific modeling. For example, here is how she characterizes modeling in science:

> To the extent that [scientific theories] are successful as representations of features of the world, their models are isomorphic in some relevant sense to those features of the world. The models, as things that represent a bit of the world, provide a kind of semantics for a theory. (2012: 10)

> If [a scientific state space model] is relevantly isomorphic to an actual dynamical system, it represents that system. In this way, we can use a mathematical model to represent the evolution of an actual dynamical system. (2012: 10)

And here is how she characterizes modeling in metaphysics:

> We can theorize about the world using models, that is, by constructing representations of the world, and metaphysical theorizing is no exception. (2012: 9)

> The models we can take to be the theory [that some things compose another just in case the activities of the former constitute a life] are structures of abstract objects that represent activity-constituting objects standing in necessitation relations to abstract objects that represent composites or wholes of the activity-constituting objects. (2012: 12)

> Models for the theory [that an event causes another iff the latter would not have occurred if the former had not occurred] are structures that represent events standing in relations of counterfactual dependence (descriptions of these models are descriptions of these structures). If these

> structures are isomorphic to causal relations in the actual world, the theory represents actual causal relations and gives an account of the nature of actual causation. (2012: 13)

> Many thought experiments are basically models of hypothetical situations … Possibilia can function as abstractions, that is, as representations of a part of an actual structure but with irrelevant detail removed, and as idealizations, that is, as representations of fictional situations. (2012: 13)

The key point in all of these passages is never that the models make it easier to express difficult ideas, nor that manipulating models can help us indirectly learn about the world. The key point over and again is that metaphysicians and scientists use models to represent real-world features, since doing so helps them investigate the world.

On this view of modeling, the neuron diagrams themselves, the marks on the page, are not the representative metaphysical models; they are way of referring to the representative metaphysical models, which are systems of abstract objects and relations between them that the diagrams, the marks on the page, represent and that, in turn, themselves represent real-world causal systems. The purpose of the interesting metaphysical models, the abstract objects and the relations between them, is not mainly to help facilitate communication. Their purpose, Paul argues, is the same as models in science: to be a suitably abstract and idealized surrogate to help us study some feature of the world that we care about and that the surrogate represents.

# Bibliography

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