ABSTRACTS

B1.9 Methodology

A Little Less Representation, A Little More Action Possibilities: Taking the Artefactual View of Scientific Models Seriously
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Recent contributions to the philosophical literature on modeling for the most part fall within a representational view of models. Whether explaining representation in updated accounts of isomorphism (van Fraassen 2008) and similarity (Giere 2004, 2006, 2010), or instead adopting novel inferential (Suarez 2003, 2004), interpretational (Contessa 2007), or semiotic (Knuuttila 2010) perspectives, these accounts generally assume that the model-target relationship is one of representation: we understand a target by examining a model because models represent their targets. Despite its popularity, however, the representational view is faced with many challenges, a central one being that of explaining the widespread use of "known falsehoods" or intentional divergences between model and target, such as abstractions and idealizations.

A powerful but still widely neglected alternative to the representational view is the artefactual view of models. Here I review Knuuttila's (2011) articulation of the artefactual view and criticize it on the grounds that it still maintains representations in the picture, thus not providing a genuine alternative to the representational view of models. In the alternative I propose, the model-target relationship depends fundamentally on what we might call the "presentational force" of a model—in contrast with the "representational force" in the representational view (cf. Suarez 2004, 2010). I articulate this notion of presentational force in terms of the affordances or action possibilities of models and the scaffolding role that models play in understanding. I examine a case of modeling group thermoregulation and energy conservation, and argue that the artefactual view better captures the explanatory contribution of models, not only circumventing challenges inherent to the representational view of models but also preserving advantages of both dyadic and triadic representational approaches, such as objectivity and interpretative diversity.

Agenda of analysis of models: from Big Data to reality
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Often forgotten that the concept of model came from the handicraft of blacksmiths, glassblowers and sculptors. And from there it was in the sphere of scientific reflection, where the presence of models began to be perceived as the quintessence of scientific knowledge. Scientific research utilises models in many places, as instruments in the service of many different needs. As physicist Ludwig Boltzmann wrote in the article “Model” from Encyclopaedia Britannica (1902): “It is perfectly clear that these models of wood, metal and cardboard are really a continuation and integration of our process of thought”. Scientists begun to analyze models in their relation to the object of research and begun to perceive them as an indication of mature theories.

In 20th century the concept of model gets into philosophy, where it is converted into a tool of philosophical reflection on the activity of scientists. Impetus it was the article of Norbert Wiener and Arturo Rosenblueth (1945) on the role of models in science. Wiener humorously formulates new ideology analysis of models in science: “the best model for a cat is another, or preferably the same cat... This ideal model can not probably be achieved. Partial models, imperfect as they may be, are the only means developed by science for understanding the universe”. Now philosophers use the concept of model for theorizing about the narrowness of scientific thinking and the limits of knowledge.

Today we can talk about third agenda. Philosophy is facing a challenge: it will be necessary to understand the effects the rapid development of information technology, growth interdisciplinary synthesis of sciences and accumulation of massive amounts of scientific knowledge (e.g. projects “Genome” and “Cognitone”). The concept of model should help “to return” from Big Data to objects of reality.

Allocating confirmation with robustness
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A result is said to be derivationally robust if it can be derived from several sets of assumptions. Evidence is indirect with respect to a given result if the result does not imply the evidence but yet the evidence confirms it. I will show that derivational robustness of a result may increase the degree to which existing pieces of evidence indirectly confirm it. The argument is thus based on combining robustness and indirect confirmation such that the evidential boost from old evidence is shown to bear more heavily on those parts of the models that are also
needed for deriving the robust result: old confirmatory evidence may weigh more heavily on the robust result if it is shown to be derivable from the same assumptions as the robust result. By showing that the core is really necessary, derivational robustness may thus increase the weight with which existing evidence indirectly confirms the robust result.

I introduce an example from climate modelling in which a model has initially both confirmed and disconfirmed results. Showing the derivational robustness of a result confirms it if the confirmatory power of the existing positive evidence on the initial version of the model can be allocated to the core, and the robust result is shown to depend on the confirmed core rather than on the disconfirmed assumptions. In order to show that the weight with which disconfirming evidence disconfirms the robust result is decreased, one also has to show that the auxiliaries are dispensable with respect to the robust result, and that they are responsible for the disconfirmed result in the initial model. However, whether or not robustness confirms is a context-specific matter. Robustness may also disconfirm.