Tarja Knuuttila Surrogate Reasoning:

An Artefactual Approach

Scientific practice revolves around an amazing variety of constructed objects rendered by different representational tools and media. These objects enable inferences concerning the natural and social phenomena in which scientists are interested. Philosophical discussion has approached the epistemic uses of such artefacts in terms of surrogate reasoning. Although this discussion has been insightful, it has remained limited in scope in that it has tended to fuse surrogate reasoning with representation. Roughly put, models have been taken as representations, and model-based representation has been analyzed in terms of surrogate reasoning. Such an understanding of surrogate reasoning latches onto the representational relationship between a model and a target, with the model acting as a surrogate for some identifiable target system. Knuuttila argues for an alternative artefactual approach that widens the discussion of surrogate reasoning beyond representation and modelling by covering: various kinds of scientific constructs; the different analogical and other relations among such objects; the relations between such objects and the features of natural and social systems. She uses examples from synthetic biology and economics to exemplify the artefactual approach to surrogate reasoning.

Tarja Knuuttila is Professor of Philosophy of Science at the University of Vienna. Previously she was Associate Professor at the University of South Carolina (USA). She holds Master's degrees in Economics (Helsinki School of Economics) and in Social and Moral Philosophy (University of Helsinki), and a PhD in Theoretical Philosophy (University of Helsinki). She served as the Editor-in-Chief of *Science & Technology Studies* (2007–10) and spent 2009–10 as Visiting Research Associate at the California Institute of Technology. Knuuttila's research is focused on scientific representation and modelling. Her approach is comparative: she has studied modelling in neuroscience, economics, and ecology, as well as in both systems and synthetic biology. Knuuttila also utilizes empirical studies as part of her philosophical agenda. She has published in numerous collections and journals, including *British Journal for the Philosophy of Science, Philosophy of Science, Erkenntnis, European Journal for Philosophy of Science, Synthese, Studies in History and Philosophy of Science, Studies in History and Philosophy of Biological and Biomedical Sciences, The Monist,* and *Science & Technology Studies.*

Lecture Series Models: A model can be an object of admiration, a miniature or a prototype, an abstracted phenomenon or applied theory, a literary text — practically anything from a human body on a catwalk to a mathematical description of a system. It can elicit desire, provide understanding, guide action or thought. Despite the polysemy of the term, models across disciplines and fields share a fundamental characteristic: their effect depends on a specific relational quality. A model is always a model of or for something else, and the relation is reductive insofar as it is selective and considers only certain aspects of both object and model. Critical discussions of models often revolve around their restrictive function. And yet models are less prescriptive and more ambiguous than codified rules or norms. What is the critical purchase of models and how does their generative potential relate to their constitutive reduction? What are the stakes in decreasing or increasing, altering or proliferating the reductiveness of models? How can one work with and on models in a creative, productive manner without disavowing power asymmetries and their exclusionary or limiting effects?

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