

Scientific Representation and Perspective

Ioannis Votsis

University of Duesseldorf

votsis@phil-fak.uni-duesseldorf.de

Consider the aims of the following three influential philosophical views. The semantic view of theories aims to supply the proper form and content of scientific theories. Structural realism aspires to delimit the epistemology and ontology of science. Mathematical structuralism seeks to reveal the epistemological and ontological nature of – you guessed it – mathematical objects. Given their divergent aims they may seem like unlikely bedfellows, but the semantic view of theories, structural realism and mathematical structuralism share enough ground to be able to benefit or suffer from some of the same reasons. What unites the three views is the purely structural analysis of their respective subject matter. The semantic view sees theories as nothing more than families of models, i.e. sets of structures. Representation, according to this view, is a matter of establishing mappings between some models of the theory and target domains. Structural realism judges scientific knowledge and perhaps even ontology to be wholly structural. Mathematical structuralism proclaims that the objects of mathematics are specifiable only up to isomorphism.

The links between the three views are even more involved than that. Both the semantic theorists and the structural realists articulate their claims in exclusively mathematical terms. If such terms can only be specified structurally, as mathematical structuralists maintain, then the content of scientific theories and physical objects is bound to be construed purely structurally. Thus mathematical structuralism plus the assumption that a correct analysis of scientific theories and physical objects need only rely on mathematical objects is in accord the semantic view of theories and structural realism respectively. In other words, a consideration that is in agreement with one viewpoint – that mathematical objects are best understood structurally is in agreement with mathematical structuralism – is also beneficial to the other two viewpoints.

Drinking from the same well also means being exposed to the same dangers lurking in the well. Critics of the semantic view of theories have, among other things, demurred that isomorphic specification is not sufficient for the representation of at least some physical systems. The same physical system will often, if not always, be amenable to representation via different non-isomorphic models. Thus a construal of theories as sets of structures does not seem sufficient to uniquely identify all target systems. Mathematical structuralists are sheltered from this objection because their target systems are mathematical, not physical. Structural realists are not so sheltered. Their endorsement of the view that physical objects may only be specified up to isomorphism means that they are as susceptible to this objection as semantic theorists. In short, a consideration that is in disagreement with one viewpoint is also in disagreement with another.

In this talk I aim to rescue semantic theorists and structural realists from this and other closely related objections by endorsing a perspectivalist approach towards scientific representation.