Representation, reality, and the philosophy of special sciences

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No one would deny that science constructs representations of the world, or at least aims to do so. But when it comes to the problem concerning the nature of scientific representation, e.g., "What aspects of the world (observable/unobservable) does it (aim to) represent?" "How can models or theories contain information about the world?, " or more broadly "What is scientific representation?," there is no clear-cut answer. Recently the problem of scientific representation has been much discussed in the literature (Swoyer 1991; Hughes 1997; French and Ladyman 1999; French 2003; Suarez 2003, 2004; Giere 2004; Callender and Cohen 2006; Frigg 2006; Contessa 2007, 2011; Van Fraassen 2008; Chakravartty 2010). Based on these discussions, this workshop approaches to the problem from the philosophy of special sciences.

The background of the recent discussion on scientific representation can be traced back to the shift in the view of scientific theories as well as the analyses of the nature of scientific theorizing occurred from the 1960s to 80s. According to "the semantic view of theories," a theory is a family of models rather than a linguistic entity. Since models are extra-linguistic entities, they are neither true nor false. They tell us something about the world by representing it rather than describing it. Thus there appears a problem of how those representations are related to the world, or how they can contain information about it. Some philosophers claim it is by (partial) isomorphism between the structures of representations and those of the target systems[1] (French and Ladyman 1999), and some maintain it is by similarity (in certain aspects and to certain degrees) between representations and their targets (Giere 1988, 2004). Other philosophers deny the central role of such relations and stress the importance of other elements, like stipulation (Callender and Cohen 2006) or the ability to allow surrogate reasoning and inference (Suarez

[1] This expression would be a little bit misleading, since for them "empirical systems" are models of data (Ibid. p.112, 115).

2003, 2004).

Contessa (2011) classifies the recent debate over the problem of scientific representation into those about 1) what makes a vehicle an epistemic representation, and those about 2) what makes a representation more faithful to its target. According to his classification, Callender, Cohen, and Suarez are concerned with the latter problem, while French, Ladyman, and Giere are with the former. So they have discussed the different problems under the heading of "the problem of scientific representation." Surely this classification gets rid of a confusion found in the current debate over scientific representation.

However, there is another problem in the recent discussions; they are based mainly on examples of everyday representations (maps, pictures) or examples from physics. Although it is quite reasonable to start an inquiry or to explain something using examples we are familiar with, it is also important to look at more complex and diverse examples from the actual scientific activity once we get a certain insight about the subject of inquiry. This workshop considers the problem of scientific representation using the examples of representation from special sciences, including biology, economics, and geoscience. We also want to discuss the problem of reality of scientific representation, based on the insight we get from the presentations.