

COMPUTER SIMULATION AS SUBSTITUTE FOR EXPERIMENTATION?

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The use of computer simulation to investigate phenomena not accessible to experimentation suggests that simulation can serve as epistemic substitute for experimentation (e.g. Hartman 1996): as different means to learning the same thing. Some recent comparative analyses of the methodology and epistemology of computer simulation and experimentation seem to offer some support for this view (Winsberg 2009, Morrison 2009, Norton and Suppe 2001). Regardless of their success these studies show two things that motivate this paper: 1) that this view cannot be simply taken for granted nor easily rejected and 2) that what is at issue is not only the epistemic function of simulation but also that of experimentation and the relation between the two.

It is intriguing that activities so different as simulation and experimentation could be capable of producing the *same* epistemic results. There is a natural inclination to think that there are things that we can learn from experimentation and that we cannot learn from simulation. Natural inclination is not a sure guide though for in spite of apparent differences between experimentation and simulation there are also strong methodological and epistemological similarities. The closer we look the more there are. In addition, how could simulation and experimentation be in conflict, like in the recent controversy about the temperature of the troposphere (Lloyd, 2010), if they were not capable, in principle, of producing the same epistemic results?

The paper starts with a brief review of various similarities between experimentation and simulation that seem to provide support for the idea that simulation can serve as an epistemic substitute for experimentation.

It then focuses on two of them in particular, that seem the most promising, and analyses two arguments based on them that can be offered against the idea that there are things that we can learn with experimentation but not with simulation. These arguments are shown to be wanting and an argument to the effect that simulation and experimentation are better construed as different epistemic instruments is developed.

Simulation and experimentation are different epistemic instruments in the sense that they are aimed at learning different things about the world. But if simulation and experimentation are aimed at learning different things, how can there be conflicts between the results from simulation and the results from experimentation? An account of the possibility of epistemic conflict in spite of different epistemic aims is proposed in the last section of the paper.