

Issues in Reproducible Simulation Research

Ben G. Fitzpatrick^{1,2*}

¹*Department of Mathematics, Loyola Marymount University, Los Angeles, CA 90045*

²*Tempest Technologies, Los Angeles, CA 90045*

bfitzpatrick@lmu.edu

In recent years, serious concerns have arisen about reproducibility in science. Sensational reports from Amgen (Begley and Ellis, 2012) and Bayer (Prinz et al, 2011) found that 47 out of 53 and 52 out of 67 preclinical studies published in high-profile journals were not reproducible. Even the more conservative estimates of problematic research in biomedicine place the rate of reproducibility at less than 50% (Freedman et al, 2015). Moreover, estimates of the cost of irreproducible preclinical studies range from 28 billion USD per year in the US alone (Freedman et al, 2015) to over 200 billion USD per year worldwide (Chalmers and Glasziou, 2009). The situation in the social sciences is not very different: reproducibility in psychological research, for example, has been estimated to be below 50% as well (Open Science Collaboration, 2015).

Less well-studied is the issue of reproducibility of simulation research. As computational models become integrated into biological research, and as techniques such as machine learning are adopted for drug discovery, the reliability of computational results must be investigated. In this talk, we discuss problems of reproducible stochastic simulations especially ABM simulations in the context of life and social science applications, and we offer some recommendations for improvements.