Recent arguments advocating for the reliability of computational methods in science have been of the following kind: A certain computational method is reliable to the extent that we can formulate a fairly consistent epistemic chain of dependable methods that precede it. This reliability chain is often fleshed out by using a version of epistemic justification or epistemic entitlement. My research focuses on novel features of software that pose serious challenges to this view of reliability in computational methods in science. These challenges are generally of three kinds. The first kind has to do with the different accounts of epistemic opacity. that is, general obstacles that interrupt the epistemic chain from one reliable method to the next. The second has to do with accountability of error in software systems and the seemingly inherent limitations exhibited by software-intensive inquiry. The third kind of challenge focuses on the ambiguous role and place that computational methodology, in particular simulation, occupies – or fails to occupy – in the spectrum of knowledge production tools within scientific inquiry.

The goal of this research is twofold: first, to elucidate some of the characteristic inadequacies of conventional concepts in epistemology of science in the face of these novel features introduced by computational methods in scientific inquiry; and second, to clarify some of the contexts in which these methods can and should be relied upon. Although Paul Humphreys' view on the limitations of conventional epistemic terms to deal with computational methods is often looked upon as a pessimistic position, his view of epistemic opacity is but the first step to build a coherent account of the novel

EPISTEMIC WARRANTS IN SOFTWARE-INTENSIVE SCIENCE

Ramon Alvarado | University of Kansas

role error plays in software. While researchers such as Barberousse and Vorms are right in saying that notions of epistemic justification are not sufficient to offer warrants for belief in simulation, this does not apply for their account of epistemic entitlement. This is because it fails to address more serious instances of error, such as path complexity, that unquestionably affect the epistemic foundation of these methods. Furthermore, other arguments, like those that appeal to the explanatory power of abstractions in simulation, may not work either. For it may be conceptually suspect to offer an argument that speaks to the empirical import of computational methodology though appeals to its irreducible theoretical abstraction. Understanding the role of error, opacity and warrants for belief in software is very important for the progress in the analysis of the role of simulation in scientific inquiry. In particular if we want to clarify a criteria, or a base upon which to start building a realistic epistemology of computational methods.

Ramon Alvarado is PhD student and GTA/Instructor at the Philosophy Department at the University of Kansas. He studied philosophy at the University of Texas at El Paso and graduated with a thesis on moral supervenience. His fields of interest are metaphysics and epistemology of science as well as philosophy of computation on which he is giving a course. One of his forthcoming publications will be: Alvarado, Symons: "Trusting Big Data: Error, Statistics and Software".