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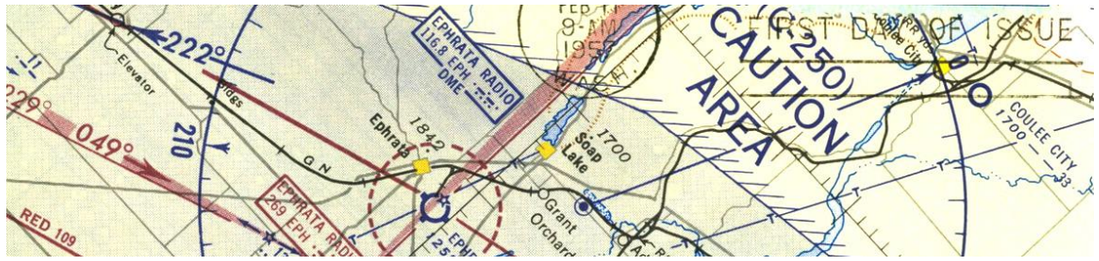
Description of the funded research project

1st Call for H.F.R.I. Research Projects to Support Faculty Members & Researchers and Procure High-Value Research Equipment



Title of the research project: The Perils of Prediction in the Physical Science: Historical and Epistemological Perspectives

Principal Investigator: Theodore Arabatzis, Professor of History and Philosophy of Science, National and Kapodistrian University of Athens

Reader-friendly title: PYTHIA

Scientific Area: Humanities and Arts

Institution and Country: National and Kapodistrian University of Athens, Greece

Host Institution: National and Kapodistrian University of Athens

Collaborating Institutions: Aarhus University, University of Edinburgh, University of Lisbon, Technische Universität Berlin

Project webpage: http://perilsofprediction.gr/

Budget: 200.000 euro

Duration: 36 months

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Research Project Synopsis

The research project PYTHIA aims at improving our understanding of science-based prediction from the perspective of history and philosophy of science (HPS) and related fields. Successful prediction has been a central goal of the sciences. Furthermore, decisions regarding public policy rely heavily on the ability to predict. In this regard, the role of the sciences is crucial, since scientific knowledge is usually a prerequisite for successful prediction. However, the extraction of predictions from scientific knowledge involves several perils and complications. The project focuses on two issues about the perils of prediction in the physical sciences: 1) How the gap between high-level theory and predictions of particular phenomena is bridged; and 2) what counts as an adequate/successful prediction in different physical sciences. It includes case studies in five areas: seismology, high-energy physics, quantum chemistry, environmental science, and 19th century classical physics. Acknowledging the increasing importance of computing for the natural sciences in general and for prediction in particular, the PYTHIA project integrates the history and philosophy of computing into the history and philosophy of the physical sciences.

Project originality

The role of prediction in the sciences has been debated for several decades. The main question considered so far is whether prediction should be given special epistemological weight in the appraisal of scientific theories. There are other questions of fundamental importance, though, that have yet to be addressed systematically, such as: What exactly constitutes a prediction? When should a prediction be considered to be successful?

Furthermore, there is an open discussion regarding the significance of prediction for the solution of practical problems: Does the predictive ability of a theory, regardless of whether it has any explanatory power, guarantee its practical effectiveness? Is it appropriate to let successful predictions guide decisions about scientific or policy issues, even without understanding why these predictions are successful? In other words, can we trust a prediction without an accompanying explanation? Are there limits to what can be predicted by science – are there phenomena that science cannot predict? And how can we tell if a phenomenon is predictable, unpredictable, or non-predictable?

The originality of the PYTHIA research program derives from its aim to answer the above questions – questions that have not yet been clarified or, at least, have not been thoroughly investigated with the methodological tools of HPS.

Expected results & Research Project Impact

The ability of science to make objective and testable predictions is considered to be one of its basic features. Therefore, a historical and epistemological analysis of important, yet relatively unexplored, aspects of prediction in the physical sciences promises to deepen our understanding of the scientific enterprise. PYTHIA is expected thereby to advance the state of the art in history and philosophy of science. Furthermore, PYTHIA can prove instrumental in bringing the history and philosophy of science and technology to bear on critical policy making. Through this project the research team will strengthen its international profile and will acquire an expertise of considerable value for making the humanities directly relevant to policy making.

The importance of this funding

The funding of the PYTHIA research program is important for several reasons: First, it enables the carrying out of cutting edge, collaborative research in the humanities. Second, it provides an opportunity for bridging the gap between the humanities and the natural sciences, both on account of the interdisciplinary character of the program and the wide-ranging expertise of the research team. Third, it allows the utilization of tools from HPS in the implementation of science policy. Finally, it gives a much needed opportunity to early career researchers in the humanities, where the availability of research funds is scarce, to focus on their research projects, to gain new research skills, and to become integrated into the international scholarly community. In all, we hope that the PYTHIA program will become an exemplar on how to strengthen the relations between the humanities and the natural sciences.

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