Studies in Applied Philosophy, Epistemology and Rational Ethics

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Preface

This volume is a collection of selected papers that were presented at the international conference Model-Based Reasoning in Science and Technology. Theoretical and Cognitive Issues (MBR012_Italy), held at the Fondazione Mediterraneo, Sestri Levante, Italy, in June 2012.


The presentations given at the Sestri Levante conference explored how scientific thinking uses models and explanatory reasoning to produce creative changes in theories and concepts. Some speakers addressed the problem of model-based reasoning in technology, and stressed issues such as the relationship between science and technological innovation. The study of diagnostic, visual, spatial,
analogical, and temporal reasoning has demonstrated that there are many ways of performing intelligent and creative reasoning that cannot be described with the help of traditional notions of reasoning such as classical logic. Understanding the contribution of modeling practices to discovery and conceptual change in science and in other disciplines requires expanding the concept of reasoning to include complex forms of creativity that are not always successful and can lead to incorrect solutions. The study of these heuristic ways of reasoning is situated at the crossroads of philosophy, artificial intelligence, cognitive psychology, and logic, that is, at the heart of cognitive science. There are several key ingredients common to the various forms of model-based reasoning. The term “model” comprises both internal and external representations. The models are intended as interpretations of target physical systems, processes, phenomena, or situations. The models are retrieved or constructed on the basis of potentially satisfying salient constraints of the target domain. Moreover, in the modeling process, various forms of abstraction are used. Evaluation and adaptation take place in light of structural, causal, and/or functional constraints. Model simulation can be used to produce new states and enable evaluation of behaviors and other factors. The various contributions of the book are written by interdisciplinary researchers who are active in the area of modeling reasoning and creative reasoning in logic, cognitive science, and science and technology; the most recent results and achievements about the topics above are illustrated in detail in the papers.

The editor expresses his appreciation to the members of the Scientific Committee for their suggestions and assistance:—Atocha Aliseda, Instituto de Investigaciones Filosoficas, Universidad Nacional Autónoma de Mexico (UNAM), Mexico—Emanuele Bardone, Institute of Informatics, University of Tallinn, Estonia—Silvana Borutti, Department of Humanities, Philosophy Section, University of Pavia, Italy—Otávio Bueno, Department of Philosophy, University of Miami, Coral Gables, USA—Mirella Capozzi, Department of Philosophy, University of Rome La Sapienza, Rome, Italy—Walter Carnielli, Department of Philosophy, Institute of Philosophy and Human Sciences, State University of Campinas, Brazil—Claudia Casadio, Department of Psychology, University of Chieti-Pescara, Italy—Carlo Cellucci, Department of Philosophy, University of Rome La Sapienza, Rome, Italy—Sanjay Chandrasekharan, School of Interactive Computing, Georgia Institute of Technology, Atlanta, USA—Roberto Cordeschi, Department of Philosophy, University of Rome La Sapienza, Rome, Italy—Roberto Feltrero, Department of Logic, History and Philosophy of Science at UNED (Spanish Open University), Madrid, Spain—Steven French, Department of Philosophy, University of Leeds, Leeds, UK—Marcello Frixione, Department of Communication Sciences, University of Salerno, Italy—Dov Gabbay, Department of Computer Science, King’s College, London, UK—Marcello Guarini, Department of Philosophy, University of Windsor, Canada—Ricardo Gudwin, Department of Computer Engineering and Industrial Automation, the School of Electrical Engineering and Computer Science, State University of Campinas, Brazil—Viorel Guliciuc, Stefan cel Mare University, Suceava, Romania—Albrecht Heeffer,
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Several papers concerning model-based reasoning deriving from the previous conferences MBR98 and MBR01 can be found in Special Issues of Journals: in Philosophica: Abduction and Scientific Discovery, 61(1), 1998, and Analogy and

Other more technical formal papers presented at (MBR012 ITALY) will be published in a special issue of the *Logic Journal of the IGPL*, edited by L. Magnani.

Finally, the present book also includes a paper *How to Learn Abduction from Animals? From Avicenna to Magnani*, that Woosuk Park has devoted to the 60th birthday of the chair of the conference.

Pavia, Italy, February 2013

Lorenzo Magnani
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