

# Introduction

Luís Moniz Pereira\* and Gregory Wheeler†

Artificial Intelligence Center - CENTRIA  
Department of Computer Science, Universidade Nova de Lisboa  
2829-516 Caparica, Portugal

\*[imp@di.fct.unl.pt](mailto:imp@di.fct.unl.pt)

†[greg@di.fct.unl.pt](mailto:greg@di.fct.unl.pt)

The papers in this volume were selected from those presented at the Fourth International Workshop on Computational Models of Scientific Reasoning and Applications, which was held in Lisbon, Portugal, September 21-23, 2005. The CMSRA workshops are an international forum for researchers from the fields of Logic & Decision, Knowledge Representation & Reasoning, Formal Epistemology, Computational Logic and Cognitive Science to share results on computational modeling of scientific reasoning. The specific aim of these workshops is to foster interdisciplinary links between these disciplines organized around the science and practice of cognitive modeling and decision.

What is new in this field of research is the two-way interaction between practical and theoretical work. From a practical point of view, distributed computing and autonomous robotic agents offer two examples where there is an increasing interest in improving the capabilities of agents (or distributed processes) to reason about what each 'knows'. From a logico-philosophical point of view, the natural emphasis on formal semantics and syntax that computational modeling demands is generating new formal studies of concepts and relations that have been traditionally studied by philosophical logics and the foundations of statistics and decision, opening promising new lines of research.

The papers in this volume offer both a snapshot of current work in the field and evidence of the methodological principle guiding the CMSRA workshops: namely, that the theoretical and practical branches of computational logic are no different from the theoretical and practical branches of other thriving disciplines. Each branch has an important influence on the development of the other.

Ray Jennings and Dorian Nicholson's contribution generalizes earlier work on weakly aggregative consequence relations. The authors motivate the results by providing a connection to Wittgenstein's account of family resemblance.

Pierangelo Dell'Acqua and Luis Moniz Pereira's contribution applies preferential reasoning to theory revision within a logic program approach, with a focus on the construction of preference rules on possible abductive extensions of a theory and how to judge appropriate preference among plausible abductive extensions.

Hans Lycke's contribution shows that the relation of relevant classical propositional derivability coincides with the relation of derivability in Ambiguity-Adaptive propositional logic. Lycke achieves this result by appeal to a semantic characterization of relevant consequence due to Neil Tennant.

Eric Pacuit’s contribution extends a framework for multi-agent social interaction developed by Parikh and Ramanjam, called history based structures, to represent uncertainty of individual agents and shows a correspondence result locating a temporal-epistemic axiom system discussed by Halpern, der Meyden and Vardi. Pacuit’s result provides new grounds for viewing history-based structures as a general framework for multi-agent interaction.

James Hawthorne’s contribution is a study of non-monotonic conditionals based on (primitive) conditional probability functions which results in a family of “sub-P” logics, namely logics that are weaker than the Preferential Semantics of Kraus, Lehman and Magidor.

The contribution by Henry Kyburg, Choh Man Teng and Gregory Wheeler addresses another sub-P axiom system designed to model  $\epsilon$ -acceptance within *Evidential Probability*. The authors also discuss several methodological issues regarding the application of logic to natural language conditionals.

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Luís Moniz Pereira and Gregory Wheeler  
CENTRIA, University Nova de Lisboa  
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