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Sujata Ghosh · Thomas Icard (Eds.)

Logic, Rationality, and Interaction

8th International Workshop, LORI 2021
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Proceedings

Editors

Sujata Ghosh
Indian Statistical Institute
Chennai, Tamil Nadu, India

Thomas Icard
Department of Philosophy
Stanford University
Stanford, CA, USA

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Preface

This volume collects the papers presented at LORI-VIII, the Eighth International Workshop on Logic, Rationality and Interaction, held (partly virtually) in Xi'an, China, during October 16–18, 2021, and hosted by the Research Center for Philosophy of Artificial Intelligence and the Department of Philosophy in the School of Humanities and Social Science at Xi'an Jiaotong University.

The workshop received a total of 40 submissions, of which 15 were accepted as full papers and 7 were accepted as short papers. During the review process each submission was read by at least two reviewers. The topics spanned the full range of LORI themes, including contributions on doxastic and epistemic logics, deontic logic, intuitionistic and substructural logics, voting theory, and (a new theme emphasized this year) causal inference. As is typical of LORI, participants came from numerous disciplines – logic, mathematics, philosophy, linguistics, computer science, economics, and others – and from countries all over the world. Complementing the excellent contributed papers were seven wonderful invited lectures by internationally renowned researchers: Ulrike Hahn, Wesley Holliday, Sara Negri, Olivier Roy, Wen-Fang Wang, Katrin Schulz, and Jiji Zhang.

The first LORI event, LORI-I, took place in August 2007, hosted by Beijing Normal University. Following the notable success of this initial meeting, the series continued with seven more outstanding events, this one, LORI-VIII, being the very latest. A full history of the series can be found at www.golori.org.

We would very much like to thank our wonderful Program Committee members and all of the external reviewers for their careful and diligent work during the reviewing process. Conference pace is always fast, and we were lucky to make final decisions on the basis of thorough and informative reviews. We would also like to thank the LORI Standing Committee, and in particular Fenrong Liu and Johan van Benthem, for critical advice throughout the process. Finally, we are very much indebted to Wei Wang and the entire Organizing Committee at Xi'an Jiaotong University for their wonderful – and indeed crucial – work to make this entire event happen.

August 2021

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Abstracts

Logical Perspectives on Voting

Wesley H. Holliday 

University of California, Berkeley
wesholliday@berkeley.edu

Abstract. In this talk, based on joint work with Eric Pacuit, I will survey some aspects of social choice and voting theory from the perspective of logicians. Topics will include: formal logics for social-choice theoretic reasoning [2]; the application of logical tools, such as SAT solving and interactive theorem proving, to voting theory [1]; generalizing impossibility theorems via preservation results inspired by model theory [6]; and finally, the design of voting methods guided by logical ideas, such as coherence [3, 5] and recursion [4].

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Bridges Between Classical and Constructive Reasoning for Infinitary Logic

Sara Negri

Dipartimento di Matematica,
Università di Genova, via Dodecaneso, 35, 16146, Genova, Italy

A survey will be presented on the bridges between classical and constructive reasoning in infinitary logic. At the level of provability we show how the method of conversion of axioms into rules gives a natural approach to Glivenko sequent classes for geometric theories. The latter encompass axiomatizations used, among other venues, for the modelling of social and epistemic notions [1, 2]. At the structural level, we show that enriching the syntax of sequents with labels for neighbourhood semantics gives an intuitionistic calculus that shares all the properties of its classical counterpart [3].

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On Garfield and Priest's Interpretation of the Use of the Catuskoti in *MMK*

Wen-fang Wang

School of Philosophy and Social Development,
Shandong University, China
wenfwang88@gmail.com

Abstract. According to Garfield and Priest's interpretation, the positive use of the catuskoti by Nāgārjuna in *MMK* shows that he endorses, at least from the conventional perspective, a four-valued semantics similar to that of Belnap's FDE, while the negative use of the catuskoti by Nāgārjuna in *MMK* indicates that, when the ineffable ultimate reality is also considered, what he really has in mind is a plurivalent five-valued semantics. Though their interpretation is interesting and of heuristic value, this talk argues that their interpretation suffers from a number of problems: the problem of an adequate logic, the problem of the collapse of kotis, the problem of literature and historical support, and the problem of a suitable explanation. This talk also discusses but rejects both Cotnoir's and Westerhoff's interpretations of the use of the catuskoti in *MMK*, though it also argues that some insights from them, as well as several insights from Garfield and Priest, should be preserved. The final part of the paper combines these insights together and describes the right interpretation of Nāgārjuna's use of the catuskoti in *MMK* with the right semantics and the right logic of *MMK*. In short, this talk argues that Nāgārjuna's 'rebuttal' of all four kotis in a catuskoti should be understood not as an external negation, but as a mere denial or a mere rejection of these kotis. If time allowed, the speaker will also talk a bit more on an interesting topic: how to "say" things unsayable.

Keywords: Nāgārjuāna · Catuskoti · Plurivalent logic · *MMK* · FDE

Intervention and Causal Conditionals in Causal Markov Categories

Yimu Yin¹ and Jiji Zhang²

¹ Independent Scholar, USA
yimu.yin@gmail.com

² Hong Kong Baptist University, Hong Kong
zhangjiji@hkbu.edu.hk

Abstract. We build on a category-theoretic treatment of causality that associates a free Markov category with a directed acyclic graph (DAG) that formalizes the syntax for causal reasoning with the DAG. This framework enables us to define and study important concepts in causal reasoning from an abstract and “purely causal” point of view, such as causal independence/separation, causal conditionals, and disintegration of intervention effects. Our results regarding these concepts abstract away from the details of the commonly adopted causal models such as (recursive) structural equation models or causal Bayesian networks. They are therefore more widely applicable and in a way conceptually clearer. Our results are also intimately related to Judea Pearl’s celebrated do-calculus, and yield a syntactical version of the causal core of the do-calculus. In addition, we construct a functor between such DAG-induced Markov categories, which we argue provides a natural and general setup for studying transformations between DAG-based causal models, including interventions as a special case.

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