Math. Struct. in Comp. Science (2018), *vol.* 28, *pp.* 338–339.
doi:10.1017/S0960129517000081 First published online 27 March 2017

Preface

Received 15 March 2017

This special issue of Mathematical Structures in Computer Science is dedicated to the memory of Barry Cooper (October 9, 1943–October 26, 2015). Barry's life in research had a huge impact on the development of the world of computability. Aside from his enormous achievements in classical computability theory, he contributed immensely to the promotion of interdisciplinary developments related to computability, in particular, by founding the Association for Computability in Europe (CiE) and its annual, highly successful conference series.

This issue results from selected works presented at the joint workshop of the series Workshop on Computability Theory (WCT) and the Turing Centenary Research Project: Mind, Mechanism and Mathematics (MMM). The workshop took place in Bucharest, on June 27–28, 2015 as a satellite workshop of the conference CiE: Evolving Computability (CiE 2015). It was the eighth workshop of the WCT series, organized by Damir Dzhafarov, Ekaterina Fokina (co-chair), Stefan Vatev, Alexandra Soskova and the third workshop of the MMM project, organized by Barry Cooper (co-chair). The goal of the workshop was to provide an opportunity to present research results that involve computability in a very broad sense, and to encourage collaborative projects between researchers from various backgrounds. The topics were consequently very wide-spread, and included classical computability theory as well as some applications of the theory of computation to the natural sciences, and also philosophical and historical aspects of computability. The workshop brought together 18 researchers at diverse stages of their career, coming from various fields and from several continents. This was a fitting reflection of Barry's idea of connecting numerous research areas through the notion of computability, thereby revealing the universality of the concept and its importance for modern science. Barry proposed the idea of publishing a special issue in MSCS with the results presented at the workshop.

The current issue contains seven selected papers from the mathematical side of the project and covers several topics involving computability. All the submitted papers have been subject to a careful reviewing process in accordance with the MSCS standards.

The paper *Splitting and non-splitting in the difference hierarchy*, by Arslanov, pays tribute to Barry Cooper's work in the difference hierarchy. It contains a summary of Barry's results in this field and then proves the existence of a new kind of splitting.

In *Autostability Spectra for Decidable Structures*, Bazhenov studies the complexity of isomorphisms between decidable copies of structures. He constructs several examples of general structures and of linear orders with specific degrees and spectra of autostability (also called degrees and spectra of categoricity) relative to strong constructivizations (also called decidable presentations) of structures.

D'Agostino and Marcone study the logic underlying the relations between mathematical statements that arise from investigations in reverse mathematics, in *The Logic of the*

Reverse Mathematics Zoo. They introduce a tableaux system for the logic and deduction systems for important fragments of second-order arithmetic.

The paper *Complexity for Partial Computable Functions over Computable Polish Spaces* by Korovina and Kudinov extends the classical notion of partial computable functions to the context of effectively enumerable topological spaces. They then study various algorithmic properties of the class of partial computable functions, including the existence of a principal computable numbering, and the complexity of problems such as totality and root verification.

In *The Universality of Polynomial Time Turing Equivalence*, Marks applies the tools of descriptive set theory to study the complexity of equivalence relations arising from computability and computational complexity theory.

Nies and Sorbi, in *Calibrating Word Problems of Groups via the Complexity of Equivalence Relations*, estimate the complexity of word problems for finitely generated groups among equivalence relations over the natural numbers in terms of computable reducibility.

In *Cellular Automata over Generalized Cayley Graphs* Arrighi, Martiel and Nesme extend cellular automata theory to generalized Cayley graphs varying in time. They study basic computational properties of generalized Cayley graphs, and prove stability of the notion of Cellular Automata over generalized Cayley graphs under composability and taking inverses.

We express our gratitude to all the authors for their contributions and also to the referees for carefully reading and commenting on the submissions. We thank Radu Gramatovici for local arrangements in Bucharest and help with organizing the workshop. We are grateful to Damir Dzhafarov, Alexandra Soskova and Mariya Soskova for their support during the preparation of this special issue. Special thanks go to the Editor-in-Chief Pierre-Louis Curien for the opportunity to publish the special issue in this journal.

Guest Editor
Ekaterina Fokina