

EDITORIAL PREFACE

# A special issue on categorical algebras and computation in celebration of John Power's 60th birthday, part I

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(Received 28 January 2022; accepted 28 January 2022)

John Power, recently retired and now an honorary professor at Macquarie University, turned 60 in December 2019. John has made substantial contributions to category theory and its applications to computer science throughout his career.

To celebrate John's achievements, and to inspire further work, two workshops were held in 2019: at Bath on 27 June 2019 (organized by Neil Ghani and Guy McCusker) to mark his retirement, and at Kyoto on 23 December 2019 (organized by Masahito Hasegawa, Ichiro Hasuo, and Makoto Takeyama) to celebrate his 60th birthday. Following the success of these workshops, this Festschrift in honor of John was proposed and a call-for-papers was circulated around April 2020. Among the submissions we received, four are included in this volume. The remaining contributions will appear in the forthcoming second volume of the Festschrift.

**John and his work** John was born in Australia in December 1959. After completing his PhD study at McGill University under the supervision of Michael Barr in 1984, John started his career as a researcher in mathematics. Then, during 5 years in Sydney and Cleveland, John became aware of the relevance of category theory to theoretical computer science. In 1989, he joined the Laboratory for Foundations of Computer Science, University of Edinburgh, and started his career in computer science. In Edinburgh, John mostly focused on research. In 2007, John moved to Bath, where he committed a lot to education too. John retired in August 2019 and returned to Australia.

In category theory, John is best known for his work on (higher or enriched) categories with algebraic structure, including two-dimensional monad theory (with Blackwell and Kelly), coherence for tricategories (with Gordon and Street),  $n$ -categorical pasting theorems, enriched monads (with Kelly), enriched Lawvere theories (with Nishizawa), pseudo-commutative monads and pseudo-closed 2-categories (with Hyland), and weak higher-dimensional categories (with Hermida and Makkai).

In computer science, jointly with a number of computer scientists (most notably Plotkin and also Milner), John developed important categorical structures for semantics of programming languages. Broadly, these contributions can be seen as studies of categories with algebraic structure. His most influential work includes a series of papers on premonoidal categories (with Anderson and Robinson) and Freyd categories (with Thielecke and Levy) which provide a foundation for direct-style reasoning on effectful programs, and the theory of algebraic effects (with Plotkin) which is a brilliant application of Lawvere theories to modeling effects. These papers had great impact not only on the theory of programming languages but also on their design and practice. John has also made important contributions to the semantics of concurrency, distributive laws and operational semantics, coalgebraic logic programming, data refinement, and many other topics.

At the same time, John has been a wonderful teacher and friend to many of us, with his exceptional insights, kindness, and humor. He supervised more than 20 PhD students in Edinburgh and Bath. Also, John worked with a number of young researchers and served as their mentor. The influence he has had on the younger generation through his research, teachings, and collaborative

activities has been enormous, as echoed in several papers in this Festschrift. The editors of this volume are no exception, and we are delighted to participate in the creation of this Festschrift in honor of our brilliant former supervisor (for Hasegawa) and colleague (for Lack and McCusker), John.

**About the papers in this volume** The paper “Freely adjoining monoidal duals” by Coulembier, Street and van den Bergh considers the problem of adding a dual of an object in a monoidal category, which is relevant to various areas of mathematics, physics, and computer science.

In “Doctrines, modalities and comonads,” Dagnino and Rosolini describe a general theory of modal operators in logic obtained from adjunctions and comonads in a suitable 2-category of doctrines, in which results from some seminal work of John play a key role.

“Coherence for bicategorical cartesian closed structure” by Fiore and Saville gives a strictification theorem for cartesian closed bicategories, which is of importance for the recent development of semantics of logic and computation, and closely related to John’s pioneering work on coherence of higher categories with algebraic structure.

“Finitary monads on the category of posets” by Adamek, Ford, Milius, and Schöder is a study of algebraic structures on partially ordered sets corresponding to finitary monads and finitary monads on the category of posets, which is built upon Max Kelly and John’s work on the presentation of enriched monads and also related to several works on algebraic theories by John and his colleagues.

All the papers presented in this volume have been fully peer-reviewed to the usual standards of *Mathematical Structures in Computer Science*. We are very grateful to the authors and reviewers whose hard work was essential in preparing this special issue. We would like to thank all of them for their help and patience, in the difficult time of the pandemic.