

Preface

This is a monograph about logic. Specifically, it presents the mathematical theory of the logic of bunched implications, **BI**: I consider **BI**'s proof theory, model theory and computation theory. However, the monograph is also about informatics in a sense which I explain. Specifically, it is about mathematical models of resources and logics for reasoning about resources.

I begin with an introduction which presents my (background) view of logic from the point of view of informatics, paying particular attention to three logical topics which have arisen from the development of logic within informatics:

- Resources as a basis for semantics;
- Proof-search as a basis for reasoning; and
- The theory of representation of object-logics in a meta-logic.

The ensuing development represents a logical theory which draws upon the mathematical, philosophical and computational aspects of logic. Part I presents the logical theory of propositional **BI**, together with a computational interpretation. Part II presents a corresponding development for predicate **BI**. In both parts, I develop proof-, model- and type-theoretic analyses. I also provide semantically-motivated computational perspectives, so beginning a mathematical theory of resources.

I have not included any analysis, beyond conjecture, of properties such as decidability, finite models, games or complexity. I prefer to leave these matters to other occasions, perhaps in broader contexts. However, I should remark that progress has already been made on some of these topics and I provide the appropriate references. Indeed, in all

respects, the work presented herein should be considered merely a first step towards an understanding of bunched logics and a mathematical theory of resources.

Since this work is a research monograph, not a textbook, I have taken the liberty of assuming, without taking very much care to be uniform in my assumptions, that readers will have some background in logic, topology, algebra, category theory, the semantics and implementation of programming languages, and a general knowledge of computer science.

The Semantics and Proof Theory of the Logic of
Bunched Implications

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2002, XLIX, 290 p., Hardcover

ISBN: 978-1-4020-0745-3