

PREFACE

The history of FUNDAMENTA INFORMATICAЕ has begun 20 volumes and over 450 papers ago. Created in 1977 by a group of theoretical computer scientists in Poland, it was intended to respond to their need for broad contacts with people active in the field all over the world, a need emerging inevitably from their own growing activity. Since then the journal has become a truly international medium of communication, representative of the main contemporary trends in Computer Science. Its path has been often marked by names of authors whose deep influence on the development of research has been widely recognized, but it has also hosted beginners making their way into the literature with promising results.

The list of members of the Editorial Board of FUNDAMENTA INFORMATICAЕ - and it is a source of pride and satisfaction for the journal that we can count on their support - indicates that it is the intention of the Editors to maintain a common basis for different geographic and research areas. Implementing this intention we have initiated a series of special issues, each of which features a particular topic or event and testifies of the state of development of the field. Among these were special issues on: *Concurrency* (Ed.B.A.Trakhtenbrot, 1988), *Logic Programming* (Ed.K.R.Apt, 1990), *Non-Monotonic Logics* (Ed.W.Marek, 1990), *Logic in Artificial Intelligence* (Ed.Z.W.Ras, 1991), *MFCS'91 (selected full-version papers)* (Ed.A.Tarlecki, 1992), *Modal Logics in Knowledge Representation* (Ed.M.Truszczyński, 1992), *Algebraic Logic and Its Applications (selected papers of section III "Algebra and Logic in Computer Science" of the Banach Center Semester on Algebraic Methods in Logic and Their Computer Science Applications, autumn 1991)* (Ed.C.Rauszer, 1993) and *Lambda Calculus and Type Theory* (Ed.J.Tiuryn, 1993). Several new such issues are in preparation.

We hope to continue with this form of presentation and at the same time we are happy to receive individual papers of high quality and indeed quality is definitely one of our main concerns. Let me acknowledge with gratitude the great work performed by our Editors and numerous referees, whose cooperation has been vital in keeping high our standards.

The eight papers contained in this Anniversary Special Issue of FUNDAMENTA INFORMATICAЕ are contributions to some important areas of theoretical Computer Science including AI and concern topics of intensive research.

The paper by J.W.de Bakker and E.P.de Vink *Bisimulation Semantics for Concurrency with Atomicity and Action Refinement* is a comparative study of two notions in concurrency mentioned in the title. A bisimulating domain used in semantic definitions arises as a solution of a system of domain equations over complete metric spaces. The authors prove the equivalence of operational and denotational models developed in the paper using higher-order techniques and Banach's fixed point theorem.

In *Reasoned Assumptions and Rational Psychology* J.Doyle starts with a critique of logical and epistemological approaches to theories of thinking in artificial intelligence to present a new mathematical development of nonmonotonic reasoning. This point of view - close to natural processes of thought - exem-

plifies the benefits of rational psychology treated as a subject for mathematical investigation.

A.Ehrenfeucht and G.Rozenberg use *Square Systems* to describe hierarchical families of sets (such as are given by an application of clustering methods) via quaternary relations with some symmetry conditions. This approach yields a unifying framework for studying decompositions of systems based on such families.

M.Fitting's *Kleene's Three-Valued Logics and Their Children* refers to the weak version of Kleene's three-valued logic, which - together with an intermediate logic of natural interest - is extended to a four-valued one and then to the family of distributive bilattices. A tableau system is sketched instead of a system of axioms. This goes beyond the well-known generalizations of Kleene's strong three-valued logic to Belnap's four-valued version and Ginsberg's bilattices.

The paper *Reductions for Primitive 2-structures* by T.Harju and G.Rozenberg deals with reversible edge-coloured directed graphs (2-structures). The authors investigate the inheritance of undecomposability by substructures and present results on composition for some important 2-structures. The paper generalizes and improves Sumner's results on graphs.

In *Semantics for Disjunctive Logic Programs with Explicit and Default Negation* J. Minker and C. Ruiz apply general techniques for extending model, fixpoint and prooftheoretic characterization of semantics for normal disjunctive logic of programs to the class of extended disjunctive programs i.e., programs with both explicit and default negation. The declarative complexity of such programs and the algorithmic complexity of proof procedures and fixpoint operators are discussed.

U.Montanari and D.Yankelevich present in *Merging CCS and Petri Nets* a modular construction of operational models for CCS. They use typed algebras to obtain a model with the structure of both CCS and Petri nets. The model is completely compositional with CCS operations defined on all state representations.

The paper *Compositional Proofs for Networks of Processes* by B.A. Trakhtenbrot contains a systematic and critical comparison of the conceptual framework for concurrency developed earlier by the author and A.Rabinovich with that used in the CORNELL Project. The "kernel techniques" introduced by Trakhtenbrot allow him to deal with some vulnerable points in the latter project. He manages to tell "the true story about compositionally complete proofs for the networks under consideration".

Introducing the above papers I wish to thank all the authors mentioned above for having accepted my invitation to contribute to this anniversary issue of FI, thus turning it into a remarkable event in the publication history of the journal. My gratitude also goes to W.Bartol, Assistant to the Editor-in-Chief, without whom this issue would never come to light.

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