

THE JOURNAL OF SYMBOLIC LOGIC

Edited by

Enrique Casanovas, *Coordinating Editor*

Sylvy Anscombe

Steve Awodey

Veronica Becher

Lev Beklemishev

Michael Benedikt

Alex Berenstein

Ricardo Camerlo

Damir Dzhafarov

Vera Fischer

Hiroshi Sakai

Anton Setzer

VOLUME 87 • NUMBER 2 • JUNE 2022 • ISSN 0022-4812

Copyright © 2022 by the Association for Symbolic Logic. All rights reserved.
Reproduction by photostat, photo-print, microfilm, or like process by permission only.



PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS FOR
AND ON BEHALF OF THE ASSOCIATION FOR SYMBOLIC LOGIC.

The BULLETIN, the JOURNAL and the REVIEW OF SYMBOLIC LOGIC are the official organs of the Association for Symbolic Logic, an international organization for furthering research in logic and the exchange of ideas among mathematicians, computer scientists, linguists, and others interested in this field.

The JOURNAL invites submission of original scholarly work in mathematical logic and its applications.

Editors

Enrique Casanovas (Coordinating Editor)

Department of Mathematics and Computer Science, University of Barcelona, Gran Via 585,
08007 Barcelona, Spain
(e.casanovas@ub.edu);

Sylvy Anscombe

Université de Paris, France
(sylvy.anscombe@imj-prg.fr);

Steve Awodey

Department of Philosophy, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, USA
(awodey@cmu.edu);

Veronica Becher

Departamento de Computación, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires,
Pabellón I, Ciudad Universitaria C1428EGA, Buenos Aires, Argentina
(vbecher@dc.uba.ar);

Lev Beklemishev

Steklov Mathematical Institute of RAS, Gubkina str. 8, 119991 Moscow, Russia
(lbekl@yandex.ru);

Michael Benedikt

Department of Computer Science, Oxford University, Wolfson Building, Parks Road, Oxford,
OX1 3QD, UK
(michael.benedikt@cs.ox.ac.uk);

Alex Berenstein

Universidade de los Andes, Colombia

Ricardo Camerlo

Universita di Genova, Italy

Damir Dzhafarov

Department of Mathematics, University of Connecticut, 341 Mansfield Road U1009, Storrs,
CT 06269-1009, USA
(damir@math.uconn.edu);

Vera Fischer

University of Vienna, Austria
(vera.fischer@univie.ac.at);

Hiroshi Sakai

Graduate School of System Informatics, Kobe University, 1-1 Rokkodai-cho, Nada-ku, Kobe,
657-8501, Japan
(hsakai@people.kobe-u.ac.jp);

Anton Setzer

Department of Computer Science, Swansea University Bay Campus, Fabian Way, Swansea, SA1 8EN, UK
(a.g.setzer@swansea.ac.uk).

Manuscripts should be submitted using EditFlow at https://ef.msp.org/submit/asl_jsl, where instructions directed specifically at using the system can also be found.

Authors should keep a complete copy of their submission and all electronic files from which it was created. They should also consult the more general guidelines for the submission of manuscripts at <https://aslonline.org/journals/the-journal-of-symbolic-logic/submission-guidelines/>. These instructions include the Association's standards about previous publication and plagiarism as well as information about copyrights and electronic copies of published papers.

No print offprints will be supplied but authors will receive a link to a freely accessible electronic pdf of their published article. Print offprints may be purchased if required.

TABLE OF CONTENTS

A marriage of Brouwer’s intuitionism and Hilbert’s finitism I: arithmetic TAKAKO NEMOTO and SATO KENTARO	437
Completely separable MAD families and the modal logic of $\beta\omega$ TOMÁŠ LÁVIČKA and JONATHAN L. VERNER	498
The consistency strength of the perfect set property for universally Baire sets of reals RALF SCHINDLER and TREVOR M. WILSON.....	508
A structural dichotomy in the enumeration degrees HRISTO A. GANCHEV, ISKANDER SH. KALIMULLIN, JOSEPH S. MILLER, and MARIYA I. SOSKOVA.....	527
On categoricity in successive cardinals SEBASTIEN VASEY	545
Closed and unbounded classes and the Häftig quantifier model PHILIP D. WELCH	564
Infinite strings and their large scale properties BAKH KHOUSSAINOV and TORU TAKISAKA.....	585
Identity crisis between supercompactness and Vöpenka’s principle YAIR HAYUT, MENACHEM MAGIDOR, and ALEJANDRO POVEDA	626
Continuous sentences preserved under reduced products ISAAC GOLDBRING and H. JEROME KEISLER	649
Epsilon theorems in intermediate logics MATTHIAS BAAZ and RICHARD ZACH.....	682
Variations on Δ_1^1 determinacy and \aleph_{ω_1} RAMEZ L. SAMI.....	721
A Q-Wadge hierarchy in quasi-Polish spaces VICTOR SELIVANOV	732
Asymptotic analysis of Skolem’s exponential functions ALESSANDRO BERARDUCCI and MARCELLO MAMINO.....	758
The Σ_1 -definable universal finite sequence JOEL DAVID HAMKINS and KAMERYN J. WILLIAMS.....	783
Luzin’s (N) and randomness reflection ARNO PAULY, LINDA WESTRICK, and LIANG YU	802
More on Fréchet–Urysohn ideals SALVADOR GARCÍA FERREIRA and OSVALDO GUZMÁN	829
Information in propositional proofs and algorithmic proof search JAN KRAJÍČEK	852
Retraction – Measuring club-sequences together with the continuum large DAVID ASPERÓ and MIGUEL ANGEL MOTA	870
Surreal ordered exponential fields – Erratum PHILIP EHRLICH and ELLIOT KAPLAN	871