

**THE
BULLETIN
OF
SYMBOLIC LOGIC**

EDITED BY

RICHARD A. SHORE, MANAGING EDITOR

ANDREAS R. BLASS ALEXANDER S. KECHRIS DANIEL LASCAR

CHARLES D. PARSONS PHILIP J. SCOTT

VOLUME 3 · NUMBER 2 · JUNE 1997

ISSN 1079-8986

**PUBLISHED QUARTERLY BY THE ASSOCIATION FOR SYMBOLIC LOGIC, INC. WITH
SUPPORT FROM ICSU AND FROM INSTITUTIONAL AND CORPORATE MEMBERS**

*Copyright © 1997 by the Association for Symbolic Logic, Inc. All rights reserved.
Reproduction by photostat, photo-print, microfilm, or like process by permission only.*

TABLE OF CONTENTS

Alonzo Church, by RICHARD A. SHORE, Managing Editor	153
---	-----

ARTICLES

Step by recursive step: Church's analysis of effective calculability, by WILFRIED SIEG	154
The impact of the lambda calculus in logic and computer science, by HENK BARENDREGT	181
Logical consequence revisited, by JOSÉ M. SAGÜILLO	216

European ASL Summer meeting, Donostia-San Sebastián, Spain, 1996,	242
Notices,	278
Erratum,	280

THE BULLETIN OF SYMBOLIC LOGIC (ISSN 1079-8986) is published quarterly, in the months of March, June, September, and December, by the Association for Symbolic Logic, Inc. at 1325 South Oak Street, Champaign, IL 61820, U.S.A. Periodicals postage is paid at Champaign, IL and additional offices. The BULLETIN is distributed with THE JOURNAL OF SYMBOLIC LOGIC and the 1997 annual subscription price for the two journals is \$285. Postmaster: Send address changes to *The Bulletin of Symbolic Logic, Journals Division UIP, 1325 South Oak Street, Champaign, IL 61820, USA*. Business correspondence should be sent to the Secretary-Treasurer of the Association, C. Ward Henson (address on inside back cover).

The BULLETIN invites submission of *Articles* and *Communications*. Articles should be expository or survey papers of broad interest that are accessible to a wide audience of logicians. They may deal with any areas of logic including mathematical or philosophical logic, logic in computer science or linguistics, the history or philosophy of logic and applications of logic to other fields. *Communications* should be announcements of important new results and ideas in any aspect of logic. The *Communications* may be short papers in their final form or preliminary announcements (extended abstracts, position papers) of longer, full papers that will be published elsewhere. In any case, they should, in addition to a description of the new results or ideas, include enough history, background and explanation to make the significance of the work apparent to a wide audience. *Communications* will be quickly refereed and published within six months of the submission of final versions.

Continued on inside back cover

10 9 8 7 6 5 4 3 2 1 02 01 00 99 98 97

THE
BULLETIN
OF
SYMBOLIC LOGIC

EDITED BY

RICHARD A. SHORE, MANAGING EDITOR
ANDREAS R. BLASS ALEXANDER S. KECHRIS DANIEL LASCAR
CHARLES D. PARSONS PHILIP J. SCOTT

VOLUME 3
1997

PUBLISHED QUARTERLY BY THE ASSOCIATION FOR SYMBOLIC LOGIC, INC. WITH
SUPPORT FROM ICSU AND FROM INSTITUTIONAL AND CORPORATE MEMBERS

The four numbers of Volume 2 were issued at the following dates:

Number 1, pages 1–152, April 8, 1997

Number 2, pages 153–280, August 5, 1997

Number 3, pages 281–400, October 7, 1997

Number 4, pages 401–540, December 18, 1997

Numbers 1–4 of this volume are copyrighted ©1997 by the Association for Symbolic Logic, Inc. Reproduction of copyrighted numbers of the BULLETIN by photostat, photoprint, microfilm, or like process is forbidden, except by written permission, to be obtained from the Secretary of the Association, C. Ward Henson, Department of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801.

The paper used in this BULLETIN is acid-free and falls within the guidelines established to ensure permanence and durability.

This BULLETIN has been registered with the Copyright Clearance Center, Inc. The appearance of a code at the bottom of the first page of an article indicates the copyright owner's consent for copying beyond that permitted by Sections 107 or 108 of the U. S. Copyright Law, provided that the per-copy fee stated in the code is paid directly to Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923. This consent does not extend to copying for general distribution, for advertising or promotion purposes, for creating new collective works, or for resale. Specific written permission for such copying must be obtained from the Association.

CONTENTS OF VOLUME 3

SHORE, RICHARD A., MANAGING EDITOR. Alonzo Church 153

ARTICLES

AVIGAD, JEREMY and SOMMER, RICHARD. A model-theoretic approach to ordinal analysis	17
BARENDREGT, HENK. The impact of the lambda calculus in logic and computer science	181
EDALAT, ABBAS. Domains for computation in mathematics, physics and exact real arithmetic	401
EKLOF, PAUL C. Set theory generated by Abelian group theory	1
KANAMORI, AKIHIRO. The mathematical import of Zermelo's well-ordering theorem	281
LAMBEK, J. Programs, grammars and arguments: a personal view of some connections between computation, language and logic	312
SAGÜILLO, JOSÉ M. Logical consequence revisited	216
SIEG, WILFRIED. Step by recursive step: Church's analysis of effective calculability	154

COMMUNICATIONS

FRIEDMAN, SY D. and KOEPKE, PETER. An elementary approach to the fine structure of L	453
GRÄDEL, ERICH, KOLAITIS, PHOKION G. and VARDI, MOSHE Y. On the decision problem for two-variable first-order logic	53
HJORTH, GREG and KECHRIS, ALEXANDER S. New dichotomies for Borel equivalence relations	329
HOFMANN, MARTIN. An application of category-theoretic semantics to the characterisation of complexity classes using higher-order function algebras	469
MCCUSKER, GUY. Games and definability for FPC	347

IN MEMORIAM

BAUMGARTNER, JAMES E. In memoriam: Paul Erdős, 1913–1996 70

MEETINGS OF THE ASSOCIATION

European ASL Summer meeting, Haifa, Israel, 1995	73
European ASL Summer meeting, Donostia-San Sebastián, Spain, 1996	242
ASL Winter Meeting, San Diego, California, January 10–11, 1997	367
ASL Annual Meeting, Cambridge, Massachusetts, March 22–25, 1997	378

MEETINGS SPONSORED BY THE ASSOCIATION

Sixth Asian Logic Conference, Beijing, P.R. China, May 20–24, 1996	148
Australasian Association for Logic 31st Annual Conference, Brisbane, Australia, July 5–8, 1996	363
7th Scandinavian Logic Symposium, Uppsala, Sweden, August 18–20, 1996	487

NOTICES

Notices	149
Notices	278
Notices	397
Notices	533

OFFICERS AND MEMBERS

List of officers, committees and members of the Association for Symbolic Logic	489
ERRATA	Pages 280 and 537.