

THE
JOURNAL
OF
SYMBOLIC LOGIC

EDITED BY

PETER ACZEL

GEORGE BOLOS

JOHN P. BURGESS

HERBERT B. ENDERTON

SY D. FRIEDMAN

AKIHIRO KANAMORI

JULIA KNIGHT

MICHAEL MAKKAJ

ANDRE SCEDROV

RICHARD A. SHORE

A. S. TROELSTRA

JOHAN VAN BENTHEM

Consulting Editors:

JAMES BAUMGARTNER

JIRÍ BEČVÁŘ

GREGORY L. CHERLIN

M. J. CRESSWELL

MATTHEW FOREMAN

SAUL A. KRIPKE

GRIGORI MINTS

J. DONALD MONK

GABRIEL SABBAGH

SCOTT SOAMES

ALASDAIR URQUHART

VOLUME 55 · NUMBER 4 · DECEMBER 1990

ISSN 0022-4812

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

*Copyright © 1990 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

| | |
|--|------|
| Cumulative index to volumes 27–55 (1962–1990) | 1329 |
| Index of contributed papers | 1330 |
| Index of abstracts | 1391 |
| Index of reviews | 1479 |
| By author of work reviewed | 1480 |
| By reviewer | 1741 |
| List of officers and members of the Association for Symbolic Logic | 1752 |
| Notices | 1790 |

THE JOURNAL OF SYMBOLIC LOGIC is published quarterly, in the months of March, June, September, and December, by the Association for Symbolic Logic, Inc., at 1981 East Locust Street, Pasadena, CA 91117. Second class postage is paid at Pasadena, CA and additional offices. The 1990 annual subscription price is \$140. Postmaster: Send address changes to *The Journal of Symbolic Logic, Association for Symbolic Logic, P.O. Box 70557, Pasadena, CA 91117*. Business correspondence should be sent to the Secretary-Treasurer of the Association, C. Ward Henson (address below).

The JOURNAL is the official organ of the Association for Symbolic Logic, an international organization for furthering research in symbolic logic and exchange of ideas among mathematicians, philosophers, and others interested in this field.

Individual membership in the Association is open to anyone interested in its work. Annual dues for members are \$40, or \$20 for students. Dues include subscription to the current volume of the JOURNAL. For their personal use, members may purchase back volumes at a discount. Persons wishing to subscribe to the JOURNAL for their individual use without becoming Association members should write to the Secretary-Treasurer.

Institutional membership in the Association is available to any academic institution or department. Annual dues are \$275. Membership privileges include choices of current subscriptions, of back volumes, and of student memberships; a detailed description is available from the Association. Information on corporate membership is also available from the Association.

Back volumes of the JOURNAL are available. Prices per volume in paper form are as follows: \$46 for Volumes 1–13, \$92 for Volumes 14–30, \$110 for Volumes 31–45, \$124 for Volumes 46–47, \$180 for Volumes 48–49, \$160 for Volumes 50–52, and \$180 for Volumes 53–54. Volume 26 is an index for Volumes 1–26; Number 4 of Volume 45 is an index for Volumes 27–45. The two indexes may be purchased together for \$120. Members of the Association may purchase back volumes for their personal use at a 25% discount. *A Bibliography of Symbolic Logic* by Alonzo Church (from Volumes 1 and 3) may be purchased separately; the price is \$18 for members or \$24 for nonmembers.

Information on microfiche and microfilm editions of the JOURNAL can be obtained from University Microfilms, 300 North Zeeb Road, Ann Arbor, MI 48106.

Notices of change of address, dues, and subscriptions to the JOURNAL should be sent to *The Association for Symbolic Logic, P.O. Box 70557, Pasadena, CA 91117*; all orders must be accompanied by payment.

Requests for information, applications for membership, business correspondence, and notices and announcements for publication in the JOURNAL should be sent to the Secretary-Treasurer of the Association, *C. Ward Henson, Department of Mathematics, University of Illinois, 1409 W. Green Street, Urbana, IL 61801*.

Books for review in the JOURNAL should be sent to *Herbert Enderton, The Journal of Symbolic Logic, U.C.L.A., Los Angeles, CA 90024*. The other editors of reviews are *George Boolos, Akihiro Kanamori, and Michael Makkai*.

Continued on inside back cover

10 9 8 7 6 5 4 3 2 1 95 94 93 92 91 90