THE

JOURNAL OF SYMBOLIC LOGIC

EDITED BY

MICHAEL DUNN

KIT FINE

YIANNIS MOSCHOVAKIS

PAUL EKLOF

Dagfinn Føllesdal

Anil Nerode

HERBERT ENDERTON WILFRID HODGES

WILLIAM TAIT

AKIHIRO KANAMORI

Managing Editor: ALFONS BORGERS

Consulting Editors:

PETER ACZEL
JIŘÍ BEČVÁŘ
GEORGE BOOLOS
JOAN BRESNAN
JOHN P. BURGESS
STEPHEN A. COOK
M. J. CRESSWELL
SOLOMON FEFERMAN
JENS ERIK FENSTAD

FREDERIC B. FITCH
HANS KAMP
DAVID KAPLAN
JEROME KEISLER
SAUL A. KRIPKE
KENNETH KUNEN
MICHAEL MAKKAI
RUTH BARCAN MARCUS
DONALD A. MARTIN

J. Donald Monk
GERT H. MÜLLER
CHARLES D. PARSONS
GABRIEL SABBAGH
GERALD SACKS
DANA S. SCOTT
RICHARD A. SHORE
STEVEN K. THOMASON
BAS VAN FRAASSEN

VOLUME 47

1982

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

The four numbers of Volume 47 were issued at the following dates:

Number 1, pages 1-238, March 22, 1982 Number 2, pages 241-480, June 2, 1982 Number 3, pages 481-720, September 15, 1982 Number 4, pages 721-952, January 17, 1983

Numbers 1-3 of this volume are copyrighted © 1982 by the Association for Symbolic Logic, Inc. Number 4 of this volume is copyrighted © 1983 by the Association for Symbolic Logic, Inc. Reproduction of copyrighted numbers of the Journal by photostat, photoprint, microfilm, or like process is forbidden, except by written permission, to be obtained through the Business Office of the Association for Symbolic Logic, P.O. Box 6248, Providence, Rhode Island 02940, U.S.A.

CONTENTS OF VOLUME 47

AANDERAA, STÅL O., BÖRGER, EGON and LEWIS, HARRY R. Conservative re-	
duction classes of Krom formulas	110
APPLEBAUM, C. H. An introduction to ω-extensions of ω-groups	27
AVRAHAM, URI and SHELAH, SAHARON. Forcing with stable posets	37
BACON, JOHN. First-order logic based on inclusion and abstraction	793
BALDWIN, JOHN T. and MILLER, DOUGLAS E. Some contributions to defina-	
bility theory for languages with generalized quantifiers	572
BARBANEL, JULIUS B. Supercompact cardinals, elementary embeddings and	
fixed points	84
Supercompact cardinals and trees of normal ultrafilters	89
BAUR, WALTER. On the elementary theory of pairs of real closed fields. II	669
BOOLOS, GEORGE. Extremely undecidable sentences	191
On the nonexistence of certain normal forms in the logic of provability	638
Börger, Egon. See Aanderaa, Stål O.	
BYERLY, ROBERT E. An invariance notion in recursion theory	48
Recursion theory and the lambda-calculus	67
CHONG, C. T. Double jumps of minimal degrees over cardinals	329
COOPER, S. B. Partial degrees and the density problem	854
CRABBÉ, MARCEL. On the consistency of an impredicative subsystem of	
Quine's NF	131
DAWES, A. M. Splitting theorems for speed-up related to order of enumera-	
tion	1
DEVLIN, KEITH J. The combinatorial principle $\Diamond^{\#}$	888
FARRINGTON, C. P. Constructible lattices of c-degrees	739
FELDMAN, NORMAN. Axiomatization of polynomial substitution algebras	481
GAIFMAN, HAIM and SNIR, MARC. Probabilities over rich languages, testing	
and randomness	495
HAY, LOUISE and MILLER, DOUGLAS. A topological analog to the Rice-	
Shapiro index theorem	824
HENLE, JAMES M. and ZWICKER, WILLIAM S. Ultrafilters on spaces of parti-	
tions	137
HOOVER, DOUGLAS N. A normal form theorem for $L_{\omega_{1}p}$, with applications	605
JECH, THOMAS. On hereditarily countable sets	37
JONES, JAMES P. Universal diophantine equation	549
KALANTARI, IRAJ and LEGGETT, ANNE. Simplicity in effective topology	169
KATZ, MICHAEL. Real-valued models with metric equality and uniformly con-	
tinuous predicates	772

KIRBY, L. A. S. Flipping properties in arithmetic	416
KLEINBERG, E. M. A measure representation theorem for strong partition car-	
dinals	161
KNIGHT, JULIA and NADEL, MARK. Expansions of models and Turing de-	
grees	587
Models of arithmetic and closed ideals	
LASCAR, DANIEL. On the category of models of a complete theory	
LEGGETT, ANNE. See KALANTARI, IRAJ	
Lewis, Harry R. See Aanderaa, Stål O.	
LIFSCHITZ, VLADIMIR. Constructive assertions in an extension of classical	
mathematics	359
LÓPEZ-ESCOBAR, E. G. K. Implicational logics in natural deduction systems	
LYNCH, JAMES F. On sets of relations definable by addition	
MAASS, WOLFGANG. Recursively enumerable generic sets	
MAGIDOR, MENACHEM. Reflecting stationary sets	
MAITRA, ASHOK. An effective selection theorem	
MARTIN, E. P. and MEYER, R. K. Solution to the $P-W$ problem	
McAloon, Kenneth. On the complexity of models of arithmetic	
MEYER, R. K. See MARTIN, E. P.	
MILLER, ARNOLD W. The Baire category theorem and cardinals of countable	
cofinality	275
MILLER, DOUGLAS E. See BALDWIN, JOHN T.	
See HAY, LOUISE	
MORGENSTERN, CARL. On generalized quantifiers in arithmetic	187
Nadel, Mark. See Knight, Julia	
Pabion, J. F. Saturated models of Peano arithmetic	625
PARIGOT, MICHEL. Théories d'arbres	841
Parsons, Charles. Intensional logic in extensional language	289
PILLAY, ANAND. Dimension theory and homogeneity for elementary exten-	
sions of a model	147
POIZAT, BRUNO. Deux ou trois choses que je sais de L_n	641
Rose, Bruce I. Preservation of elementary equivalence under scalar exten-	
sion	734
SCHINZEL, BRITTA. On decomposition of Gödelnumberings into Friedberg-	
numberings	267
SCHMERL, JAMES H. and SIMPSON, STEPHEN G. On the role of Ramsey quanti-	
fiers in first order arithmetic	423
SCHMERL, ULF R. Iterated reflection principles and the ω -rule	721
SCHMID, JÜRG. Model companions of distributive p-algebras	680
SUETAH SAHADON SEE AVDAHAM IIDI	

SHORE, RICHARD A. On homogeneity and definability in the first-order theory	
of the Turing degrees	8
SIMPSON, STEPHEN G. See SCHMERL, JAMES H.	
SMORYŃSKI, C. Recursively saturated nonstandard models of arithmetic; ad-	
dendum	493
SNIR, MARC. See GAIFMAN, HAIM	
STATMAN, R. Completeness, invariance and λ-definability	17
STEEL, JOHN R. A classification of jump operators	
STOB, MICHAEL. Index sets and degrees of unsolvability	
TERLOUW, JAN. On definition trees of ordinal recursive functionals: Reduc-	
tion of the recursion orders by means of type level raising	395
VÄÄNÄNEN, JOUKO. Abstract logic and set theory. II. Large cardinals	
WEITKAMP, GALEN. Analytic sets having incomparable Kleene degrees	
ZWICKER, WILLIAM S. See HENLE, JAMES M.	
MEETINGS AND ABSTRACTS	
Australasian Annual Conference, Wollongong, New South Wales, 1980	717
Abstracts of papers	717
REVIEWS	
Reviews	197
Reviews	436
Reviews	689
Reviews	900
NOTICES	
Notices	237
Notices	479
Notices	719
Notices	
OFFICERS AND MEMBERS	
List of officers and members of the Association for Symbolic Logic	918

ERRATA

VOLUME 40

Page 721, column 2, line 22. For «Kahn», read «Kann».

VOLUME 44

Page 690, column 1, line 10 from below. For «Abhandlung», read «Abhandlungen».

VOLUME 46

Page 186, line 18 from below. For «f i i f» (at the end of the line), read «f f f f».

VOLUME 47

Page 191. The footnote should read «Received March 21, 1979». Page 202, line 20 from below. Delete «and isomorphic as fields».

ABCDEFGHIJ-CM-89876543

Back volumes of the Journal are available in paper form, on microfilm, and (beginning with Volume 44) on microfiche. Prices per volume in paper form are as follows: \$20.00 for Volumes 1-17, \$25.00 for Volumes 18-36, \$45.00 for Volume 37, \$53.00 for Volume 38, \$60.00 for Volumes 39-41, and \$72.00 for Volume 42 and later volumes. A Bibliography of Symbolic Logic by Alonzo Church (from Volumes 1 and 3) may be purchased separately; the price is \$9.00 for members or \$12.00 for nonmembers. There are two cumulative indexes which may also be purchased separately. The first one is an index to volumes 1-25 and the second is an index to volumes 27-45. The price for each is \$18.75 for members or \$25.00 for nonmembers. Prices for back volumes on microfilm or microfiche may be obtained by writing to the Association.

Applications for membership in the Association, requests for information, notices of change of address, and all business correspondence should be sent to *The Association for Symbolic Logic*, P. O. Box 6248, Providence, RI 02940. Dues and subscriptions to the Journal should be sent to *The Association for Symbolic Logic*, P. O. Box 1571, Annex Station, Providence, RI 02901; all orders must be accompanied by payment.

Notices and announcements for publication in the JOURNAL should be sent to the Secretary of the Association, Louise Hay, Department of Mathematics, University of Illinois at Chicago Circle, Chicago, IL 60680.

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 Michael Dunn, Paul Eklof, Akihiro Kanamori, and William Tait.

Articles being submitted for publication in the JOURNAL should be sent in duplicate to one of the following editors: Kit Fine, Department of Philosophy, University of Michigan, Ann Arbor, MI 48109; or Dagfinn Føllesdal, Department of Philosophy, University of Oslo, Blindern, Oslo 3, Norway; or Wilfrid Hodges, Bedford College, University of London, Regent's Park, London NWI 4NS, England; or Yiannis Moschovakis, Department of Mathematics, U. C. L. A., Los Angeles, CA 90024; or Anil Nerode, Department of Mathematics, Cornell University, Ithaca, NY 14850.

Each manuscript should be typewritten with wide margins and with double spacing between the lines. Footnotes should be numbered consecutively and should also be typed with wide margins and double spacing, preferably on a separate sheet. Two copies of the manuscript should be sent to the editor, and the author should also keep a complete copy. An article of more than thirty-two printed pages in length may be divided by the editors between two or more, not necessarily consecutive, numbers. Authors receive fifty reprints of each article and additional reprints may be purchased if desired.

Authors of papers (excluding reviews) accepted for publication in the JOURNAL are notified of the approximate number of printed pages. At that time they are asked, if funds are available from supporting institutions or grants, to arrange for payment of page charges of \$30.00 per printed page. This request involves no financial obligation for the author, and acceptance of the paper will not be affected by whether payment is made.

The JOURNAL invites submission of (1) original technical papers in the field of symbolic logic, (2) expository papers in this field, (3) papers whose main point is philosophical and which either bear upon logic or make use of its methods, and (4) studies in the history of logic in which modern technical developments are taken into account.