

THE
JOURNAL
OF
SYMBOLIC LOGIC

EDITED BY

ALONZO CHURCH HARTLEY ROGERS, JR ARTHUR N. PRIOR
ALICE A. LAZEROWITZ JULIA ROBINSON

Managing Editor: ALFONS BORGERS

Consulting Editors:

W. ACKERMANN	LEON HENKIN	GENE F. ROSE
ALAN ROSS ANDERSON	HANS HERMES	BARKLEY ROSSER
C. A. BAYLIS	E. J. LEMMON	H. ARNOLD SCHMIDT
JONATHAN F. BENNETT	RICHARD MONTAGUE	KURT SCHÜTTE
PAUL BERNAYS	ANDRZEJ MOSTOWSKI	DANA SCOTT
MARTIN DAVIS	GERT H. MÜLLER	THORALF SKOLEM
FREDERIC B. FITCH	STEVEN OREY	J. F. THOMSON
G. HASENJAEGER	RÓZSA PÉTER	A. R. TURQUETTE
	ABRAHAM ROBINSON	

VOLUME 27
NUMBERS 1–4
1962

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

*Copyright 1963 by the Association for Symbolic Logic, Inc.
Reproduction by photostat, photo-print, microfilm, or like process by permission only*

THE JOURNAL OF SYMBOLIC LOGIC is the official organ of the Association for Symbolic Logic Inc., published quarterly, in the months of March, June, September, and December. The Journal is published for the Association by *N.V. Erven P. Noordhoff, Publishers, Groningen, The Netherlands*. The subscription price is six dollars and fifty cents annually, for current subscriptions. New subscriptions must begin with the first number of the current volume, as determined by the date of receipt of the subscription. Completed volumes are sold at eight dollars. Members of the Association of three years standing may purchase back volumes of the Journal at reduced rates for their personal use (except volume 1). THE JOURNAL OF SYMBOLIC LOGIC publishes the official notices of the Division of Logic, Methodology and Philosophy of Science of the International Union of History and Philosophy of Science.

Applications for membership in the Association, subscriptions to the JOURNAL, changes of address, and all business correspondence should be addressed to: ***The Association for Symbolic Logic, 190 Hope Street, Providence 6, Rhode Island.***

Articles for publication in the JOURNAL should be sent to *Hartley Rogers, Jr., Massachusetts Institute of Technology, Cambridge 39, Massachusetts* or to *Alice A. Lazewowitz, 31 Langworthy Road, Northampton, Massachusetts* or to *Arthur N. Prior, University of Manchester, Manchester, England* or to *Julia Robinson, 243 Lake Drive, Berkeley 8, California*.

All manuscripts should be typewritten with wide margin and wide spacing between the lines, and the author should keep a complete copy; footnotes should be numbered consecutively and should also be typed with wide margin and wide spacing (preferably on a separate sheet). If an article is of more than thirty-two (printed) pages in length, the editors reserve the right to divide it between two or more, not necessarily consecutive, numbers. Authors receive fifty reprints of each article, with covers, and additional reprints may be purchased if desired.

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

Authors and publishers are requested to send, for review, copies of books and reprints of articles in journals to *Alonzo Church, Fine Hall, Princeton University, Princeton, New Jersey*.

THE
JOURNAL
OF
SYMBOLIC LOGIC

EDITED BY

ALONZO CHURCH HARTLEY ROGERS, JR ARTHUR N. PRIOR
ALICE A. LAZEROWITZ JULIA ROBINSON

Managing Editor: ALFONS BORGERS

Consulting Editors:

W. ACKERMANN	LEON HENKIN	GENE F. ROSE
ALAN ROSS ANDERSON	HANS HERMES	BARKLEY ROSSER
C. A. BAYLIS	E. J. LEMMON	H. ARNOLD SCHMIDT
JONATHAN F. BENNETT	RICHARD MONTAGUE	KURT SCHÜTTE
PAUL BERNAYS	ANDRZEJ MOSTOWSKI	DANA SCOTT
MARTIN DAVIS	GERT H. MÜLLER	THORALF SKOLEM
FREDERIC B. FITCH	STEVEN OREY	J. F. THOMSON
G. HASENJAEGER	RÓZSA PÉTER	A. R. TURQUETTE
	ABRAHAM ROBINSON	

VOLUME 27

1962

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

The four numbers of Volume 27 were issued at the following dates:

Number 1, pages 1–130, May 17, 1963.

Number 2, pages 131–254, August 7, 1963.

Number 3, pages 255–382, September 23, 1963.

Number 4, pages 383–504, October 30, 1963.

All numbers of this volume are copyrighted by the Association for Symbolic Logic, Inc. Reproduction of copyrighted numbers of the Journal by photostat, photo-print, microfilm, or like process is forbidden, except by written permission of the Managing Editor.

TABLE OF CONTENTS

Quasi-truth-functional systems of propositional logic. By NICHOLAS RESCHER	1
Disjunction and existence under implication in elementary intuitionistic formalisms. By S. C. KLEENE	11
The pure calculus of entailment. By ALAN ROSS ANDERSON and NUEL D. BELNAP, Jr.	19
Note on Słupecki T-functions. By ROBERT E. CLAY	53
On Post's canonical systems. By RAYMOND M. SMULLYAN	55
Syllogism and quantification. By TIMOTHEY SMILEY	58
Reviews	73
Notice of an international symposium on the theory of models . . .	128
Notice of a meeting of the Association for Symbolic Logic	129
Notice of fellowship and research opportunities in mathematics . . .	129
Elections	129
Notice of a meeting of the Association for Symbolic Logic	130
An emendation of the axiom system of Hilbert and Ackermann for the restricted calculus of predicates. By DAVID PAGER	131
On weak completeness of intuitionistic predicate logic. By G. KREISEL	139
Die Nichtaxiomatisierbarkeit des unendlichwertigen Prädikatenkalküls von Łukasiewicz. By BRUNO SCARPELLINI	159
Independence proofs in predicate logic with infinitely long expressions. By CAROL R. KARP	171
The implicational fragment of Dummett's LC. By R. A. BULL	189
Theories incomparable with respect to relative interpretability. By RICHARD MONTAGUE	195
Reviews	212
Early history of the Association for Symbolic Logic. By C. J. DUCASSE and HASKELL B. CURRY	255
Transfinite recursive progressions of axiomatic theories. By SOLOMON FEFERMAN	259
An improved prenex normal form. By C. C. CHANG and H. JEROME KEISLER	317

TABLE OF CONTENTS

A propositional logic with subjunctive conditionals. By R. B. ANGELL	327
Some forms of completeness. By P. C. GILMORE	344
Reviews	353
Meeting of the Association for Symbolic Logic, Leeds 1962. By M. H. LÖB	373
Abstracts of papers	373
Incompleteness along paths in progressions of theories. By S. FEFERMAN and C. SPECTOR	383
The separation theorem of intuitionist propositional calculus. By ALFRED HORN	391
On McKinsey's syntactical characterizations of systems of modal logic. By F. R. DRAKE	400
The number of modalities in T supplemented by the axiom $CL^2\phi L^3\phi$. By TAKEO SUGIHARA	407
Functional completeness and canonical forms in many-valued logics. By WILLIAM H. JOBE	409
Extensions of some theorems of Anderson and Belnap. By ALAN ROSE	423
The independence of connectives. By TIMOTHY SMILEY	426
Two arithmetical techniques with numbered classes. By GERALD B. STANDLEY	437
The semantics of singular terms. By GORDON MATHESON	439
Reviews	467
Twenty-eighth annual meeting of the Association for Symbolic Logic. By ROBERT L. VAUGHT	475
Abstracts of papers	475
List of officers and members of the Association for Symbolic Logic . .	484

ERRATA

VOLUME 20

Page 197, line 18. For « H. S. CALDWELL », read « S. H. CALDWELL ».
Page 321, column 2, line 10. For « H. S. », read « S. H. ».

VOLUME 22

Page 348, line 17. Delete the negation sign and for $= 0$, read $= 1$.

VOLUME 23

Page 134, line 5. For e , read \dot{e} .
Page 314, line 6 from the bottom. For R_e^a , read $R_{\dot{e}}^a$.

VOLUME 24

Page ii, line 5. For « Maart », read « March ».
Page 190, line 17. For « ŁUSZCZEWESKA », read « ŁUSZCZEWSKA ».
Page 287, the unnumbered footnote. For 1959, read 1958.
Page 347, column, next-to-last line. For « Semantics », read « semantics ».
Page 353. The first line at the top of column 2 should be indented.

VOLUME 25

Page ii, line 5. For $\delta\delta$, read 9.
Page 158, line 7 from the bottom. For \sim , read \sim .
Page 179, line 23. For XIII, read XXIII.
Page 182, line 14. For \sim , read \sim .
Page 250, line 9. For « "Función" », read « "Función" ».
Page 265, line 26. For « f. », read « ff. ».
Page 265, last line. For « f. », read « ff. ».
Page 266, line 17. For « f. », read « ff. ».
Page 269, line 1. Add a hyphen at the end of the line.
Page 284. Insert space between lines 7 and 6 from the bottom.
Page 297, line 4. For « consequences », read « conséquences ».
Page 330, line 6 from the bottom. For the first P_2 read P_0 .
Page 334, line 2. Delete parentheses, twice.
Page 354, line 24. For « systeme », read « système ».
Page 358, line 10 from the bottom. For], read [.
Page 360, line 3. For $(x/p)(y/q)$, read $\begin{pmatrix} x \\ p \end{pmatrix} \begin{pmatrix} y \\ q \end{pmatrix}$.
Page 361, line 22. For XXV 000(0), read XXV 356(1).
Page 361, line 27. For $a < b$, read $a <_{\Delta} b$.
Page 362, line 24. For « HILLARY », read « HILARY ».

ERRATA

- Page 370, last line. For « *for the synthesis* », read « *in synthesis* ».
Page 376, line 31 from the bottom. For « *pure* », read « "*pure*" ».
Page 377, line 19. For « ZIEMBINSKI », read « ZIEMBIŃSKI ».
Page 380, line 9. For XXV 000, read XXV 299(1).
Page 380, line 7 from the bottom. For « PAWLOWSKI », read « PAWŁOWSKI ».
Page 381, line 3. For « Bochenski », read « Bocheński ».
Page 381. Insert space between lines 6 and 7.
Page 381, line 10. For XXV 271, read XXV 269.
Page 383, line 15. For « Ferruccio Rossi-Landi », read « FERRUCCIO ROSSI-LANDI ».

VOLUME 27

- Page 16, line 11 and line 16. For †, read |.