

1974 EUROPEAN MEETING OF STATISTICIANS
AND
SEVENTH PRAGUE CONFERENCE ON INFORMATION THEORY,
STATISTICAL DECISION FUNCTIONS, AND RANDOM PROCESSES
18–23 AUGUST 1974

FIRST ANNOUNCEMENT

The Institute of Mathematical Statistics and the Institute of Information Theory and Automation of the Czechoslovak Academy of Sciences are jointly organizing the above Conference, which is also sponsored by IASPS. The proposed dates of the Conference, to be held in Prague, are 18 to 23 August 1974.

In addition to the traditional topics of the previous Prague Conferences, the programme has been broadened to include all aspects of Probability, Applied Probability, Mathematical Statistics and Applied Statistics.

Twentyfour speakers of international standing are being invited to lecture on important new developments in every branch of Probability and Statistics.

There will be ample opportunity for participants to present 20 minute communications outlining their recent research results. Presented papers, both invited and communicated, will be published in the Transactions of the Conference. The summaries will be distributed to all participants on their arrival at the conference.

May we encourage your participation in what promises to be a lively and interesting meeting for all European statisticians. May we also ask you to enrol with the Organizing Committee at your earliest convenience. This will not constitute a final commitment to the Conference; further details of the Programme will be mailed to all respondents towards the end of the year.

Will anyone interested in attending the Conference or presenting a 20-minute communication, kindly send in their name, address, and the tentative title of their communication to the Conference Organizers at

EMS and 7 Prague Conference
Institute of Information Theory and Automation
Vysehradská 49
128 48 Prague 2
Czechoslovakia

J. Gani

O. Šefl

Methuen's Supplementary Review Series in Applied Probability

General Editor: M. S. BARTLETT, M. A., D.SC., F. R. S.

Editor: J. GANI, D. I. C., PH. D., D.SC.

The remaining stock in this Series has been purchased by the Applied Probability Trust. The volumes still available are:

- Volume 2. DIFFUSION MODELS IN POPULATION GENETICS
by M. Kimura
- Volume 3. GROUP REPRESENTATIONS AND APPLIED PROBABILITY
by E. J. Hannan
- Volume 5. RECENT RESULTS IN INFORMATION THEORY by S. Kotz
- Volume 6. ON THE ALGEBRA OF QUEUES by J. F. C. Kingman
- Volume 8. STOCHASTIC APPROACH TO CHEMICAL KINETICS
by D.A. McQuarrie

While stocks last, these reviews may be purchased at the price of £0.50 (U.S.\$ 1.25; \$A. 1.00) each, post free, or £2.00 (U.S.\$5.00; \$A. 4.00) for the five volumes. Please send your order to:

Executive Editor, Applied Probability,
Department of Probability and Statistics,
The University, Sheffield S3 7RH, England.

Also available: Proceedings of the WHO SYMPOSIUM ON QUANTITATIVE EPIDEMIOLOGY (Moscow, November 1970); reprinted from the *Advances in Applied Probability*, Vol. 3. The price per copy is £0.50 (U.S.\$1.25; \$A. 1.00).

It is essential that all orders are accompanied by a remittance, payable to "Applied Probability".

North-Holland Books in Probability and Statistics

Probability Theory

By A. RÉNYI, University of Budapest

1970. 666 pages. Dfl. 68.00 (about US \$ 26.20)

The Single Server Queue

By J. W. COHEN, Technological University Delft, The Netherlands

1969. 671 pages. Dfl. 108.00 (about US \$ 41.50)

Statistical Theory of Sample Survey Design and Analysis

By H. S. KONIJN, Tel-Aviv University, Israel

1973. About 440 pages.

A Survey of Combinatorial Theory

Edited by J. N. SRIVASTAVA, Colorado State University, F. HARARY, University of Michigan, C. R. RAO, Indian Statistical Institute, G.-C. ROTA, Massachusetts Institute of Technology and S. S. SHRIKHANDE, University of Bombay

1973. 476 pages. Dfl. 100.00 (about US \$ 38.50)

Statistical and Computational Methods in Data Analysis

By S. BRANDT, Institute of High Energy Physics, Heidelberg University

1970. 335 pages. Dfl. 54.00 (about US \$ 20.80)

north-holland

P.O. BOX 211
AMSTERDAM
THE NETHERLANDS

1219 NH

Sole distributors for the U.S.A. and Canada

American Elsevier Publishing Company, Inc., 52 Vanderbilt Avenue, New York, N.Y. 10017

Advances in Applied Probability

The Editorial Board would like to encourage the submission to the *Advances* of Review Papers summarising and coordinating recent results in any of the fields of Applied Probability. The papers should be approximately 40–50 printed pages in length.

In addition to these Review Papers, *Advances* is also designed to be a medium of publication for (1) long research papers in Applied Probability, which may include expository material, (2) expository papers on branches of mathematics of interest to probabilists, (3) papers outlining areas in the biological, physical, social and technological sciences in which probability models can be usefully developed, and finally, (4) papers in Applied Probability presented at conferences which do not publish their proceedings.

In short, the main function of *Advances* is to define areas of recent progress and potential development in Applied Probability. As with the *Journal of Applied Probability*, *Advances* undertakes to publish papers accepted by the Editors within 15 months of their submission.

The Editorial Board consists of E. Sparre Andersen, D. Blackwell, J. W. Cohen, B. Gnedenko, J. Hájek, E. J. Hannan, C. C. Heyde, J. Keilson, D. G. Kendall, J. F. C. Kingman, K. Krickeberg, R. M. Loynes, P. A. P. Moran, J. Neveu, K. R. Parthasarathy, N. U. Prabhu, R. Pyke, C. A. B. Smith and L. Takács. The Editor-in-Chief is J. Gani, and the Editorial Office of the *Advances* is in the Department of Probability and Statistics, The University, Sheffield S3 7RH, England.

Volume 5 No. 2 of *Advances* contains the following papers:

- S. Karlin and N. Kaplan Criteria for extinction of certain population growth processes with interacting types
- S. L. Phoenix and H. M. Taylor The asymptotic strength distribution of a general fiber bundle
- A. M. Walker On the estimation of a harmonic component in a time series with stationary dependent residuals
- C. J. Preston Generalized Gibbs states and Markov random fields
- M. Rudemo Point processes generated by transitions of Markov chains
- S. I. Resnick and M. Rubinovitch The structure of extremal processes
- A. J. Stam Regular variation of the tail of a subordinated probability distribution
- J. Bather Optimal decision procedures for finite Markov chains. Part I: Examples
- R. K. Deb and R. F. Serfozo Optimal control of batch service queues
- J. Senturia and P.S. Puri A semi-Markov storage model
- S. I. Rosenlund On the length and number of served customers of the busy period of a generalised $M/G/1$ queue with finite waiting room

Subscription rates (post free) per volume are:

For libraries and institutions: U.S.\$26.00 £stg.10.00 \$A.22.50

For individuals belonging to a recognised scientific society: U.S.\$10.40 £stg.4.00 \$A.9.00

The price of back numbers is per volume U.S.\$24.70, £stg.9.50 \$A.21.35

A special discount of approximately 10% is allowed to subscribers who order current issues of both the *Journal* and *Advances* at the same time direct from the Editorial Office. In this case the combined prices are as follows:

For libraries and institutions: U.S.\$58.50 £stg.22.50 \$A.50.65

For individuals: U.S.\$21.00 £stg. 8.00 \$A.18.25

Cheques made out on U.S., U.K. and Australian banks will be acceptable: they should be made payable to *Applied Probability*, and sent to:

Executive Editor, *Advances in Applied Probability*,
Department of Probability and Statistics,
The University, Sheffield S3 7RH, England.

Subscription rates

Subscriptions (post free) for the 1973 volume of the *Journal* are:

U.S. \$39, £stg. 15.00, \$A.33.75, for libraries and institutions;

U.S. \$13, £stg. 5.00, \$A.11.25, for individuals belonging to a recognised scientific society.

Members of the London Mathematical Society should apply direct to the Secretary of the Society for copies of the *Journal*.

All enquiries about the *Journal*, as well as other subscriptions and orders for back numbers should be sent to the Executive Editor, Miss M. Hitchcock, Department of Probability and Statistics, The University, Sheffield S3 7RH, England. The price of back numbers varies from volume to volume, and enquiries should be sent to the Executive Editor. Cheques, money orders, etc. should be made out to *Applied Probability*; cheques on U.S., U.K. and Australian banks will be acceptable.

Notes for Contributors

It is a condition of publication in the *Journal of Applied Probability* that papers shall not previously have appeared elsewhere, and will not be reprinted without the written permission of the Trust. The copyright of all published papers shall be vested in the Trust. It is the general policy of the *Journal* not to accept for publication papers which cannot appear in print within 15 months of their date of submission. Authors will receive 50 reprints of their papers free, and joint authors a proportional share of this number. Additional reprints will be provided at cost.

Manuscripts should be written in English or French; manuscripts in other languages may be accepted by the Editors, but will appear (subject to the author's agreement) in English or French translation in the *Journal*.

It will be of help to the Editors if the following conventions are adopted:

a) The manuscript should be typewritten, using double spacing, on one side of the paper only. The original and a copy may be submitted to any Editor; a duplicate of the covering letter should, however, be sent to the Editor-in-Chief.

b) Each paper submitted should be accompanied by

- (i) a short abstract of approximately 4–10 lines giving a non-mathematical description of the subject matter and results;
- (ii) a list of keywords detailing the contents for the purpose of computerised information retrieval.

c) References should be indicated in the text by the name of the author(s) and the date, thus: Feller (1961), and the full references listed at the end of the article in alphabetical order. Journal references should include the title of the article cited, the title of the journal (abbreviated in the style of the *International Journal of Abstracts: Statistical Theory and Method*), the volume, and inclusive page numbers. Book references should give the full title, the publisher, and the place of publication. For example:

Feller, W. (1961) A simple proof of renewal theorems. *Comm. Pure Appl. Math.* **14**, 285–293.

Robinson, E. A. (1959) *An Introduction to Infinitely Many Variates*. Griffin, London.

d) Type faces should be carefully distinguished on the manuscript using the following standard methods of marking:

Italic capitals (*T*, *I*, *R*) and lower case letters (*t*, *i*, *r*) should be underlined once, e.g., T, I, R, t, i, r.

Bold-face capitals (**T**, **I**, **R**) and lower case letters (**t**, **i**, **r**) should have a curly underline, e.g., T, I, R, t, i, r.

Greek characters (α , β , θ) and script letters (\mathcal{J} , \mathcal{I} , \mathcal{R}) should be carefully drawn and identified when first used by a marginal note of the form ' α —lower case Greek alpha' or ' \mathcal{R} —script R'.

e) Indices and subscripts should be clearly distinguished, using the marking $\overset{4}{\underset{4}{\wedge}}$ where necessary.

Authors will receive only first proofs for correction; charges will be made for excessive alteration to these.

CONTENTS

Volume 10

Number 3

September 1973

Research Papers

NIELS BECKER R. L. HUDSON E. J. HANNAN B. D. CRAVEN LAURENS DE HAAN AND SIDNEY I. RESNICK R. W. SHORROCK DARIUSH HAGHIGHI-TALAB AND CHRISTOPHER WRIGHT GORDON PLEDGER AND FRANK PROSCHAN PRANAB KUMAR SEN MATTHEW J. SOBEL P. A. P. MORAN J. MICHAEL HARRISON MICHAEL A. CRANE PETER PURDUE	491 502 510 520 528 543 556 572 586 597 605 613 630 644	Carrier-borne epidemics in a community consisting of different groups A quantum-mechanical central limit theorem for anti-commuting observables The estimation of frequency The spectral density of a Markov process Almost sure limit points of record values Record values and inter-record times On the distribution of records in a finite sequence of observations, with an application to a road traffic problem Stochastic comparisons of random processes, with applications in reliability An asymptotically efficient test for the bundle strength of filaments Continuous stochastic games Necessary conditions for Markovian processes on a lattice The heavy traffic approximation for single server queues in series Queues in transportation systems, I: a Markovian system Non-linear matrix integral equations of Volterra type in queueing theory
--	--	--

Short Communications

J. RADCLIFFE DONALD C. RAFFETY S. G. S. SHIVA, N. U. AHMED AND N. D. GEORGANAS D. C. BOES AND J. D. SALAS- LA CRUZ ERHAN ÇINLAR AND PETER JAGERS P. L. DAVIES WOOLLCOTT SMITH O. P. SHARMA P. J. BURVILLE AND J. F. C. KINGMAN	652 659 666 671 678 682 685 691 697	The asymptotic frequencies of the types in a multitype age-dependent branching process allowing immigration Random environment branching processes with equal environmental extinction prob- abilities Order preserving measures of information On the expected range and expected adjusted range of partial sums of exchangeable random variables Two mean values which characterize the Poisson process A class of almost nowhere differentiable stationary Gaussian processes which are somewhere differentiable Shot noise generated by a semi-Markov process A model for queues in series On a model for storage and search
--	---	--