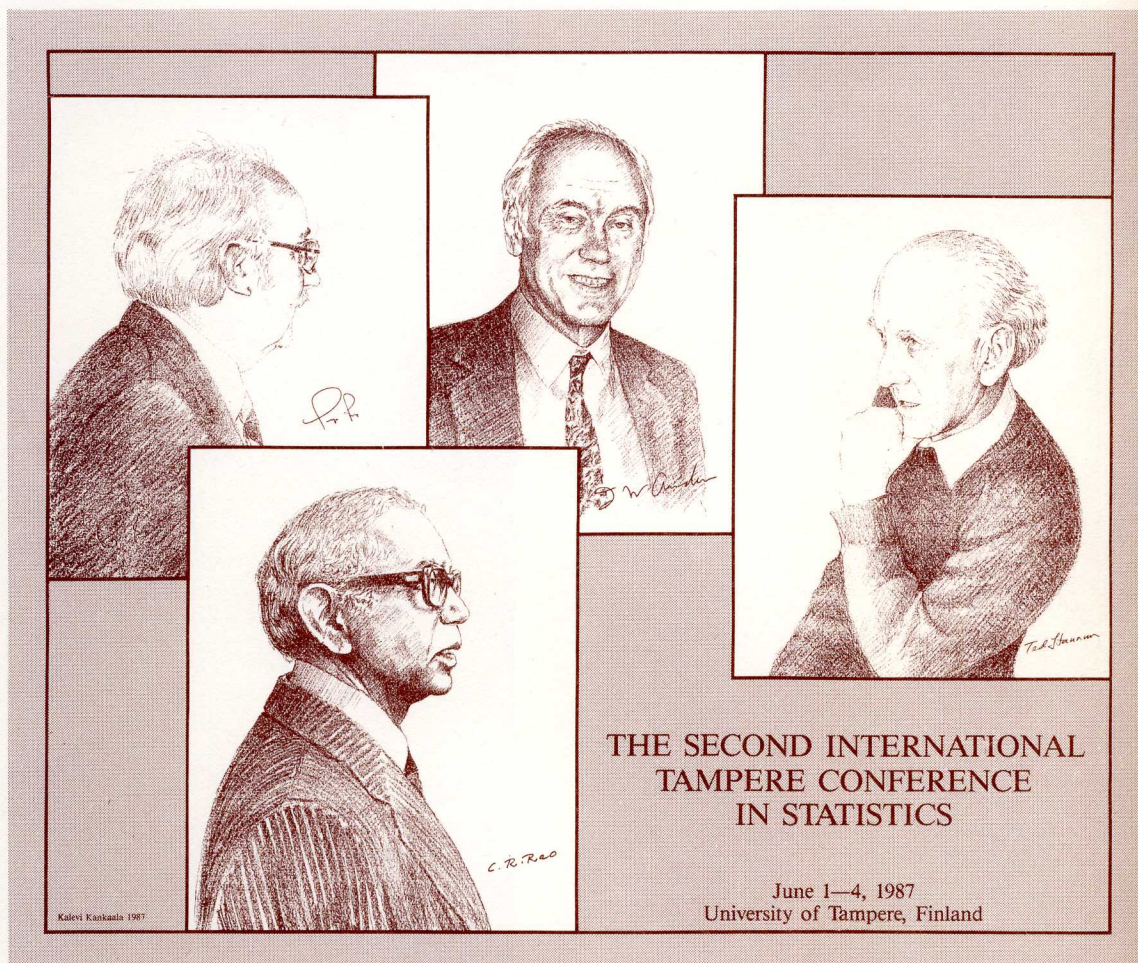


Pukkila  
Puntanen  
Editors

# Proceedings of the Second International Tampere Conference in Statistics



# PROCEEDINGS

of the  
Second International  
Tampere Conference in Statistics

*University of Tampere, Tampere, Finland*

*1 - 4 June 1987*

Edited by

Tarmo Pukkila and Simo Puntanen

Published by

Department of Mathematical Sciences/Statistics, University of Tampere

P.O. Box 607, SF-33101 Tampere, Finland

1987

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1987

Report No. A 184

ISBN 951-44-2168-X  
ISSN 0356-4231

Printed by Vammalan Kirjapaino Oy, Vammala

## PREFACE

The Second International Tampere Conference in Statistics was held at the University of Tampere, Tampere, Finland, from 1-4 June 1987. The conference brought together more than 200 researchers – from 25 different countries – in linear models, multivariate analysis, statistical computing, time series analysis and related themes. This conference continued the spirit kindled by the First International Tampere Seminar on Linear Statistical Models and their Applications that was held at the University of Tampere from August 30 - September 2, 1983.

The conference comprised Plenary Sessions (of keynote addresses with discussion), Invited Talks, and Contributed Papers. The keynote speakers were Professors T.W. Anderson (Stanford, U.S.A.), George E.P. Box (Madison, U.S.A.), E.J. Hannan (Canberra, Australia) and C. Radhakrishna Rao (Pittsburgh, U.S.A. and New Delhi, India). These four statisticians do not need any introduction to the statistical community – their contributions to the development of modern statistical science have indeed been outstanding. It is not only a pleasure to publish their excellent papers in these *Proceedings* but it was also thrilling to meet and visit with these keynote speakers in the various conference activities.

The thanks of the organizers also go to the discussants of the keynote addresses, respectively: Professors Michael D. Perlman (U.S.A.), Stratis Kounias (Greece), Knut Conradsen (Denmark) and C. G. Khatri (India). The invited talks were given by Professors A.C. Atkinson (U.K.), Jerzy K. Baksalary (Poland), Knut Conradsen (Denmark), Takeaki Kariya (Japan), C.G. Khatri (India), Seppo Mustonen (Finland), Michael D. Perlman (U.S.A.), John W. Pratt (U.S.A.), Daryl Pregibon (U.S.A.), Friedrich Pukelsheim (F.R. Germany), Tarmo Pukkila (Finland), Jorma Rissanen (U.S.A), Alastair J. Scott (New Zealand), Bimal K. Sinha (U.S.A.), Terry P. Speed (Australia) and George P.H. Styan (Canada). Special thanks are due to these speakers for their stimulating talks and for preparing such authoritative papers for these *Proceedings*. Professor P.R. Krishnaiah of the University of Pittsburgh, U.S.A., was also an invited speaker but due to serious illness was unable to come: we were deeply saddened to learn that Professor Krishnaiah passed away on 1 August 1987.

Dr. Timo Teräsvirta of the Research Institute of the Finnish Economy (Helsinki) gave the Opening Address of the conference. I am also grateful to Elina Mustonen and University Rector Jarmo Visakorpi for their contributions in the Opening Session.

There were more than 70 speakers in the contributed paper sessions. I wish to thank each of them for their kind cooperation as well as the chairmen of these sessions.



All papers in this volume have been refereed, including all the keynote addresses and invited papers. Exceptionally warm thanks should go to the 140 referees (whose names appear on page 701); the quality of these *Proceedings* is very much due to their unselfish efforts. Of the 48 contributed papers submitted for publication, 30 were accepted for publication and appear in these *Proceedings*.

Many of the papers have been typeset in our Department (using a Xerox Star) and thanks for this typesetting go to Leena Kaunisto, Elisa Lahtinen, Pirjo Larima, Virpi Mäntylä, Tuija Nummi and Marita Raita. We are also grateful to Arto Kallinen for his help with several technical arrangements while preparing this volume.

The conference was organized by a local committee within the Statistics Group of the Department of Mathematical Sciences, consisting of Paula Hietala, Simo Puntanen, George P.H. Styan and myself. Yes, indeed, there is Professor Styan of McGill University in this "local group" – he participated in several long, enthusiastic, and very helpful discussions, taking place in various parts of the world, concerning both this conference and these *Proceedings*.

Also Pentti Huuhtanen, Raija Leppälä and Tapio Nummi very kindly helped with various arrangements. Pirjo Larima deserves very special thanks for her considerable work for the conference during the summer 1987. Thanks also go to Professor Sergio G. Koreisha (University of Oregon) for assistance in planning the sessions during his visit to Tampere in March 1987.

I wish to thank Kalevi Kankaala for preparing the drawings of the four keynote speakers and the associated poster for the conference; this poster is the basis of the dust jacket of these *Proceedings*.

The conference was financially supported by the Ministry of Education of Finland, the University of Tampere and various associations and companies whose names are listed on page VIII. All deserve our warmest thanks for their invaluable support. We are also indebted to the City of Tampere for inviting all participants to a Civic Reception in the Town Hall.

The organizers were also glad to see the active interest shown in the social programme of the conference – particularly by experiencing the sweat in the sauna party in the traditional Finnish way. There was talk while planning for this conference that the organizers were all of a sweat: as it turned out the winter preceding the conference was the coldest in Finland this century.

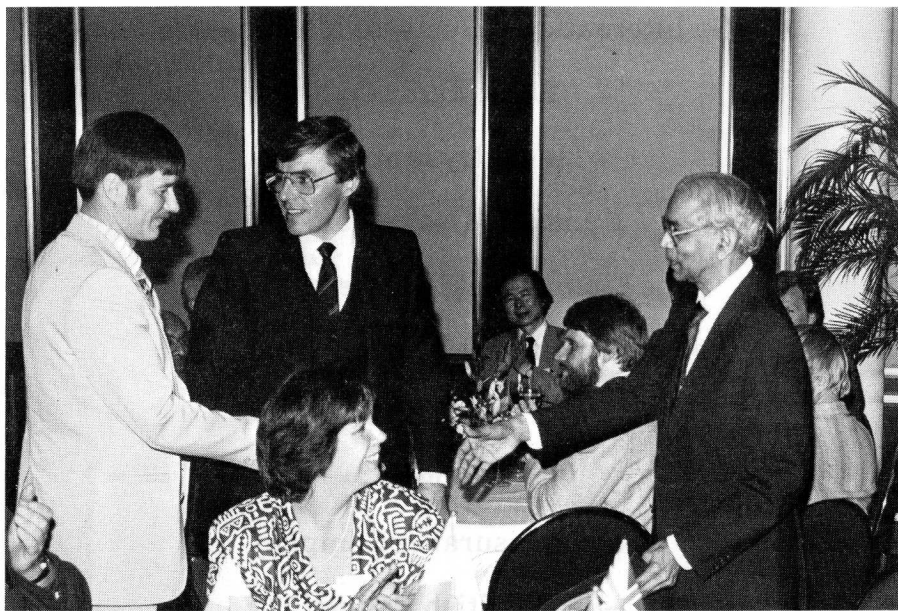
TARMO PUKKILA

*Conference Director*

2 November 1987



E.J. Hannan, George E.P. Box, T.W. Anderson



Kalevi Kankaala, Tarmo Pukkila, C. Radhakrishna Rao

The conference was sponsored by

The Ministry of Education of Finland

The University of Tampere

The Foundation of the University of Tampere

The City of Tampere

The Finnish Cultural Foundation

Finnair Oy

Oy International Business Machines Ab

Rank Xerox Oy

Industry Mutual

Kansallis-Osake-Pankki

The Finnish Metalworkers' Union

Pension Insurance Company Ilmarinen

Hotel Ilves

Okobank

Sampo Insurance Company

The British Council

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