



KUNGL  
TEKNISKA  
HÖGSKOLAN

**Activity Report**  
**July 1, 1999 – June 30, 2000**  
**Mathematical Statistics**

**Department of Mathematics**  
**Royal Institute of Technology**  
**S-100 44 Stockholm, Sweden**

## 1. Personnel

- Professors:** **Lars Holst**, FD. Main research areas: Combinatorial probability theory, limit theorems and approximations in probability, stochastic modelling.  
**Timo Koski**, FD. Main research areas: Statistical learning theory, classification, probabilistic bioinformatics. (Professor from December 6, 1999)
- Associate professor:** **Jan Grandell**, FD. Main research areas: Point processes (Biträdande professor) and risk theory.
- Associate professor:** **Boualem Djehiche**, FD. Main research areas: Stochastic analysis, mathematical epidemiology, risk theory. (Universitetslektor, docent)
- Senior lecturers:** **Josefin Bodell**, TeknD. (Universitetslektorer) **Jan Enger**, FD.  
**Gunnar Englund**, TeknD.  
**Mikael Raab**, TeknD. (To August 31, 1999)
- Researcher:** **Torkel Erhardsson**, TeknD. (Forskarassistent)
- Senior tutors:** **Gunnar Karlsson**, civiling. (Universitetsadjunkter) **Göran Rundqvist**, FK.
- Graduate students:** **Fredrik Armerin**, civiling. (From September 1, 1999)  
**Anna Carlsund**, FM.  
**Per Hallberg**, civiling.  
**Henrik Hult**, civiling. (From January 24, 2000)  
**Andreas Lindell**, civiling. (To May 31, 2000)

## 2. Research

(See the home page of the Division of Mathematical Statistics:  
<http://www.math.kth.se/matstat/matstat.html>.)

### 2.1. Fractional stochastic partial differential equations

*Research leader*

Boualem Djehiche.

*Keywords*

Fractional Brownian motion, long-range dependence, stable processes.

*Project description*

This project addresses the problem of existence, uniqueness and regularity of solutions to stochastic partial differential equations driven by fractional white noise and fraction differential operators responsible for the spatial motion. These solutions arise as high density limits of particle systems with long-range dependence.

## **2.2. Rare events in stochastic processes and distributional approximations**

*Research leader*

Torkel Erhardsson.

*Keywords*

Rare events, approximation, error bound, Stein's method, coupling.

*Project description*

We study random quantities related to rare events in stochastic processes (first occurrence times of rare events, the total number of rare events, etc.), and look for distributional approximations with explicit error bounds for such quantities. We also develop mathematical tools for constructing distributional approximations with error bounds, using techniques like Stein's method and couplings.

## **2.3. Risk theory and point processes**

*Research leader*

Jan Grandell.

*Keywords*

Cox process, Lundberg inequality, martingale methods, ruin probability.

*Project description*

Generalization of the classical risk models to cases where the occurrence of the claims may be described by more general point processes than the Poisson process.

## **2.4. Range of random walks**

*Research leader*

Lars Holst.

*Scientists*

K. S. Chong (Hong Kong University) and R. Cowan (Sydney University).

*Project description*

Studies of the distributions of the range for simple random walks and Brownian motions using the ruin problem and weak convergence.

## **2.5. Random walks and Brownian motions**

*Research leader*

Lars Holst.

*Scientists*

Anna Carlsund and Andreas Lindell.

*Keywords*

Random walk, Brownian motion, diffusion and birth-and-death processes.

*Project description*

Calculations of probability distributions connected with simple random walks and birth-and-death processes; comparison with approximations based on diffusion processes related to Brownian motion; finding probability distributions of functionals of certain diffusions by weak convergence of random walks.

## 2.6. Numerical taxonomy

*Research leader*

Timo Koski.

*Scientists*

Mats Gyllenberg and Tatu Lund (University of Turku).

*Keywords*

Clustering theory, data mining, predictive inference, stochastic complexity.

*Project description*

The project is initiated by problems of identification of bacteria. In numerical bacterial taxonomy a classification is not fixed but is continuously updated as new bacteria are discovered. This means that an item is either identified, that is, put into an already existing class, or, if it is sufficiently different from all established classes, it forms a new class. The statistical models for this are formulated in terms of exchangeability.

Classification can amongst other things be viewed as a means for storing and compressing information as well as for rational organization of databases. The availability of the simplest possible system of classes is thus a prerequisite for understanding of and learning about the underlying phenomena.

Classification means the task of establishing the classes themselves from a given database of ‘unclassified’ items, i.e. of inferring both the number of classes, the class descriptions, and the class memberships for a given data set. Thus the project is concerned with ‘unsupervised learning’ in an extended sense, as it is also trying to infer a structural parameter (the number of classes) from the data.

Since classification amounts to clustering of vectors, the algorithms can actually be developed without reference to any specific application. Hence the results can be used in several fields of electrical and computer engineering.

The research is supported by NFR and by Knut and Alice Wallenberg Foundation.

## 3. Education

### 3.1. Undergraduate courses

The Department of Mathematics gives undergraduate courses in mathematical statistics at all programs of the Royal Institute of Technology (KTH), except at the Program of Architecture; in all ten courses. The following courses have been given:

5B1501 Probability Theory and Statistics for the Program of Industrial and Management Engineering, the Program of Surveying, the Program of Mechanical Engineering, the Program of Vehicle Engineering, and the Program of Civil Engineering.

5B1503 Statistics and Design of Experiments for the Program of Materials Technology and the Program of Chemical Engineering.

5B1504 Mathematical Statistics for the Program of Electrical Engineering.  
5B1506 Mathematical Statistics for the Program of Computer Science and Technology and the Program of Engineering Physics.  
5B1538 Reliability Theory.  
5B1540 Probability Theory.  
5B1545 Time Series Analysis.  
5B1550 Applied Mathematical Statistics.  
5B1555 Computer Intensive Methods in Mathematical Statistics.  
5B1570 Martingales and Stochastic Integrals.

The first four courses are basic courses for the different programs of KTH. The last six courses are upper level undergraduate courses. About 1300 students a year study courses in mathematical statistics; more than 2000 lessons are given each year.

The course 5B1550 was given in cooperation with the Institute of Actuarial Mathematics and Mathematical Statistics at Stockholm University.

The Department of Mathematics had also some responsibility for the examination in mathematical statistics at Mälardalen University.

### 3.2. Graduate course

**Lars Holst** gave the course 5B5507 *Stationary Stochastic Processes*.

### 3.3. Licentiate thesis

**Andreas Lindell:** *Numerical investigations of the distributions of the longest excursions in tied down simple Random Walks and Brownian Bridges*. April 2000.

### 3.4. Master theses (Examensarbeten)

**Fredrik Wikefeldt:** *Optimal Portfolios and Time Horizons*. September 1999.

**Yuna Cho:** *Pricing Callable Mortgage Backed Bonds with Term Structure Models*. September 1999.

**Arun Kaul:** *Liquidity Risk in Portfolio Transactions*. November 1999.

**Mikael Däckfors:** *Extreme Value Theory Approach to Value-at-Risk with Applications to Market and Operational Risks*. November 1999.

**Maria Jansson:** *Pricing Interest Rate Derivatives Using a Three Factor Brace-Gatarek-Musiela Model*. November 1999.

**Joacim Wiklander:** *A Multi-Factor Model for the Swedish Stock Market — The relationship between macroeconomic variables, financial statements and stock return*. November 1999.

**Pontus Lidbrink, Gustav Fyring:** *Valuing and hedging Asian Basket options*. December 1999.

**Henrik Hult:** *Quadratic hedging — An overview*. January 2000.

**Oskar Lagergren Bjursten:** *A Cointegration Approach to the Dynamics of Savings*. January 2000.

**Magnus Moglia:** *En stokastisk modell för förändringen av temperatur och vind i atmosfären*. January 2000.

**Mattias Karlsson:** *Optimal Information Transmission in the Auditory System*. January 2000.

**Henrik Waldenlind:** *Managing Volatility Risk*. January 2000.

**Filip Lindskog:** *Modelling Dependence with Copulas and Monte Carlo Approaches to Risk Management*. February 2000.

**Ylva Gustafsson:** *Hidden Markov Models with Applications in Speaker Verification*. February 2000.

**Carl-Magnus Fahlcrantz:** *Computer-Intensive Methods in Modern Navigation*. March 2000.

**Niklas Oreland:** *The relationship between financial statements and stock returns on the European market*. April 2000.

**Céline Mougin, Armel Voinnesson:** *On volatility surfaces for American equity options*. June 2000.

**Mikael Sandberg:** *Prissättning av optioner med elektricitet som underliggande vara med tidsberoende volatilitet*. June 2000.

## 4. Publications

### 4.1. Published papers

**P. Ekman, G. Englund, et al.:** Optimizing the therapeutic approach of transurethral alprostadil. *British Journal of Urology*, Vol. 86, no. 1 (2000), pp. 68–74.

**Torkel Erhardsson:** Compound Poisson approximation for the Johnson-Mehl model. *Journal of Applied Probability*, Vol. 37 (2000), pp. 101–117.

**Torkel Erhardsson:** Compound Poisson approximation for counts of rare patterns in Markov chains and extreme sojourns in birth-death chains. *Annals of Applied Probability*, Vol. 10 (2000), pp. 573–591.

**Torkel Erhardsson:** On stationary renewal reward processes where most rewards are zero. *Probability Theory and Related Fields*, Vol. 117 (2000), pp. 145–161.

**K. S. Chong, R. Cowan, L. Holst:** The Ruin Problem and Cover Times of Asymmetric Random Walks and Brownian Motions. *Advances of Applied Probability*, Vol. 32 (2000), pp. 177–192.

**M. Gyllenberg, T. Koski, T. Lund:** Applying the EM-algorithm to classification of bacteria. *Proceedings of the International ICSC Congress on Intelligent Systems and Applications*, Vol. 2 (2000), pp. 65–71.

**M. Gyllenberg, T. Koski, T. Lund, O. Nevalainen:** On self-adaption in multioperator local search. *Proceedings of the Fourth International Conference on Knowledge-Based Intelligent Engineering Systems and Allied Technologies*, Vol. 1, R. J. Howlett and L. C. Jain (Editors), pp. 181–184, Institute of Electrical and Electronics Engineers, Brighton, UK, 2000.

**H. G. Gyllenberg, M. Gyllenberg, T. Koski, T. Lund, H. Mannila, C. Meek:** Singling out ill-fit items in a classification. Application to the taxonomy of Enterobacteriaceae. *Archives of Control Sciences*, Special Issue on Estimation and Control in Medicine and Biology, Vol. 9, (1999), pp. 97–105.

**H. G. Gyllenberg, M. Gyllenberg, T. Koski, T. Lund, J. Schindler:** An assessment of cumulative classification. *Quantitative Microbiology*, Vol. 1 (1999), pp. 7–27.

**H. G. Gyllenberg, M. Gyllenberg, T. Koski, T. Lund, J. Schindler:** Enterobacteriaceae taxonomy approached by minimization of stochastic complexity. *Quantitative Microbiology*, Vol. 1 (1999), pp. 157–170.

**M. Gyllenberg, T. Koski, T. Lund, O. Nevalainen:** Clustering by adaptive local search with multiple search operators. *Pattern Analysis and Applications*, Vol. 3, no. 4 (2000), pp. 348–357.

**M. Gyllenberg, T. Koski:** Probabilistic models for bacterial taxonomy. *International Statistical Review*, 2000 (to appear).

**P. Fränti, H. G. Gyllenberg, M. Gyllenberg, J. Kivijärvi, T. Koski, T. Lund, O. Nevalainen:** Minimizing stochastic complexity using local search and GLA with applications to classification of bacteria. *BioSystems*, Vol. 57 (2000), pp. 37–48.

**T. Koski, P. Sundar:** Two applications of reproducing kernel Hilbert spaces in stochastic analysis. *Stochastics in Finite and Infinite Dimensions. In Honor of Gopinath Kallianpur*, T. Hida, R. L. Karandikar, H. Kunita, B. S. Rajput, S. Watanabe, J. Xiong (Editors), pp. 195–206, Birkhäuser Verlag, Boston, Basel, Berlin, 2000.

#### **4.2. Technical reports and preprints**

**Abdelkarim Berkaoui, Youssef Ouknine, Boualem Djehiche:** *Sur les grandes déviations en théorie de filtrage non linéaire*. TRITA-MAT-1999-MS-01, September 1999. To appear in *Studia Mathematica*.

**Boualem Djehiche, M’hamed Eddahbi, Youssef Ouknine:** *A logarithmic Sobolev inequality for one-dimensional multivalued stochastic differential equations*. TRITA-MAT-1999-MS-02, November 1999.

**Boualem Djehiche, M’hamed Eddahbi:** *Hedging options in market models modulated by fractional Brownian motion*. TRITA-MAT-1999-MS-03, November 1999. To appear in *Stochastic Analysis and Applications*.

## 5. Seminars

### 1999

- Sept. 13. **Lars Holst:** *Några diffusionsproblem.*
- Sept. 20. **Fredrik Wikefeldt:** Presentation of Master thesis: *Optimal Portfolios and Time Horizons.*
- Sept. 20. **Yuna Cho:** Presentation of Master thesis: *Pricing Callable Mortgage Backed Bonds with Term Structure Models.*
- Sept. 27. **Johan Jonasson,** Department of Mathematical Statistics, Chalmers University of Technology, Göteborg: *My three favorite proofs and some related open problems.*
- Oct. 11. **Alessandro Juri,** Department of Mathematics, ETH Zürich: *Super-modular order and Lundberg exponent.*
- Oct. 18. **Mioara Buiculescu,** Centre for Mathematical Statistics, Bukarest: *Stationary structures associated with Markov processes.*
- Oct. 25. **Hanspeter Schmidli,** Department of Theoretical Statistics, Aarhus University: *Queueing and risk models perturbed by Lévy processes.*
- Nov. 1. **Lars Holst:** *Några "snapshots" om inbäddning.*
- Nov. 8. **Arun Kaul:** Presentation of Master thesis: *Liquidity Risk in Portfolio Transactions.*
- Nov. 8. **Mikael Däckfors:** Presentation of Master thesis: *Extreme Value Theory Approach to Value-at-Risk with Applications to Market and Operational Risks.*
- Nov. 22. **Lars Holst:** *Extremvärden och samlarproblem.*
- Nov. 29. **Maria Jansson:** Presentation of Master thesis: *Pricing Interest Rate Derivatives Using a Three Factor Brace-Gatarek-Musiela Model.*
- Nov. 29. **Joacim Wiklander:** Presentation of Master thesis: *A Multi-Factor Model for the Swedish Stock Market — The relationship between macro-economic variables, financial statements and stock return.*
- Dec. 6. **Lars Holst:** *Extremvärden och samlarproblem (fortsättning).*
- Dec. 13. **Timo Koski:** *Itô's kalkyl och rekursiva maximum-likelihood-skattningar.*
- Dec. 20. **Pontus Lidbrink, Gustav Fyring:** Presentation of Master thesis: *Valuing and hedging Asian Basket options.*

### 2000

- Jan. 14. **Henrik Hult:** Presentation of Master thesis: *Quadratic hedging — An overview.*
- Jan. 14. **Oskar Lagergren Bjursten:** Presentation of Master thesis: *A Co-integration Approach to the Dynamics of Savings.*
- Jan. 17. **Magnus Moglia:** Presentation of Master thesis: *En stokastisk modell för förändringen av temperatur och vind i atmosfären.*



- Jan. 17. **Mattias Karlsson:** Presentation of Master thesis: *Optimal Information Transmission in the Auditory System.*
- Jan. 24. **Henrik Waldenlind:** Presentation of Master thesis: *Managing Volatility Risk.*
- Jan. 31. **Lars Holst:** *Samlarproblem och extremvärdesteori.*
- Febr. 7. **Filip Lindskog:** Presentation of Master thesis: *Modelling Dependence with Copulas and Monte Carlo Approaches to Risk Management.*
- Febr. 14. **Svante Janson,** Uppsala University: *Parking problem, hashing, random forests, graph enumeration, random walks and Brownian motion.*
- Febr. 21. **Ylva Gustafsson:** Presentation of Master thesis: *Hidden Markov Models with Applications in Speaker Verification.*
- Febr. 28. **Anna Carlsund:** *Övertäckningstider för en enkel slumpvandring med oberoende, exponentialfördelade uppehållstider.*
- March 6. **Allan Gut,** Uppsala University: *Stoppade summor och följder.*
- March 13. **Anna Carlsund:** *Övertäckningstider för en enkel slumpvandring med oberoende, exponentialfördelade uppehållstider (fortsättning).*
- March 20. **Patrik Albin,** Department of Mathematical Statistics, Chalmers University of Technology, Göteborg: *On extremes and streams of upcrossings.*
- March 27. **Carl-Magnus Fahlcrantz:** Presentation of Master thesis: *Computer-Intensive Methods in Modern Navigation.*
- April 3. **Torgny Lindvall,** Department of Mathematical Statistics, Chalmers University of Technology, Göteborg: *Stokastisk dominans: Strassens sats, maximal diagonalsannolikhet och simulering.*
- April 14. **Claudia Klüppelberg,** Technische Universität München: *Insurance and finance.*
- April 17. **Niklas Orelund:** Presentation of Master thesis: *The relationship between financial statements and stock returns on the European market.*
- May 8. **Andreas Lindell:** *Numerical investigations of the distributions of the longest excursions in tied down simple Random Walks and Brownian Bridges.*
- May 29. Discussion of the Licentiate thesis by **Andreas Lindell:** *Numerical investigations of the distributions of the longest excursions in tied down simple Random Walks and Brownian Bridges.* Invited opponent: **Bengt Rosén,** Statistics Sweden.
- June 9. **Céline Mougín, Armel Voinnesson:** Presentation of Master thesis: *On volatility surfaces for American equity options.*
- June 9. **Mikael Sandberg:** Presentation of Master thesis: *Prissättning av optioner med elektricitet som underliggande vara med tidsberoende volatilitet.*

## 6. Presentations by staff

**Anna Carlsund:** *Övertäckningstider*. Stockholm-Uppsala Symposium on Mathematical Statistics, Stockholm, May 25, 2000.

**Anna Carlsund:** *Random walks and birth-and-death processes with state depending transition probabilities*. 18th Nordic Conference on Mathematical Statistics, Grimstad, Norway, June 7, 2000.

**Boualem Djehiche:** *Hedging options in market models modulated by fractional Brownian motion*. Seminar at the Department of Mathematical Statistics, Lund University, February 18, 2000.

**Boualem Djehiche:** *Entropy estimates of ruin probabilities revisited*. Seminar at the Laboratory of Actuarial Mathematics, University of Copenhagen, March 28, 2000.

**Boualem Djehiche:** *A logarithmic Sobolev inequality for one-dimensional multi-valued SDE*. Seminar at the Department of Mathematics, Université des Sciences et Technologies de Lille, May 10, 2000.

**Torkel Erhardsson:** *Compound Poisson approximation for Markov chains, and extensions*. Seminar at the Department of Statistics, Stanford University, January 18, 2000.

**Torkel Erhardsson:** *Compound Poisson approximation for Markov chains, and extensions*. Seminar at the Department of Statistics, University of California at Berkeley, February 10, 2000.

**Torkel Erhardsson:** *Compound Poisson approximation for Markov chains, and extensions*. Contributed lecture at the 5th World Congress of the Bernoulli Society and 63rd Annual Meeting of the IMS, Guanajuato, Mexico, May 18, 2000.

**Jan Grandell:** *Simple approximations of ruin probabilities*. Workshop on Risk Theory, Oberwolfach, September 7, 1999.

**Lars Holst:** *Samlar- och födelsedagsproblem*. Stockholm-Uppsala Symposium on Mathematical Statistics, Stockholm, May 25, 2000.

**Lars Holst:** *Extreme value distribution collector and birthday problems*. 18th Nordic Conference on Mathematical Statistics, Grimstad, Norway, June 7, 2000.

**Timo Koski:** *A tutorial on hidden Markov models*. An invited series of lectures at the ComBi seminar at Turku, August 30 – 31, 1999.

**Timo Koski:** *En prediktiv modell för klassificering av sekvenser*. Seminar at the Department of Mathematical Statistics, Chalmers University of Technology, Göteborg, November 11, 1999.

**Timo Koski:** *Om Meta-Meme-modellen*. Seminar at the Department of Mathematical Statistics, Chalmers University of Technology, Göteborg, November 12, 1999.

**Timo Koski:** *A probabilistic model for bacterial taxonomy*. Lecture at the meeting “Matematiikka 2000” of the Mathematical Society of Finland, Turku, January 10, 2000.

**Timo Koski:** *A model for predictive mixtures and for classification of sequences.* Mathematische Stochastik, Oberwolfach, March 17, 2000.

**Timo Koski:** *Various Markovian statistical models for sequences.* Lecture series at the Graduate Course on Bioinformatics, Göteborg, March 23 – 25, 2000.

**Timo Koski:** *A model for predictive mixtures and for classification of sequences.* Workshop in Bioinformatics and Statistical Genetics, Göteborg, May 13, 2000.

**Timo Koski:** *Bayesian learning for Hidden Markov Models.* CMCM Seminar at the University of Jyväskylä.

## 7. Conferences, guest researchers, etc.

Most of the staff participated in the Stockholm-Uppsala Symposium on Mathematical Statistics, Stockholm, May 25, 2000.

**Fredrik Armerin** participated in Concentrated Advanced Course on Lévy Processes, organized by MaPhySto, Aarhus, Denmark, January 24 – 28, 2000.

**Fredrik Armerin** and **Henrik Hult** participated in the First World Congress of the Bachelier Finance Society, Paris, June 28 – July 1, 2000.

**Anna Carlsund** and **Lars Holst** participated in the 18th Nordic Conference on Mathematical Statistics, Grimstad, Norway, June 5 – 8, 2000.

**Boualem Djehiche** was guest professor at the Laboratory of Actuarial Mathematics, University of Copenhagen, January 1 – June 30, 2000.

**Boualem Djehiche** was guest professor at the Department of Mathematics, Université des Sciences et Technologies de Lille, May 1 – 30, 2000.

**Torkel Erhardsson** was a postdoc at the Department of Statistics at Stanford University, supported by STINT, July 1, 1999 – June 30, 2000.

**Torkel Erhardsson** participated in the 5th World Congress of the Bernoulli Society and 63rd Annual Meeting of the IMS, Guanajuato, Mexico, May 2000.

**Jan Grandell** participated in a workshop on Risk Theory at Oberwolfach, September 5 – 11, 1999.

**Timo Koski** participated in the ComBi-seminar at Turku, Finland, August 1999.

**Timo Koski** participated in the meeting “Matematiikka 2000” of the Mathematical Society of Finland, Turku, January 2000.

**Timo Koski** was guest researcher in Bioinformatics at Chalmers University of Technology, Göteborg, during March 23 – May 31, 2000.

## 8. Other activities

**Boualem Djehiche** is a regular reviewer for Mathematical Reviews.

**Boualem Djehiche** is Swedish editor of Scandinavian Actuarial Journal.

**Boualem Djehiche** is a referee for Advances in Applied Probability, for Probability Theory and Related Fields, and for Scandinavian Actuarial Journal.

**Boualem Djehiche** was a member of the examination committee (betygsnämnd) at the disputation for doctoral degree of Dragi Anevski at Lund University, April 7, 2000.

**Jan Enger** is coordinator of the Swedish work in the international standardization committees ISO/TC69 Applications of Statistical Methods and ISO/TC 176 Quality Management and Quality Assurance. He is a member of the working groups on Statistical Sampling Plans belonging to ISO/TC69. He was one of the Swedish delegates at the meetings of the above-mentioned committees.

**Jan Enger** is a member of the Committee on Quality of Jernkontoret.

**Jan Enger** is a member of the Six Sigma Steering Group at Ericsson.

**Gunnar Englund** is senior biostatistician at AstraZeneca.

**Torkel Erhardsson** is a referee for Random Structures and Algorithms.

**Torkel Erhardsson** has evaluated a research grant application for the Israel Science Foundation.

**Jan Grandell** is a referee for Applied Probability.

**Jan Grandell** is censor at the Faculty of Natural Sciences at the University of Copenhagen, Denmark.

**Jan Grandell** is a regular reviewer for Mathematical Reviews.

**Lars Holst** has been involved in the evaluation of research proposals to the Australian Research Council.

**Lars Holst** is a regular reviewer for Mathematical Reviews and Zentralblatt für Mathematik. He is a referee for Applied Probability, for Statistics and Probability Letters, and for Scandinavian Journal of Statistics.

**Lars Holst** was a member of the evaluation committee for a position as university lecturer in Mathematical Statistics at Linköping University, November 1999.

**Lars Holst** was a member of the evaluation committee for a position as university lecturer in Mathematical Statistics at Växjö University, December 1999.

**Lars Holst** is Chairman of the Swedish Statistical Society since September 23, 1999.

**Timo Koski** is a referee for Scandinavian Journal of Statistics.

**Timo Koski** was a member of the evaluation committee for a position as university lecturer in Mathematical Statistics at Chalmers University of Technology, Göteborg, September 1999.

**Timo Koski** was acting professor of Applied Mathematics at University of Turku during September – October 1999.

**Timo Koski** was preliminary examiner (förhandsgranskare för tryckningstillstånd) of the doctoral thesis by Jorma Boberg “Cluster Analysis: an Approach with Applications to Protein Structures”, University of Turku, September 1999.

**Timo Koski** was opponent for the doctoral thesis by Patrik Wahlberg, “On Methods of Pattern Recognition with Applications to Epileptic Electroencephalograms”, Department of Signal Processing, Lund Institute of Technology, October 15, 1999.

**Timo Koski** was a member of the evaluation committee for a position as university lecturer in Mathematical Statistics at Umeå University, November 1999.

**Timo Koski** was a member of the evaluation committee for a position as university lecturer in Mathematical Statistics at Uppsala University, Spring 2000.

**Timo Koski** was a member of the examination committee (betygsnämnd) at the disputation for doctoral degree of Nibia Aires at the Department of Mathematical Statistics, Chalmers University of Technology, Göteborg, April 13, 2000.