

The official newsletter of the International Society for Bayesian Analysis.

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The ISBA NEWSLETTER
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ISBA is a Scientific Society encouraging the interface between Bayesian Statistic methods and all other areas of science and policy-making.

CONFERENCES

Update on ISBA95: The Third World Meeting of the International Society for Bayesian Analysis

We are all set for the Third World Meeting of ISBA. The program is in its (almost) final version. There will be an estimated 160 participants. The Dinner on September 28, sponsored by the Governor of Oaxaca, promises to be an exceptional event. As indicated there will be a Folkloric show. We have planned for a tour to the ruins of Monte Alban on Friday the 29th during the lunch break. Those taking the tour will receive a Box Lunch. Additional sightseeing tours will be available for those interested.

Oaxaca City is surrounded by many archeological wonders. Some say that more than any other place on earth. The visit to this city will be a rewarding experience in history. The renowned sites of Mitla, Monte Alban, Zaachila and Yagul are among the favorites. The famed Santo Domingo cathedral is in the center of this colorful area that includes a main plaza bordered with museums, restaurants and boutiques that feature the garments and unique crafts of the region.

The meeting place, Hotel San Felipe, is located a short drive (or walk) from downtown Oaxaca. It is on a hillside that overlooks the colonial city. It is a friendly and comfortable haven for rest & relaxation after a day of browsing, sightseeing shopping and even meetings. Dine on superbly prepared local & international dishes. Bask in the sunshine or plunge into our sparkling pool. It has

a complimentary shuttle service between the city and the hotel.

PROGRAM

Thursday, September 28

Registration 4:30 - 7:30
Welcoming Banquet 8:30 - 11:00

Friday, September 29

Registration 7:30 - 9:00
Track 1 9:00 - 10:00
Track 2 10:30 - 12:00
Excursion to Monte Alban 12:15 - 3:45
Lunch 12:30 - 2:00
Track 3 4:00 - 5:30
Track 4 6:00 - 7:00
Dinner 7:30 - 9:00
Poster gala 9:00 - 12:00

Saturday, September 30

Track 5 9:00 - 10:00
Track 6 10:30 - 12:00
Lunch 12:30 - 2:00
ISBA Business Mtg 2:30 - 4:00
Track 7 4:00 - 5:30
Track 8 6:00 - 7:30
Banquet & party 8:30 - 12:00

Talk lengths: Each talk including discussion is allotted 30 minutes.

Presenter: * denotes the presenting author.

Track 1: Friday 9:00 - 10:00

A.1 Implementation of The Subjective Paradigm Chair: Ignacio Mendez (UNAM)

Elicitation of Probabilities for Normative Systems Ward Edwards (Univ. of Southern California)

The Bayes Inference Engine Gregory S. Cunningham* (Los Alamos National Laboratory) Kenneth M. Hanson (Los Alamos National Laboratory)

B.1 Bayesian Methods for Nonlinear Models Chair: Debajyoti Sinha (Univ. of New Hampshire)

Estimating Yield Response to Soil Nitrogen in the Presence of Measurement Error Bruce A. Babcock (Iowa State Univ.) Alicia Carriquiry* (Iowa State Univ.) Hal S. Stern (Iowa State Univ.)

Doubly Truncated Regression Model with an Autoregressive Error Hiroki Tsurumi* (Rutgers Univ.) Clara Vega (Federal Reserve Bank of New York)

C.1 Bayesian Analysis of Finance Models Chair: Athanassios Katsis (George Washington Univ.)

Multifactor Equity Models in a Bayesian Setting Agustin Sevilla (Chancellor Capital Mgmt.)

Hierarchical Bayes Estimation of the Market Model Martin R. Young* (Univ. of Michigan) Peter J. Lenk (University of Michigan)

Track 2: Friday 10:30 - 12:00

A.2 Bayesian Model Selection and Hypotheses Testing Chair: Belem Trejo (UNAM)

Model Selection for Multivariate Survival Data H. Aslanidou (Univ. of New Hampshire) D. K. Dey* (Univ. of Connecticut) D. Sinha (Univ. of New Hampshire)

Computational Aspects of Intrinsic Bayes Factors J. A. Varshavsky* (Eli Lilly Laboratories) J. O. Berger (Purdue University)

On The Selection Between Separate Models L. R. Pericchi (Universidad Simon Bolivar)

B.2 Bayesian Forecasting Chair: Victor H Salinas-Torres (Universidad de Santiago de Chile)

Robust Credibility with the Kalman Filter Jose Garrido* (Concordia University) Rosario Romero (Universidad Carlos III de Madrid)

Bayesian Forecasting of IBNR Reserves Enrique De Alba (ITAM)

Using Long, Medium and Short Term Trends to Forecast Turning Points in the Business Cycle: International Evidence Antonio Garcia-Ferrer* (Universidad Autonoma de Madrid) Ricardo Queralt (Universidad Autonoma de Madrid)

C.2 Bayesian Analysis of Environmental Problems Chair: Jose Andres Christen (UNAM)

Managing Electric and Magnetic Fields, Insights from Decision Analysis Detlof Von Winterfeldt* (University of Southern California) Ralph L. Keeney (Univ. of Southern California) Gordon Hester (Univ. of Southern California)

Climate Change Decision Making, Model and Parameter Uncertainties Explored Hadi Dowlatabadi* (Carnegie Mellon Univ.) Milind Kandlikar (Carnegie Mellon Univ.)

Managing Uncertainty, The Tropospheric Ozone Challenge Hung-Po Chao (Electric Power Research Inst.) Stephen Peck* (Electric Power Research Inst.) Steve Wan (Consultant)

Track 3: Friday 4:00 - 5:30

A.3 Bayesian Methods in Time Series Chair: William Bishop (State Univ. of New York at Stony Brook)

Bayesian Model Selection for Nonlinear Time Series Robert E. McCulloch* (University of Chicago) Ruey S. Tsay (University of Chicago)

Inference About The AR(1) Coefficient On The Product Space X. L. Meng (Univ. of Chicago) George C. Tiao* (Univ. of Chicago) D.M. Xu (University of Oregon)

Temporal and Contemporaneous Disaggregation of Multiple Economic Time Series Victor M. Guerrero* (ITAM) Fabio H. Nieto (Universidad Nacional De Colombia)

B.3 Improved Calculations for Bayesian Analysis Chair: Raul Rueda (UNAM)

Systematic Sampling, Groups and Monte Carlo
Michael Evans* (Univ. of Toronto) Timothy Swartz
(Univ. of Toronto)

Density Estimation, Binary Regression and the Steepest Ascent Method Sanjib Basu (Univ. of Arkansas)

Wavelets for a Bayesian Brani Vidakovic (Duke Univ.)

C.3 Bayesian Methods for Environmental Analysis Chair: Merlise Clyde (Duke University)

Bayesian Environmental Policy Decisions: Two Case Studies L. J. Wolfson* (Univ. of Waterloo) J. B. Kadane (Carnegie Mellon Univ.) M. J. Small (Carnegie Mellon Univ.)

Bayesian Computations For Spatial Prediction
Ernst Linder* (Univ. of New Hampshire) Marvin J. Karson (Univ. of New Hampshire) Marie Gaudard (Univ. of New Hampshire) Debajyoti Sinha (Univ. of New Hampshire)

Remote Sensing Based Estimation of the Relative Proportions of Two Species Edwin J. Green (Rutgers Univ.) William E. Strawderman* (Rutgers Univ.)

Track 4: Friday 5:30 - 6:30

A.4 Multiparameter Inference Chair: Younshik Chung (Pusan National University)

The Finite Sample Properties of Simultaneous Equations' Estimates and Estimators: Bayesian And Non-Bayesian Approaches
Arnold Zellner (University of Chicago)

Bayesian Inference in the Multivariate Mixed Model ANOVA Jim Press (Univ. of California Riverside)

B.4 Special Priors Chair: Federico O'Reilly (UNAM)

On Priors Providing Frequentist Validity for Bayesian Inference for Multiple Parametric Functions Gauri Sankar Datta (Univ. of Georgia)

Priors And Posteriors For Scalar Parameters
Donald A. S. Fraser* (University of Toronto) Nancy Reid (University of Toronto)

C.4 Bayesian Design Chair: Jose A. Villasenor (Colegio de Posgraduados)

Bayesian Software Reliability Gordon Kaufman (Massachusetts Institute of Technology)

Optimal Bayesian Designs for Models with Partially Specified Heteroscedastic Structure
Holger Dette (Technische Universitaet Dresden) Weng Kee Wong (University of California at Los Angeles)

Poster Gala Friday Evening 9:00 - 12:00

Tehuantepec A & B

Chair: Lara J. Wolfson (University of Waterloo)

Robustness of Tests on the Weighted Mean of Superpopulation Expectations Under Normal Priors Roberto Behar (Universidad del Valle) Carlos Bouza (Universidad de La Habana) Mario Miguel Ojeda* (Universidad de Jalapa Veracruzana)

A Joint Order Selection Criterion for Multiple Sinusoids in Autoregressive Noise by Asymptotic Bayesian Statistics William Bishop (State University of New York at Stony Brook)

Bayesian Multisample Cluster Analysis Of Regression Models In Several Groups Using A New Informational Complexity Criterion
Hamparsum Bozdogan (Univ. of Tennessee)

Sample Selection In Radiocarbon Dating
Jose Andres Christen (UNAM)

Sampling Based Approach To Bayesian Analysis Of Binary Regression Model With Incomplete Data Younshik Chung (Pusan National Univ.)

Model Uncertainty in Predicting Transportation Behaviour Merlise Clyde (Duke University)

Estimation Of A Lifetime Curve From Incomplete Field Data And A Dirichlet Process Prior Knowledge On The Observable Random Vector Arturo J. Fernandez* (Universidad de La Laguna) Jose I. Bravo (Universidad de La Laguna) Inigo de Fuentes (Universidad de La

Laguna)

Predicting Failure Rates Using Incomplete Age Distribution Data Edward I. George* (Univ. of Texas at Austin) Ming Luo (Univ. of Texas at Austin)

Bayesian Optimal Allocation of Binomial Samples Athanassios Katsis* (George Washington Univ.) Blaza Toman (George Washington Univ.)

On Bayesian Methods for Combining Statistical Tests Jim Koziol* (Scripps Research Institute)
Henry C. Tuckwel (Australian National Univ.)

Bayesian Estimation of Association in Contingency Tables with One Fixed Margin Maria Eglee Perez (Universidad Simon Bolivar)

General Strategies for Assessing Convergence of MCMC Algorithms Using Coupled Chains Alex Reutter* (Duke Univ.) Valen Johnson* (Duke Univ.)

Evaluation of Multivariate Decision Models and 1-out-of-n Selection Systems Edward S. Robins (ESRO Technologies Inc) Score Pattern Loss Functions and Algorithms as a Refinement in Decision

Hierarchical Modelling of Retailer Promotional Response Peter Boatwright (Univ. of Chicago) Peter Rossi* (Univ. of Chicago)

Bayesian Methods For Interval-Censored Survival Data Debajyoti Sinha (Univ. of New Hampshire)

On Convergence Problems in the Use of Certain Dirichlet Process Prior in a Series System Victor H Salinas-Torres* (Universidad de Santiago de Chile) Carlos A. B. Pereira (Universidad de Sao Paulo) Ram C. Tiwari (University of North Carolina at Charlotte)

Reference Priors for the Exponential Decay Model A. J. Van Der Merwe* (Univ. of the Orange Free State) J. L. Du Plessis (Univ. of the Orange Free State)

Bayesian Demography: Projecting the Iraqi Kurdish Population, 1977-1990 B. J. Daponte (Carnegie Mellon Univ.) L. J. Wolfson* (Univ. of

Waterloo) J. B. Kadane (Carnegie Mellon Univ.)

Track 5: Saturday 9:00 - 10:00

A.5 Prior Specification Chair: A. J. Van Der Merwe (University of the Orange Free State)

Conjugate Parameterizations for Exponential Families Eduardo Gutierrez-Pena (Imperial College London and UNAM)

Priors of Convenience Barry C. Arnold* (University of California Riverside) Enrique Castillo (University Of Cantabria) Jose Maria Sarabia (University Of Cantabria)

B.5 Alternative Times Series Methods Chair: Ruey Tsay (University of Chicago)

Bayesian Models For Non-Linear Autoregressions Peter Mueller* (Duke University) Mike West (Duke University) Steve Maceachern (Duke University)

A Continuous Model For Bayesian Forecasting With Stable Seasonal Patterns Enrique de Alba (Instituto Tecnologico Autonomo De Mexico) M. Mendoza* (Instituto Tecnologico Autonomo De Mexico)

C.5 Bayesian Methods for Genetics Chair: Arturo J. Fernandez (Universidad de La Laguna)

Assessing the Probability of Carrying a Breast Cancer Gene based on Family History Don Berry (Duke Univ.) Giovanni Parmigiani* (Duke Univ.) Juana Sanchez (Duke Univ.)

Bayesian Methods In Animal Breeding and Genetics Daniel Gianola (Univ. of Wisconsin)

Track 6: Saturday 10:30 - 12:00

A.6 Model Robustness and Criticism Chair: Mario Miguel Ojeda (Universidad Veracruzana)

Prior Density Ratio Class Robustness John Geweke* (Univ. of Minnesota and Federal Reserve Bank of Minneapolis) Lea Petrella (Univ. of Florence and Univ. of Minnesota)

Local Robustness and Influence for Contamination Classes of Prior Distributions Elias Moreno* (Universidad de Granada) Carmen Martinez (Universidad de Granada) J. Antonio Cano (University of Murcia)

Some Uses Of Order Statistics In Bayesian Analysis Seymour Geisser (Univ. of Minnesota)

B.6 Hierarchical Models for Health Policy
Chair: Jim Koziol (Scripps Research Institute)

Predicting the Number of Potential Organ Donors Using a Hierarchical Model Cindy Christiansen (Harvard Medical School)

Hierarchical Bayesian Approaches To The Synthesis Of Evidence - The Case Of Breast Cancer Screening Keith R. Abrams* (Univ. of Leicester) Teresa C. Smith (Univ. of Leicester) David R. Jones (Univ. of Leicester)

Bayes Factors For Discrimination Between Fixed And Random Effects Models In Meta-Analysis Keith R. Abrams (Univ. of Leicester) Bruno Sanso* (Universidad Simon Bolivar)

C.6 Bayesian Methods for Management
Chair: Edward S. Robins (ESRO Technologies Inc)

Bayesian Optimal Promotional Activity For Firms Facing Discrete Product Demand Lawrence Marsh* (University of Notre Dame) Arnold Zellner (University of Chicago)

Robust Bayesian Selection of the Best Supplier John Deely* (University of Canterbury) Wesley Johnson (University of California at Davis)

A Decision Analysis Approach to Process Capability Analysis Jose M. Bernardo (Universidad de Valencia) Telba Z. Irony* (George Washington University)

Track 7: Saturday 4:00 - 5:30

A.7 Resolving Model Uncertainty Chair: Maria Eglee Perez (Universidad Simon Bolivar)

Prediction Via Model Averaging Merlise Clyde (Duke University) Heather Desimone (Duke Univ.) Giovanni Parmigiani* (Duke Univ.) Brani Vidakovic (Duke Univ.)

Multiperiod Ahead Predictive Density and Model Comparison in Dynamic Models Chung-Ki Min (George Mason University)

Informational Complexity Approach To Predictive Regression Models Of Future

Observations Hamparsum Bozdogan (University of Tennessee)

B.7 Bayesian Simulation Methodology
Chair: Alex Reutter (Duke University)

Partial Conditioning In Markov Chain Monte Carlo Julian Besag (University of Washington)

Sequential Learning Through Multiple Imputations Jun Liu (Stanford University) Wing Hung Wong (Chinese University of Hong Kong)

Efficient Markov Chain Monte Carlo Analysis Of Sequential Observations Carlo Berzuini* (University of Pavia) Nicky Best (MRC Cambridge) Wally Gilks (MRC Cambridge)

C.7 Bayesian Portfolio Construction Chair: Lourdes de la Fuente (ITAM)

One Bayesian Model Of Portfolio Management Arkady Shemyakin* (Independent Siberian University) Alexandra Ukolova (Independent Siberian University)

Global Asset Allocation: Stretching Returns By Shrinking Forecasts Jose Mario Quintana* (Bankers Trust Co.) Vijay Kumar Chopra (Bankers Trust Co.) Bluford H. Putnam (Bankers Trust Co.)

Bayesian Portfolio Selection Using Gibbs Sampling Alex Greyserman (Mint Investment) Douglas Jones* (Rutgers University) William E. Strawderman (Rutgers University)

Track 8: Saturday 6:00-7:30

A.8 Reference Priors And Bayes Factors
Chairman: Manuel Mendoza (ITAM)

Reference Priors for a Product of Several Normal Means Dongchu Sun (University of Missouri) Keying Ye* (University of Virginia)

Fair Bayes Factors For The Regression Model Aart De Vos (Vrije Universiteit)

Numerical Reference Posterior Distributions Jose M. Bernardo* (Universidad de Valencia) Maria Efstathiou (Imperial College, London) Adrian F. M. Smith (Imperial College, London)

B.8 Bayesian Analysis Of Discrete Data
Chair: Gauri Sankar Datta (Univ. of Georgia)

A Unified Bayesian Analysis of Item Response Models Malay Ghosh (University of Florida)

Problems In Bayesian Item Response Theory Hyungseok Lee (University of Missouri) Robert K. Tsutakawa* (University of Missouri)

Bayesian Selection and Estimation of the Best Multinomial Population Balgobin Nandram (Worcester Polytechnic Institute)

C.8 Bayesian Methods for Reliability
Chair: Thomas Mazzuchi (George Washington Univ.)

Burn-in Makes me Feel Good Nicholas Lynn (George Washington University) Nozer D. Singpurwalla* (George Washington University)

The Bayesian Basis of Probabilistic Physics of Failure Max Mendel (Univ. of California-Berkeley)

Bayesian Computations for a Class of Reliability Growth Models Al Erkanli (George Washington Univ.) Thomas Mazzuchi (George Washington Univ.) Refik Soyer* (George Washington Univ.)

AWARDS

THE LEONARD J. SAVAGE THESIS AWARD COMMITTEE

The winner of the 1994 Savage Thesis Award is:

"Bayesian Optimal Designs for Approximate Normality" by Dr. Merlise A. Clyde, supervised by Professor Kathryn Chaloner, University of Minnesota

Honorable Mentions are awarded to:

"Estudios Sobre Robustez Bayesiana Global" by Dr. Maria del Carmen Fernandez Llana, supervised by Professor Julian de la Horra Navarro, Universidad Autonoma de Madrid.

"Local Sensitivity of Posterior Expectations" by Dr. Paul G. Gustafson, supervised by Professor Larry Wasserman, Carnegie Mellon University

"Semiparametric Bayesian Analysis of Single and Multiple Event Time Data" by Dr. Debajyoti Sinha, supervised by Professor W. J. Hall, Rochester

University

The evaluation committee included: Ehsan Soofi, Chair (University of Wisconsin-Milwaukee), John Monahan (North Carolina University) Adrian Smith (Imperial College), and Mike West (Duke University). Prof. Monahan joined the committee as the representative of the American Statistical Association-Section on Bayesian Statistical Sciences.

A Savage Award Session was held at the 1995 Joint Statistical Meeting. The four finalists presented their theses related research at this session. The American Statistical Association-Section on Bayesian Statistical Sciences (ASA SBSS) and the International Society for Bayesian Analysis (ISBA) co-sponsored the Savage Award Session. The session was organized by Ehsan Soofi, chaired by Arnold Zellner, and Mike West served as a discussant.

FROM THE MAILBAG

Dr. Tim Dunne, Dept. of Math. and Stat., U. of Cape Town, Rondebosch 7700, South Africa, has agreed to be Chair of the Organizing Committee for the World Meeting of ISBA, ISBA96, to be held at the U. of Cape Town in December, 1996. A Program Chair and Program Committee will be appointed in the near future. Those with an interest in serving, please send a note to Zellner, obtaining more information re the meeting can contact Dr. Dunne at: dunne@uctvax.uct.za.ac

ISBA's Council of Sciences is getting organized. At least two of the activities we plan are organizing special sessions at national and international conferences--in statistics and also in the substantive fields--and arranging for the publication of volumes on Bayesian analysis and science. At the ISBA meeting in Oaxaca we are planning a session on Bayesian analysis in genetics. We appreciate your input on the utility of developing a volume for publication on this subject. Please convey your interest to Don Berry (db@isds.duke.edu). Also, please suggest roles you feel the Council should play in promoting Bayesian endeavors and disseminating Bayesian ideas.

All ISBA members should be aware that a great

benefit of your membership is that you can present papers at ISBA meetings and the papers can subsequently be printed in proceedings volumes jointly published with the American Statistical Association/Section on Bayesian Statistical Science. Further, when you (or anyone) purchases a copy of these proceedings volumes, ISBA gets a share of the revenues. If you have not yet ordered a copy of the ASA SBSS/ISBA 1994 Proceedings Volume, you still can. Contact the ASA Office for details, or the ISBA publications chair, John Geweke (geweke@bayes.econ.umn.edu).

New Bayesian Book List

The ISBA Newsletter is interested in beginning a column on new books covering Bayesian topics in all fields of science. If you have written a book published in or after 1993, or know of such a book that you think is worthy of other members interest, please send details to the ISBA Newsletter and we will publish the information in future issues.

STUDENT CORNER NEWS

Here is another installment in our look at the research projects pursued by graduate students and recent graduates in Bayesian statistics. If you would like to contribute an abstract to this ongoing feature, please contact Alyson Wilson at alyson@isds.duke.edu.

For a future article, we would like to examine some of the people, books, and ideas that are influential in Bayesian statistics. (Thanks to David Rios Insua, Technical University of Madrid for the idea.) Please send your answers to the following questions to Alyson Wilson by e-mail at alyson@isds.duke.edu, or by regular mail at 2322 Cheyenne, Las Cruces, NM 88011-8057 USA. (1) Why did you become a Bayesian? (2) Which book was the most influential? (3) Which person was the most influential? (4) When and where did you receive your training in statistics, and specifically in Bayesian statistics?

Jacinto Ramón Martín Jiménez
(jrmartin@fi.upm.es), Artificial Intelligence
Department, Technical University of Madrid

BAYESIAN ROBUSTNESS WITH IMPRECISE BELIEFS AND PREFERENCES

The foundations of Bayesian Decision Theory provide the framework in which inference and decision making problems should be solved. However, they demand excessive precision in the Decision Maker's beliefs and preferences.

In chapter 1, we shall provide foundations for a more robust Decision Theory, allowing for certain imprecision in the Decision Maker's judgments. We shall study Decision Making under risk and under uncertainty, within the Anscombe-Aumann framework. We model preferences over consequences with a class of utility functions and beliefs with a class of probability distributions.

Chapter 2 studies dominance relations between alternatives for certain classes of priors and of utility functions. We provide an algorithm to compute the efficient set when the number of alternatives is finite. For infinite cases, we suggest approximation methods to the efficient set.

Chapter 3 studies local sensitivity, using Fréchet derivatives. These studies check the validity of the conclusions of a Decision Analysis: they suggest when and what additional information is requested. We conclude with several open problems.

Scott Berry (berry@stat.tamu.edu), Carnegie Mellon University/Texas A & M University

In my dissertation, "Discrete Search and Rescue for an Intelligent Object," I looked at the problem of searching for a thinking object among discrete locations. I studied the best way to train the object, prior to it becoming lost and applied this theory to search and rescue. My dissertation develops some optimal search strategies but mainly concentrates on the object's options. I also considered the consequences of allowing the object to learn; for example, the object knows when he has not yet been found and can update accordingly. Some interesting game-theoretic examples arise, for example, in a two-player game, one player may deviate from his equilibrium choice even knowing that the opponent is also using an equilibrium strategy. A section of my thesis work is included in my paper, "Discrete Search for an Intelligent Object: The Leprechaun's Problem," which has been submitted for publication.

I have been doing some research in meta-analysis, or synthesis of information from multiple studies. I take a Bayesian hierarchical

perspective, which is ideally suited for such problems. With recent developments in Monte-Carlo-based sampling schemes the Bayesian approach is becoming more tractable. I have developed a model and written code for comparing two treatments across studies and have applied it to many published examples of meta-analysis in medicine. In some cases the conclusions are quite different from the "standard" conclusions. I am also investigating the design issues involved in a multi-center clinical trial. For example, if you have the resources to treat N patients, how many centers should you use and how many patients at each center should be used? I have also applied hierarchical models in some environmental settings. I developed (with Mockus and Small) models to monitor land waste facilities. I have also done some consulting for a production company monitoring hazardous materials.

I am working on a decision problem that deals with adjusting the α -level for sample size. In hypothesis testing, I have found that--surprising though it is to many people-- to be coherent the α -level must be adjusted dramatically depending on the sample size.

I plan to continue my research in biostatistics and game theory. Both are well suited for a subjective Bayesian approach.

I hope to do additional sports analyses in the vein of my "hitting streaks vs. .400-hitter" paper. There are many applications of certain types of statistical ideas in sports. For example, I would like to address some of the many sports myths. Sports analyses also aid in my teaching. Some students like sports examples, and essentially all find that some important issues become transparent in the context of sports settings.

Nancy Paul Silliman (sillimann@cder.fda.gov),
Carnegie Mellon University/U.S. Food and Drug
Administration

ISSUES IN COMBINING INFORMATION: HIERARCHICAL MODELS, SELECTION MODELS, AND UNOBSERVED DATA

This thesis addresses three tools for combining information: hierarchical models, selection models or weighted distributions, and data augmentation. Hierarchical models allow one to investigate

variability both within and between units. Selection models allow one to model non-randomly selected data. Data augmentation provides a robust approach for considering the influence of unobserved units. This dissertation focuses on how these three tools can be used to combine information in a meta-analysis. However, the methods presented here are general, and can be used in many different settings (e.g., a multi-center clinical trial).

First, hierarchical models and the technology for implementing them in practice are reviewed (i.e., Markov Chain Monte Carlo methods such as Gibbs sampling). Second, hierarchical selection models are introduced, which combine the use of hierarchical models and weight functions. In these models, the hierarchical structure allows one to investigate variability both within and between studies, while the weight functions allow one to model any bias in the collection of the studies. Thus, one can simultaneously address two common concerns about meta-analysis: how to deal with heterogeneity of study results and how to deal with publication bias. Markov Chain Monte Carlo methods, namely a hybrid Gibbs/Metropolis approach, are used to estimate the hierarchical selection model. Initially, the weight function is specified. For a more robust approach, estimation of the weight function is considered. Classes of weight functions are considered in a non-hierarchical context. Third, the use of the hierarchical selection model is combined with data augmentation to simultaneously consider heterogeneity of study results, publication bias

involved in the collection of the studies, and sensitivity of conclusions to studies which were conducted but remain unobserved. This last approach may be considered a "complete" approach to meta-analysis.

To estimate the hierarchical model, the hierarchical selection model, and the hierarchical selection model with data augmentation, computer programs were written in Fortran, using IMSL subroutines, to perform the various Gibbs and Gibbs/Metropolis sampling algorithms. Some of these programs are included in an Appendix at the end of this dissertation.

Lara Wolfson (lara@stat.cmu.edu), Carnegie
Mellon University/University of Waterloo

STATISTICAL DECISION THEORY FOR ENVIRONMENTAL REMEDIATION

The use of loss functions for constructing a statistical decision making framework is demonstrated through the case study of a former battery recycling facility in Pennsylvania. Toxic lead contamination of soil had occurred, and remediation was therefore mandated by the EPA. A Bayesian model is proposed that uses covariate and prior information to address the latent variable problem of distinguishing background soil lead concentrations from plant contamination. The results from this model are illustrated with a

variety of loss functions, formulated both from the perspective of the plant and of the EPA, to create a framework that incorporates uncertainty for deciding which properties near the facility are eligible for remediation, while allowing each party in the decision-making process to understand the implications of their decisions for the other party. This approach can easily be adapted to many types of environmental risk or similar public policy problems where uncertainty is present and multiple stakeholders have different perspectives on potential losses or benefits of different decisions and outcomes. (with J. Kadane and M. Small, under revision for *Technometrics*)