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Education

Ph.D., Department of Statistics, The University of Chicago, Chicago, Illinois, December 1995 (Prof. Xiao-Li Meng, advisor).

B.S. with Honors and Distinction, Statistics and Biometry, Cornell University, Ithaca, New York, May 1990 (Prof. George Casella, advisor).

Professional Experience

Head, Section of Statistical Genetics and Bioinformatics, Department of Quantitative Health Sciences, The Cleveland Clinic Foundation, Cleveland, Ohio, 2005–present.

Head, Section of Biostatistics, Department of Quantitative Health Sciences, The Cleveland Clinic Foundation, Cleveland, Ohio, 2005–present.

Director, Collaborative Biostatistics Center, Department of Biostatistics and Epidemiology, The Cleveland Clinic Foundation, Cleveland, Ohio, 2003–2005.

Associate Staff, Department of Quantitative Health Sciences, The Cleveland Clinic Foundation, Cleveland, Ohio, 2003–present.

Senior Research Statistician, deCODE Genetics, Waltham, Massachusetts, 2001–2003.

Assistant Professor, Department of Statistics, Harvard University, Cambridge, Massachusetts, 1995–2001.

Consultant, SAS Institute, Inc., Cary, North Carolina, 2000.

Consultant, Merck and Company, Inc., West Point, Pennsylvania, 2000.

Consultant, Biostat, Teaneck, New Jersey, 1997.

Consultant, DataMetrics Research, Inc., Newton, Massachusetts, 1996–2001.

Consultant, Department of Radiation and Cellular Oncology, The University of Chicago, Chicago, Illinois, 1993–1995.

Consultant, Department of Surgery, The University of Chicago, Chicago, Illinois, 1993–1995.

Consultant, Applied Real Estate Analysis, Inc., Chicago, Illinois, 1993.

Consultant, Center for Health Administration Studies, The University of Chicago, Chicago, Illinois, 1992–1993.

Awards

Harvard University Clark Fund Award, "Developing Computing Environments for Missing Data Problems," 2000.

The University of Chicago Department of Statistics Consulting Award, 1993 and 1994.

United States Department of Education Fellowship, 1991–1993.

Grants

National Heart, Blood, and Lung Institute SCCOR Grant 1 P50 HL 077107-01, "Molecular Determinants of Coronary Artery Disease," 2005-2009, Principal Investigator E. J. Topol, Cleveland Clinic Lerner College of Medicine at Case Western Reserve University, Cleveland, Ohio. Role: Core Co-Director.

National Institute Of Neurological Disorders and Stroke Program Project Grant 2 P01 NS 038667-06, "Tissue Injury and Inflammation in Multiple Sclerosis," 2004-2009, Principal Investigator R. M. Ransohoff, Cleveland Clinic Lerner College of Medicine at Case Western Reserve University, Cleveland, Ohio. Role: Co-Investigator.

National Heart, Blood, and Lung Institute Program Project Grant 1 P01 HL 076491-01, "Oxidation in Inflammation and Cardiovascular Disease," 2004-2009, Principal Investigator S. L. Hazen, Cleveland Clinic Lerner College of Medicine at Case Western Reserve University, Cleveland, Ohio. Role: Core Director.

National Institute Of Neurological Disorders and Stroke Grant 7 R01 NS 037959-06, "Deep Brain Stimulation for Parkinson's," 1999-2005, Principal Investigator J. Vitek, Cleveland Clinic Lerner College of Medicine at Case Western Reserve University, Cleveland, Ohio. Role: Co-Investigator.

Statistics and Probability, Division of Mathematical Sciences, National Science Foundation Grant 9705158, "Multiple Imputation: Research for the Third Decade," 1997–1999, Co-Principal Investigator with D. B. Rubin, Harvard University, Cambridge, Massachusetts.

National Institute of Mental Health Grant 040799, "Neurophysiological Studies Of Schizophrenia," 1998, Principal Investigator R. W. McCarley, Harvard University Medical School, Boston, Massachusetts. Role: Consultant

National Institute of Mental Health Grant 0031154, "Biological Research in Schizophrenia," 1996–2000, Principal Investigator P. S. Holzman, McClean Hospital, Belmont, Massachusetts. Role: Consultant

Refereed Publications

BARNARD, J. (2000). MiPy: A system for generating multiple imputations. In *Proceedings in Computational Statistics 2000*, eds. J.G. Bethlehem & P.G. van der Heijden, pp. 199–204, Heidelberg, Physica-Verlag.

BARNARD, J. & MENG, X.L. (1999). Applications of multiple imputation in medical studies: From AIDS to NHANES. *Statistical Methods for Medical Research* **8**, 17–36.

BARNARD, J. & RUBIN, D.B. (1999). Small-sample degrees of freedom with multiple imputation. *Biometrika* **86**, 948–955.

BARNARD, J., DU, J., HILL, J.L. & RUBIN, D.B. (1998). A broader template for analyzing broken randomized experiments. *Sociological Methods and Research* **27**, 285–317.

BARNARD, J., MCCULLOCH, R.E. & MENG, X.L. (2000). Modeling covariance matrices in terms of standard deviations and correlations, with applications to shrinkage. *Statistica Sinica* **10**, 1281–1311.

BARNARD, J., FRANGAKIS, C., HILL, J.L. & RUBIN, D.B. (2002). The Bayesian analysis of the New York School Choice Scholarships Program: A randomized experiment with noncompliance and missing data (with discussion). In *Case Studies in Bayesian Statistics*, eds. C. Gatsonis, R. Kass, B. Carlin, A. Carriquiry, A. Gelman, I. Verdinelli & M. West, vol. 5, pp. 3–98, Springer.

BARNARD, J., FRANGAKIS, C., HILL, J. & RUBIN, D.B. (2003). Principal stratification approach to broken randomized experiments: A case study of school choice vouchers in New York City (with discussion). *Journal of the American Statistical Association* **98**, 299–323.

BRASS, A.L., BARNARD, J., PATAI, B.L., SALVI, D. & RUKSTALIS, D.B. (1995). Androgen up-regulates epidermal growth factor receptor expression and binding affinity in pc3 cell lines expressing the human androgen receptor. *Cancer Research* **55**, 3197–3203.

COLEMAN, M.J., COOK, S., MATTHYSSE, S., BARNARD, J., LO, Y., LEVY, D.L., RUBIN, D.B. & HOLZMAN, P.S. (2002). Spatial and object working memory impairments in Schizophrenia patients: A Bayesian item response theory analysis. *Journal of Abnormal Psychology* **111**, 425–435.

KELLEN, M., ARONSON, S., ROIZEN, M.F., BARNARD, J. & THISTED, R.A. (1993). Predictive and diagnostic tests of renal failure: A review. *Anesthesia and Analgesia* **78**, 134–142.

KONG, A., GUDBJARTSSON, D.F., SAINZ, J., JONSDOTTIR, G.M., GUDJONSSON, S.A., RICHARDSSON, B., SIGURDARDOTTIR, S., BARNARD, J., HALLBECK, B., MASSON, G., SHLIEN, A., PALSSON, S.T., FRIGGE, M.L., THORGEIRSSON, T.E., GULCHER, J.R. & STEFANSSON, K. (2002). A high-resolution recombination map of the human genome. *Nature Genetics* **31**, 241–247.

KONG, A., BARNARD, J., GUDBJARTSSON, D.F., THORLEIFSSON, G., JONSDOTTIR, G., SIGURDARDOTTIR, S., RICHARDSSON, B., JONSDOTTIR, J., THORGEIRSSON, T., FRIGGE, M.L., LAMB, N.E., SHERMAN, S., GULCHER, J.R. & STEFANSSON, K. (2004). Recombination rate and reproductive success in humans. *Nature Genetics* **36**, 1203–1206.

LI, X., MEHROTRA, D.V. & BARNARD, J. (2005). Analysis of incomplete longitudinal binary data using multiple imputation. *Statistics in Medicine* To appear.

MANTHA, S., ROIZEN, M.F., BARNARD, J., THISTED, R.A., ELLIS, J.E. & FOSS, J. (1994). Relative effectiveness of four preoperative tests for predicting adverse cardiac outcomes after vascular surgery: A meta-analysis. *Anesthesia and Analgesia* **79**, 422–433.

O'DONNELL, B.F., MCCARLEY, R.W., POTTS, G.F., SALISBURY, D.F., NESTOR, P.G., HIRAYASU, Y., NIZNIKIEWICZ, M.A., WIBLE, C.G., BARNARD, J., BOOKSTEIN, F. & SHENTON, M.E. (1999). Identification of electrical sources underlying p300 abnormalities in schizophrenia. *Psychophysiology* **36**, 388–398.

STEFANSSON, H., HELGASON, A., THORLEIFSSON, G., STEINTHORSDOTTIR, V., MASSON, G., BARNARD, J., BAKER, A., JONASDOTTIR, A., INGASON, A., GUDNADOTTIR, V.G., DESNICA, N., HICKS, A., GYLFASON, A., GUDBJARTSSON, D.F., JONSDOTTIR, G.M., SAINZ, J., AGNARSSON, K., BIRGISDOTTIR, B., GHOSH, S., OLAFSDOTTIR, A., CAZIER, J.B., KRISTJANSSON, K., FRIGGE, M.L., THORGEIRSSON, T.E., GULCHER, J.R., KONG, A. & STEFANSSON, K. (2005). A common inversion under selection in Europeans. *Nature Genetics* **37**, 129–137.

Nonrefereed Publications

BARNARD, J. (1990). *Sets of Regression Predictors with Positive Regression Sum of Squares*. B.S. Honors thesis, Cornell University.

BARNARD, J. (1995). *Cross-Match Procedures for Multiple Imputation Inference: Bayesian Theory and Frequentist Evaluation*. Ph.D. thesis, Department of Statistics, The University of Chicago.

BARNARD, J. (1996). Crossed repeated-imputation procedures and the NCHS health examination survey. In *ASA Proceedings of the Biometrics Section*, pp. 7–12.

BARNARD, J. & MENG, X.L. (1994). Exploring cross-match estimators with multiply-imputed data sets. In *ASA Proceedings of the Section on Survey Research Methods*, pp. 894–899.

BARNARD, J., RUBIN, D.B. & SCHENKER, N. (1998). Multiple imputation methods. In *Encyclopedia of Biostatistics*, eds. P. Armitage & T. Colton, vol. 4, pp. 2272–2780, Chichester: Wiley.

BARNARD, J., RUBIN, D.B. & SCHENKER, N. (2001). Multiple imputation. In *International Encyclopedia of the Social and Behavioral Sciences*, eds. N.J. Smelser & P.B. Baltes, vol. 15, pp. 10204–10210, New York: Pergamon.

COOK, S., BARNARD, J., LO, Y., RUBIN, D.B., COLEMAN, M.J., MATTHYSSE, S., LEVY, D.L. & HOLZMAN, P.S. (2002). Working memory impairments in Schizophrenia patients: A Bayesian bivariate IRT analysis. In *Case Studies in Bayesian Statistics*, eds. C. Gatsonis, R. Kass, A. Gelman, D. Higdon, D. Pauler & I. Verdinelli, vol. 6, pp. 193–206, Springer.

Teaching

Courses Taught at The University of Chicago

"Statistical Methods and Their Applications," Statistics 220, Spring 1993 and Winter 1994.

Courses Taught at Harvard University

"Introduction to Quantitative Methods," Statistics 101, Spring 1996, Fall 1996, Fall 1997, and Fall 1998.

"Regression Analysis," Statistics 139, Fall 1996.

"Generalized Linear Models," Statistics 149, Spring 1998, Spring 1999, Spring 2000, and Spring 2001.

"Statistical Computing Methods," Statistics 221, Spring 1996.

"Multivariate Analysis," Statistics 230, Fall 1995 and Fall 1998.

"Incomplete Multivariate Data," Statistics 232, Fall 1997 and Fall 1999.

"Advanced Regression Analysis," Statistics 239, Fall 1999 and Fall 2000.

"Frequentist Evaluation and Bayesian Procedures," Statistics 316, Spring 1997.

Teaching at The Cleveland Clinic Foundation

"Statistical Genetics and Inherited Coronary Artery Disease," two-hour presentation in the CMERAD courses "Introduction to Clinical Research and Scientific Writing" and "Introduction to Medical Statistics," Winter 2004, Spring 2004, Fall 2004, and Spring 2005.

Presentations

Invited Talks

"Object Oriented and Graphical Methods for Bayesian Models," joint with R. E. McCulloch, Joint Statistical Meetings, New York, New York, August 2002.

"MiPy: A System for Generating Multiple Imputations," COMPSTAT 2000 Meetings, Utrecht, Netherlands, August 2000.

"The Bayesian Analysis of the New York School Choice Scholarships Program: A Randomized Experiment with Noncompliance and Missing Data," Department of Statistics, University of Pennsylvania, Philadelphia, Pennsylvania, April 2000.

"An Overview of Methods and Software for Analyzing Randomized Experiments with Missing Data," Ciminera Statistical Science Seminar, Merck Research Laboratories, West Point, Pennsylvania, March 2000.

"The Bayesian Analysis of the New York School Choice Scholarships Program: A Randomized Experiment with Noncompliance and Missing Data," Department of Statistics, Ohio State University, Columbus, Ohio, January 2000.

"An Overview of Methods and Software for Analyzing Randomized Experiments with Missing Data," Bristol-Myers Squibb, Wallingford, Connecticut, November 1999.

"Analysis of Randomized Experiments with Noncompliance and Missing Data using Multiple Imputation," University of Washington Biostatistics Department Colloquium, Seattle, Washington, February 1999.

"Analysis of Randomized Experiments with Noncompliance and Missing Data using Multiple Imputation," Midwest Biopharmaceutical Statistics Workshop, Muncie, Indiana, May 1998.

"Superefficiency of Multiple Imputation and the Conservativeness of Posterior Predictive P-Values," Catholic University of Louvain, Louvain-la-Nueve, Belgium, March 1997.

"A Strategy for Modeling Covariance Matrices in Terms of Standard Deviations and Correlations, with Applications to Shrinkage," Harvard School of Public Health Bayesian Working Group, Boston, Massachusetts, November 1996.

"Crossed Repeated-Imputation Procedures and the NCHS Health Examination Survey," Joint Statistical Meetings, Chicago, Illinois, August 1996.

"Shrinkage Priors for Covariance Matrices," Boston University Mathematics Colloquium, Boston, Massachusetts, March 1996.

"BRUTO and Hierarchical Interaction Models," AT&T Bell Labs Seminar Series, Murray Hill, New Jersey, September 1992.

"Modeling Dose-Response Curves Using Generalized Linear Models," Searle Research and Development, Skokie, Illinois, September 1991.

"Inspection and Control Systems for Polarcor Glass Production," Corning, Inc., Corning, New York, September 1990.

Contributed Talks and Posters

"Multiple Imputation in Microarray Data Analysis," Joint Statistical Meetings, Toronto, Canada, August 2004.

"A Closer Look at Human Recombination," ENAR 2004 Spring Meetings, Pittsburgh, Pennsylvania, March 2004.

"Working Memory Impairments in Schizophrenics: A Bayesian Bivariate IRT Approach," poster presentation with S. Cook, Y. Lo, D. B. Rubin, M. J. Coleman, S. Matthysse, D. L. Levy, and P. S. Holzman, Seventh Valencia International Meeting on Bayesian Statistics, Tenerife, Spain, June 2002.

"An Extension to the General Location Model," Joint Statistical Meetings, Indianapolis, Indiana, August 2000.

"MiPy: A System for Generating Multiple Imputations via MCMC," Joint Statistical Meetings, Baltimore, Maryland, August 1999.

"The State of Software for Analyzing Randomized Experiments with Missing Data," ENAR 1999 Spring Meetings, Atlanta, Georgia, March 1999.

"Small Sample Degrees of Freedom with Multiple Imputation," Joint Statistical Meetings, Dallas, Texas, August 1998.

"Bayesian Analysis of Randomized Experiments with Noncompliance and Missing Data using Multiple Imputation," poster presentation with C. Frangakis, J. Hill, and D. B. Rubin, Sixth Valencia International Meeting on Bayesian Statistics, Alcossebre, Spain, June 1998.

"A Broader Template for Analyzing Randomized Experiments with Noncompliance and Missing Data," ENAR 1998 Spring Meetings, Pittsburgh, Pennsylvania, March 1998.

"The Bayesian Analysis of Randomized Experiments with Noncompliance and Missing Data using Multiple Imputation," poster presentation with J. Hill, C. Frangakis, and D. B. Rubin, Case Studies in Bayesian Statistics Workshop 4, Pittsburgh, Pennsylvania, September 1997.

"Modeling Covariance Matrices in Terms of Standard Deviations and Correlations, with Application to Shrinkage," Joint Statistical Meetings, Anaheim, California, August 1997.

"Modeling Covariance Matrices in Terms of Standard Deviations and Correlations, with Application to Shrinkage," Royal Statistical Society Practical Bayesian Statistics 4 Conference, Nottingham, England, July 1997.

"Exploring Cross-Match Estimators with Multiply-Imputed Data Sets," Joint Statistical Meetings, Toronto, Canada, August 1994.

"Meta-Analytic Techniques for Diagnostic and Screening Tests," Joint Statistical Meetings, San Francisco, California, August 1993. Also presented at the University of Chicago Biostatistics Seminar Series, May 1993.

Tutorials, Short Courses, and Workshops

"Multiple Imputation for Missing Data," one-day American Statistical Association Continuing Education course joint with D. B. Rubin, Joint Statistical Meetings, Atlanta, Georgia, August 2001.

"Multiple Imputation for Missing Data," tutorial joint with D. B. Rubin, COMPSTAT 2000 Meetings, Utrecht, Netherlands, August 2000.

"Multiple Imputation for Missing Data," one-day course, Northeastern Illinois Chapter of the American Statistical Association, Northbrook, Illinois, June 2000.

"Multiple Imputation for Missing Data," two-day LearnStat course joint with D. B. Rubin, American Statistical Association, Alexandria, Virginia, September 1999.

"Multiple Imputation for Missing Data in Clinical Trials," tutorial, Drug Information Association 1999 Annual Meeting, Baltimore, Maryland, June 1999.

"Multiple Imputation for Missing Data," tutorial, Federal Drug Administration, Rockville, Maryland, March 1999.

"Multiple Imputation for Missing Data," two-day LearnStat course joint with D. B. Rubin, American Statistical Association, Alexandria, Virginia, September 1998.

"Multiple Imputation for Missing Data in Clinical Trials," tutorial joint with D. B. Rubin, Drug Information Association 1998 Annual Meeting, Boston, Massachusetts, June 1998.

"Short Course on Multiple Imputation for Missing Data," two-day course joint with D. B. Rubin, Utrecht University, Utrecht, Netherlands, May 1998.

"Workshop on Using the Multiple Imputation Technique to Handle Missing Data," ENAR 1998 Spring Meetings, Pittsburgh, Pennsylvania, March 1998.

"Workshop on Missing Data Analysis: Multiple Imputation for Missing Data," joint with D. B. Rubin, Boston Chapter of the American Statistical Association Workshop, Bentley College, Massachusetts, March 1998.

"Short Course on Multiple Imputation for Missing Data," two-day course joint with D. B. Rubin, Utrecht University, Utrecht, Netherlands, November 1997.

"Workshop on Multiple Imputation," joint with D. B. Rubin, Boston Chapter of the American Statistical Association Short Course, Cambridge, Massachusetts, March 1997.

Professional Activities and Memberships

Member of the ENAR 2005 Program Committee.

Guest Associate Editor for *Statistica Sinica*, 1996–1998.

Refereed for *Annals of Statistics*, *Biometrics*, *Biometrika*, *Genetics*, *Journal of the American Statistical Association*, *Journal of Biopharmaceutical Statistics*, *Journal of Computational and Graphical Statistics*, *Journal of Official Statistics*, *Journal of the Royal Statistical Society, Series C: Applied Statistics*, *Psychological Methods*, *Statistica Sinica* and *Statistics in Medicine*.

Reviewer of a SBIR Phase 1 grant proposal, 1998.

Roundtable discussion leader for "Using Multiple Imputation: Applications and Software" and for "Inference with Multiply Imputed Data" at the Joint Statistical Meetings, 1997 and 1999.

Section Chair, ENAR Spring Meetings, 1999, Joint Statistical Meetings, 1999, and COMPSTAT 2000 Meetings, 2000.

Member of the American Association for the Advancement of Science, American Society of Human Genetics, American Statistical Association, International Biometric Society, and the International Genetic Epidemiology Society; Fellow of the Royal Statistical Society.

Clinic and University Activities

External Dissertation Committee Member for Edward Mascha, who received a Ph.D. in Biostatistics from Case Western Reserve University in 2005, thesis title "Assessing Treatment Effect Heterogeneity for Binary Outcomes."

Founder and member of the Working Group on Statistical Research Computing, Department of Quantitative Health Sciences, The Cleveland Clinic Foundation, 2004–present.

Member of the General Medical Sciences Review Committee, The Cleveland Clinic Foundation, 2003–present.

Co-chair of the Research Workshop in Applied Statistics, Harvard University, 1999–2001.

Assistant Chair of the "Statistics/Psychology Lunch," Department of Statistics and Department of Psychology, Harvard University, 1998–2001.

Co-advisor for C. J. Shen, who received a Ph.D. in Statistics in 2000, thesis title "Nested Multiple Imputation."

Reader of three Ph.D. theses for students in Statistics and Psychology, 1998, 1999, and 2001.

Colloquium Chair, Department of Statistics, Harvard University, 1995–1997.

Head Tutor, Department of Statistics, Harvard University, 1996–1997.

System Administrator, Department of Statistics, Harvard University, 1996–2000.