

Bibhas Chakraborty

Education

- 2009 PhD, Statistics (expected)
University of Michigan, Ann Arbor
- 2007 MA, Statistics
University of Michigan, Ann Arbor
- 2003 MStat (Master of Statistics), with Distinction
Indian Statistical Institute, Calcutta, India
- 2001 BSc (Statistics Honors; Minor Concentrations in Mathematics and Physics), First Class First
R.K. Mission Residential College, Narendrapur
University of Calcutta, Calcutta, India

Research Interests

1. **Dynamic Treatment Regimes and Multi-stage Decisions:** My primary research interest falls in the area of multi-stage decisions, sometimes called dynamic treatment regimes in a longitudinal setting. Dynamic treatment regimes are decision rules about recommended treatments based on past treatment and time-varying patient characteristics. Once developed, they can be employed to enhance the clinical judgments used in practice. I work on developing methods for bias-corrected estimation and valid inference of these decision rules under nonregular scenarios.
2. **Reinforcement and Supervised Machine Learning:** My another area of interest is reinforcement learning, a branch of machine learning where an agent learns to choose optimal actions by interacting with the environment. This has striking similarity with the problem of estimating optimal dynamic treatment regimes mentioned above. I work on modification of classical reinforcement learning algorithms for medical applications. I am also interested in supervised machine learning in general: classification algorithms, variable selection, and shrinkage methods.
3. **Design of Experiments for Multicomponent Treatments:** My another research thread lies in the design of experiments for developing multicomponent treatments, often involving behavioral or delivery components (factors). In particular, I work on the use of fractional factorial designs for such trials. I have been involved with the design and analysis of a smoking cessation trial for cancer prevention involving multicomponent behavioral interventions.

Methodological Papers

1. **Chakraborty, B.,** Strecher, V., and Murphy, S. (2008). Confidence Intervals for Parameters of Fitted Q-learning Algorithm. *To be submitted to Neural Information Processing Systems (NIPS) workshop on Model Uncertainty and Risk in Reinforcement Learning.*
2. **Chakraborty, B.,** and Murphy, S. (2008). Inference on Nonregular Parameters of Optimal Dynamic Treatment Regimes. *To be submitted to Statistical Methods in Medical Research.*

Methodological Papers (continued)

3. **Chakraborty, B.**, Collins, L., Strecher, V., and Murphy, S. (2008). Developing Multicomponent Interventions using Fractional Factorial Designs. *To be submitted to Statistics in Medicine*.
4. Collins, L., **Chakraborty, B.**, Murphy S., and Strecher, V. (2008). Comparison of a phased experimental approach and a single randomized clinical trial for developing multicomponent behavioral interventions. *Submitted to Clinical Trials*.
5. Nair, V., Strecher, V., Fagerlin, A., Ubel, P., Resnicow, K., Murphy, S., Little, R., **Chakraborty, B.**, and Zhang, A. (2008). Screening Experiments and Fractional Factorial Designs in Behavioral Intervention Research. *American Journal of Public Health, 98: 1354 - 1359*.

Substantive Papers

1. Strecher, V., McClure, J., Alexander, G., **Chakraborty, B.**, Nair, V., Konkell, J., Greene, S., Collins, L., Carlier, C., Wiese, C., Little, R., Pomerleau, C., and Pomerleau, O. (2008). Web-Based Smoking Cessation Components and Tailoring Depth: Results of A Randomized Trial. *American Journal of Preventive Medicine, 34(5): 373 - 381*.
2. Strecher, V., McClure, J., Alexander, G., **Chakraborty, B.**, Nair, V., Konkell, J., Greene, S., Couper, M., Carlier, C., Wiese, C., Little, R., Pomerleau, C., and Pomerleau, O. (2008). The Role of Engagement in a Tailored Web-Based Smoking Cessation Program: Results of a Randomized Trial. *Submitted to the Journal of Medical Internet Research*.
3. Zick, S., Schwabl, H., Flower, A., **Chakraborty, B.**, and Hirschhorn, K. (2008). Unique Aspects of Herbal Whole System Research. *To appear in Explore: The Journal of Science and Healing*.

Invited Presentations

1. *Inference for Multistage Decision Policies via Regularized Q-Learning*. Yahoo! Research Lab, Santa Clara, California. March 2008.
2. *Experimental Designs for Building and Refining CAM Interventions*. Workshop on Applying Principles from Complex Systems to Studying the Efficacy of CAM Therapies, Georgetown University School of Medicine, Washington, DC. October 2007.
3. *A Novel Approach for Developing Whole System Herbal Therapies*. International Congress on Complementary Medicine Research, Munich, Germany. May 2007.
4. *The Multi-phase Optimization Strategy: A Novel Way to Develop Multi-component Behavioral Interventions*. International Biometric Society's Eastern North American Region (ENAR) Spring Meetings, Atlanta, Georgia. March 2007.
5. *Forever Free: Preliminary Analysis*. Center for Health Communications Research Seminar Series, University of Michigan, Ann Arbor, Michigan. March 2006.
6. *Design Strategies for Behavioral Intervention Research: A New Direction*. The Methodology Center Brownbag Seminar Series, Pennsylvania State University, State College, Pennsylvania. March 2005.

Other Presentations

1. *Developing Multicomponent Interventions using Fractional Factorial Designs*. Rackham Interdisciplinary Statistics Student Seminar Series, Ann Arbor, Michigan. July 2008.
2. *Inference for Dynamic Treatment Regimes via Q-Learning*. Joint Statistical Meetings (JSM), Salt Lake City, Utah. July 2007.
3. *Estimation and Inference for Optimal Dynamic Treatment Regimes*. Poster Presentation at the Michigan Student Symposium for Interdisciplinary Statistical Sciences (MSSISS), Ann Arbor, Michigan. March 2007.
4. *Forecasting Future Capital Expenditures of IBM Research*. Mathematical Sciences Division Seminar Series, IBM T.J. Watson Research Center, Yorktown Heights, New York. August 2006.
5. *The Multi-phase Optimization Strategy: A New Way to Develop Multi-component Interventions*. International Biometric Society's Eastern North American Region (ENAR) Spring Meetings, Tampa, Florida. March 2006.
6. *Some Statistical Issues in Designing Behavioral Interventions*. Department of Statistics Student Seminar Series, Pennsylvania State University, State College, Pennsylvania. March 2005.

Awards and Honors

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| 2007 | Rackham Travel Grant to present at the Joint Statistical Meetings (JSM), Salt Lake City, Utah. Awarded by the Graduate School of the University of Michigan. |
| 2007 | International Society for Complementary Medicine Research (ISCMR) Travel Grant to present at the International Congress on Complementary Medicine Research at Munich, Germany. |
| 2006 | Rackham Travel Grant to present at the International Biometric Society's Eastern North American Region (ENAR) Spring Meetings at Atlanta, Georgia. Awarded by the Graduate School of the University of Michigan. |
| 2005 | Rackham Travel Grant to present at the International Biometric Society's Eastern North American Region (ENAR) Spring Meetings at Tampa, Florida. Awarded by the Graduate School of the University of Michigan. |
| 2003 - 2004 | Fellowship for First Year Graduate Students. Awarded by the Department of Statistics, University of Michigan. |
| 2003 | Dewesh-Kamal Scholarship to pursue higher studies in the United States. Awarded by the Ramakrishna Mission Institute of Culture, Calcutta, India. |
| 2001 | Prof. Anil Bhattacharya Memorial Award, for obtaining the highest score in Statistics in B.Sc. Examination (Part II) of the University of Calcutta. Awarded by R.K. Mission Residential College, Narendrapur, India. |
| 2000 | Swami Lokeswarananda Memorial Gold Medal, for obtaining the highest score in Statistics in B.Sc. Examination (Part I) of the University of Calcutta. Awarded by the R.K. Mission Residential College, Narendrapur, India. |

Research Positions

- Winter 2004 - Summer 2005 Graduate Student Research Assistant (with Prof. Susan Murphy and Prof. Vijay Nair) Department of Statistics, University of Michigan. Supported by an NIH P-50 Center Grant, awarded to the Center for Health Communications Research, University of Michigan, Ann Arbor.
- Fall 2005 - Winter 2006 Graduate Student Research Assistant (with Prof. Susan Murphy). Institute for Social Research, University of Michigan, Ann Arbor.
- Summer 2006 Summer Intern (with Dr. Jonathan Hosking). IBM T.J. Watson Research Center, Yorktown Heights, New York.
- Summer 2007 Graduate Student Research Assistant (with Prof. Vijay Nair). Department of Statistics, University of Michigan. Supported by an NIH P-50 Center Grant, awarded to the Center for Health Communications Research, University of Michigan, Ann Arbor.
- Summer 2008 Graduate Student Research Assistant (with Prof. Susan Murphy). Institute for Social Research, University of Michigan, Ann Arbor.

Teaching Experience

- Fall 2003 Graduate Student Instructor, Department of Statistics, University of Michigan: *Introduction to Statistics and Data Analysis* (Undergraduate Level, Pre-calculus). Responsibilities include leading a lab on data analysis using SPSS and review of course material, and grading homeworks and exams.
- Fall 2006, Winter 2007, Fall 2007, Winter 2008 Graduate Student Instructor, Department of Statistics, University of Michigan: *Applied Statistics* (Master's Level). Responsibilities include preparing homework solutions, grading homeworks and exams, and holding office hours to help students with data analysis using R.
- Fall 2008 Graduate Student Instructor, Department of Statistics, University of Michigan: *Design of Experiments* (Master's Level) and *Linear Models* (PhD Level). Responsibilities include preparing homework solutions, grading homeworks and exams, and holding office hours to help students with data analysis using R.

Conferences and Workshops Attended

- October 2007 Workshop on Applying Principles from Complex Systems to Studying the Efficacy of CAM Therapies, Georgetown University School of Medicine, Washington, DC (invited).
- July 2007 Joint Statistical Meetings (JSM), Salt Lake City, Utah.
- June 2007 SAMSI Workshop on Challenges in Dynamic Treatment Regimes and Multistage Decision-Making, Research Triangle Park, North Carolina.
- May 2007 International Congress on Complementary Medicine Research, Munich, Germany (invited).
- March 2007 Michigan Student Symposium for Interdisciplinary Statistical Sciences (MSSISS), University of Michigan, Ann Arbor, Michigan.
- March 2007 International Biometric Society's ENAR Spring Meetings, Atlanta, Georgia (invited).

Conferences and Workshops Attended (continued)

- March 2006 International Biometric Society's ENAR Spring Meetings, Tampa, Florida.
- September 2005 Workshop on Methodology for Adaptive Treatment Strategies. Institute for Social Research, University of Michigan, Ann Arbor, Michigan.

Computing Skills

- General Programming C, L^AT_EX, HTML.
- Statistical Programming Matlab, R, SAS (Proficient); SPSS, JMP (Familiar).
Extensive experience in Matlab programming for research projects.

Professional Memberships

- 2005 - Present Eastern North American Region (ENAR) subdivision of the International Biometric Society
- 2004 - Present American Statistical Association
- 2004 - Present Institute of Mathematical Statistics

References

1. **Prof. Susan A. Murphy**
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2. **Prof. Vijayan N. Nair**
Chair and D. A. Darling Professor of Statistics, and Professor of Industrial and Operations Engineering,
University of Michigan.
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3. **Dr. Jonathan R. M. Hosking**
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