BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Tze Leung Lai	Professor of Statistics
eRA COMMONS USER NAME LAI.TZE	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Hong Kong University, Hong Kong	B.A.	1967	Mathematics
Columbia University, New York	M.A.	1970	Statistics
Columbia University, New York	Ph.D.	1971	Statistics

A. Personal Statement

I am Professor of Statistics and, by courtesy, of Health Research and Policy and of the Institute of Computational and Mathematical Engineering at Stanford University. I am also Co-director of the Biostatistics Core of the Stanford Cancer Institute and Center for Innovative Study Design at Stanford University School of Medicine. I have supervised 68 PhD theses and six postdoctoral trainees. I have published over 280 papers, many of which are in clinical trial design and analysis, population pharmacokinetics and pharmacodynamics, survival analysis, longitudinal data analysis, multiple endpoints, biomarkers, adaptive methods, sequential analysis and time series.

My focus in “personalized translational neuroscience” is on the design of biomarker-guided treatment strategies for depression. As Co-director of the Biostatistics Core of the Stanford Cancer Institute, the development and validation of biomarker-guided targeted therapies for cancer has been a major area of my research over the past few years. Several major advances in the design of clinical trials and their statistical analyses have been made, and it is exciting to broaden the scope of applications from cancer to neuroscience.

B. Positions and Honors

Positions and Employment

1971–1974 Assistant Professor of Statistics, Columbia University
1974–1977 Associate Professor of Statistics, Columbia University
1977–1986 Professor of Statistics, Columbia University
1986–1987 Higgins Professor of Mathematical Statistics, Columbia University
1987– Professor of Statistics, Stanford University
2001–2004 Chair, Department of Statistics, Stanford University
2005– Co-director, Biostatistics Core, Stanford Cancer Institute
2005– Director, Program in Financial Mathematics, Stanford University
2007– Professor, by courtesy, of Health Research and Policy, Stanford University School of Medicine
2009 – Professor, by courtesy, Institute of Computational and Mathematical Engineering, Stanford University
2009 – Co-director, Center for Innovative Study Design, Stanford University School of Medicine

Other Experience and Professional Memberships

1977–1981 Research Collaborator, Brookhaven National Laboratory
1977–1987 Statistical Consultant, Pediatric Pulmonary Division, Columbia Presbyterian Medical Center
1989–1993 External Examiner, National University of Singapore
1991– External Assessor, Chinese University of Hong Kong
1992– Advisory Committee Member, Institute of Statistical Science, Academia Sinica
2002– Advisory Committee Member, National Health Research Institute (Taipei)
2003– Chair of Advisory Committee, School of Statistics, Morningside Center of Mathematics (Beijing)

2005– Data and Safety Monitoring Committee, Stanford University Cancer Center
2008– Member, Translational Oncology (formerly Molecular Therapeutics) Program, Stanford University Cancer Institute

Honors

1983 COPSS (Committee of Presidents of Statistical Societies) Award
1983 John Simon Guggenheim Fellowship
1994 Elected Member of Academia Sinica
1999 Center for Advanced Study in the Behavioral Sciences Fellowship
2005 Abraham Wald Prize in Sequential Analysis
2010 Pao-Lu Hsu Lecture in Statistics, Peking University
2012 Saw Swee Hock Lecture in Statistics, University of Hong Kong

C. Selected peer-reviewed publications (in chronological order)

1. Lai, TL, Shih, MC and Wong, SP. A new approach to modeling covariate effects and individualization in population pharmacokinetics-pharmacodynamics. J. Pharmacokinetics & Pharmacodynamics 2006, 33:49–74. doi: 10.1007/s10928-005-9000-2
2. Lai, TL and Li, W. Confidence intervals in group sequential trials with random group sizes and applications to survival analysis. Biometrika 2006, 93:641–654. doi:10.1093/biomet/93.3.641
3. Bloch, DA, Lai, TL, Su, Z and Tubert-Bitter, P. A combined superiority and non-inferiority approach to multiple endpoints in clinical trials. Statistics in Medicine 2007, 26:1193–1207. doi: 10.1002/sim.2611
4. Bartroff, J and Lai, TL. Efficient adaptive designs with mid-course sample size adjustment in clinical trials. Statistics in Medicine 2008, 27:1593–1611. doi: 10.1002/sim.3201
5. Lai, TL, Shih, MC and Su, Z. Tests and confidence intervals for secondary endpoints in sequential clinical trials. Biometrika 2009, 96: 903–915. doi:10.1093/biomet/asp063
6. Bartroff, J and Lai, TL. Approximate dynamic programming and its applications to the design of Phase I cancer trials. Statistical Science 2010, 25: 245–257. doi: 10.1214/10-STS317
7. Bartroff, J and Lai, TL. Incorporating individual and collective ethics into Phase I cancer trial designs. Biometrics 2011, 67: 596–603. doi: 10.1111/j.1541-0420.2010.01471.x
8. Shih, MC, Lai, TL, Heyse, JF and Chen, J. Sequential generalized likelihood ratio tests for vaccine safety evaluation. Statistics in Medicine 2010, 29: 2698–2708. doi: 10.1002/sim.4036
9. Lai, TL and Lavori, PW. Innovative clinical trial designs: Toward a 21st-century health care system. Stat. Biosci. 3: 145–168. doi: 10.1007/s12561-011-9042-5
10. Lai, TL, Lavori, PW and Shih, MC. Sequential design of Phase II-III cancer trials. Stat. Med. 2012, 31, 1944–1960. doi: 10.1002/sim.5346
11. Lai, TL, Lavori, PW, Shih, MC and Sikic, B. Clinical trial designs for testing biomarker-based personalized therapies. Clin. Trials J. 2012, 9, 141–154. doi: 10.1177/1740774512437252
12. He, P, Lai, TL and Liao, OY. Futility stopping in clinical trials. Statistics and Its Interface 2012, 5, 415–424.
13. Lai, TL and Liao, OY. Efficient adaptive randomization and stopping rules in multi-arm clinical trials for testing a new treatment. Sequential Anal. 2012, 31, 441–457. doi: 10.1080/07474946.2012.719433
14. Lai, TL, Liao, OY and Kim, DW. Group sequential designs for developing and testing biomarker-guided personalized therapies in comparative effectiveness research. Contemporary Clinical Trials 2013, 36, 651–663. doi: 10.1016/j.cct.2013.08.007
15. Bartroff, J, Lai, TL and Narasimhan, B. A new approach to designing phase I-II cancer trials for cytotoxic chemotherapies. Stat. Med. 2014, 33, 2718–2735. doi: 10.1002/sim.6124

D. Research Support

NSF DMS 1106535 Lai (PI), Siegmund (Co-PI) 07.01.2011–12.31.2014
Statistical Methodology and Applications to Economics, Engineering and Genetics

An important objective of the proposed research is to develop statistical methods for gene mapping, i.e., the identification of genomic regions containing a gene (or genes) affecting a trait of interest in either humans or in experimental organisms. A closely related area of research is estimation and forecasting problems in time series models and stochastic dynamical systems whose parameters may change with time. Another direction of research is econometric time series and stochastic optimization problems in engineering and economics. The broader implications of the research include (i) direct applications in genetics, where mapping can be the first step towards better diagnostics or treatment of a disease or towards improving plant or animal stocks, in engineering and in finance, and (ii) training the next generation of scientists by involving graduate students in all phases of the research.

NCI 2P30 CA124435 Lai (Co-director, Biostatistics Core) 07.01.2010–06.30.2015
Cancer Institute Support Grant

NSF DMS 1407828 Lai (PI) 07.01.2014–06.30.2018
The past three years witnessed the beginning of a new era in financial markets and in the US health care system, following the health care and financial reform legislation of 2010. This era poses new challenges and opens up new opportunities for the field of Statistics. In addition, advances in high-performance computing and communication networks and in machine learning and statistical modeling of high-dimensional data have led to a new field called data science. A long-term objective of the proposed research is to develop innovative statistical methodologies and combine them with advances in data science for addressing challenges in quantitative finance and health care, and resolving related fundamental problems in engineering and economics. The research is broadly divided into three areas. In the past decade, spurred by applications to personalized strategies in medicine and electronic business, there has been great interest in contextual bandits; the proposed research is expected to develop a definitive contextual bandit theory. Applications to genomic-guided personalized cancer treatments and web-based recommender systems will also be explored. The second area is the development of efficient adaptive particle filters in nonlinear state-space models that have far-ranging applications in engineering and economics. The third area of research proposed is in health care cost management, macroeconomic time series modeling and prediction, and fault detection and surveillance in network models for manufacturing systems and for systemic risk in financial markets. This research builds on the accomplishments from the previous grant period in dynamic empirical Bayes modeling, evolutionary credibility theory in actuarial science, high-dimensional stochastic regression, change-point problems and sequential detection, and involves a team of graduate students to push forward to new frontiers. The broader impact of the research includes (i) direct applications in engineering, finance, insurance, risk management and surveillance, and (ii) training the next generation of scientists in academia, industry, and government by involving graduate students in all phases of the research and developing new advanced courses and revising the curriculum in financial and risk modeling, statistics and data science, and clinical trials and biostatistics.