

John L. Bowman, Ph. D.
Transportation Systems and Decisions Sciences
Bowman Research and Consulting
February, 2010

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BIOGRAPHY

Dr. John L. Bowman is an expert in disaggregate travel demand modeling. He is best known for his development and ongoing improvement of the activity schedule approach for the forecasting of regional passenger travel demand, and for enabling planning agencies to develop knowledge, skills, models and software needed to implement and use these models. He developed the approach and demonstrated its value by developing a working prototype for Boston, while earning his Masters and Ph.D. degrees at MIT (1995 and 1998) under the guidance of Professor Moshe Ben-Akiva. In 1996, while still a student, he designed an enhanced version of the model system for Portland Oregon, which he helped implement as the first working model system of its type used for forecasting by a metropolitan area.

Since 1998 Dr. Bowman has operated an independent consultancy specializing in the development and implementation of practical activity-based travel forecasting model systems for metropolitan regions. In that capacity he has been involved in the design and implementation of several activity-based model systems, including models for Columbus, Ohio (2001-2003), Atlanta, Georgia (2002-2006), Sacramento, California (2005-2006), Denver, Colorado (2006-2008) and Seattle, Washington (2008-present). He has also conducted model development planning studies for Tampa, Florida (2008) and Los Angeles, California (2008). Two highlights stand out from these efforts. First, Dr. Bowman designed and implemented the flexible validatable population synthesizer being used by Atlanta and other regions. Second, and most notably, in less than 18 months Dr. Bowman, with colleague Mark Bradley, successfully completed the design, development, programming and implementation of the Sacramento demand model system, and guided its integration with the Sacramento supply models as a forecasting system that fully equilibrates demand and supply.

Dr. Bowman has developed numerous market demand simulators for major European firms based on stated choice data, for which he does experimental design, survey design, model estimation, programming, calibration and validation. He has developed a network assignment model in EMME2 for Mexico City, estimated two airport access mode choice models (Portland and Sacramento), estimated models with combined RP and SP data, and estimated uncertainty and bias of model-based forecasts for a major transportation infrastructure investment project in Asia.

In addition to his research and consulting, Dr. Bowman teaches occasionally at MIT and contributes to the field through publications, presentations, as a reviewer for several journals, and as a member of technical committees for the Transportation Research Board and the European Transport Conference.

RESEARCH AND CONSULTING

Advanced travel demand modeling

2010-present. NCHRP (project 08-78). With J. Richard Kuzmyak and others. Developing methods for a guidebook for practitioners on estimating and forecasting bicycling and walking activity.

2009-present. Chicago Metropolitan Agency for Planning (CMAP). With Peter Vovsha, Tom Rossi, Kostas Goulias and Ram Pendyala. Developing a strategic plan for advanced travel modeling at CMAP. Primary responsibility is preparation of the data development component of the plan.

2009-present. FHWA (SHRP2 C10A project). With Resource Systems Group (RSG), Bradley and AECOM Consult. Integrating an activity-based model system (DaySim) with the TranSims Router and Microsimulator in Burlington, Vermont and Jacksonville, Florida.

2009-present. Puget Sound Regional Council (PSRC). With Mark Bradley, DKS, RSG and Urban Analytics. Managing project to implement an activity-schedule-based travel demand model system. Serving as technical lead, principal designer and model developer (with Bradley). Guiding and assisting all other aspects of project.

2008-present. Mid-Ohio Regional Planning Council (MORPC). Assisting University of Texas at Austin to compare MORPC trip-based model system with their new tour-based model system.

2008-2010. FHWA. With Bradley, Castiglione and Resource Systems Group. Integrated the SACOG activity-based demand model (DaySim) with the TranSims Router.

2003-2009. Developed a population synthesizer (PopSyn) for Atlanta Regional Commission (ARC). Helped DRCOG, PSRC and SANDAG implement it for their regions.

2008. Florida DOT Region 7 (Tampa Bay area) and Southern California Association of Governments (SCAG). With Mark Bradley. Explained the state of practice and prepared activity-based model system design and implementation plan.

2008. Puget Sound Regional Council (PSRC). With Mark Bradley and Joe Castiglione. Implemented a day-activity schedule microsimulation model and integrated it with PSRC's existing trip-based model system as a first step into activity-based travel demand forecasting. Conducted planning and design with PSRC for a subsequent full implementation of an activity-based model system that will be integrated with their land use forecasting microsimulation model.

2006-2008. Denver Regional Council of Governments (DRCOG). Helped design and develop a new activity-schedule-based travel demand model system. Guided the development of model components by DRCOG staff.

2005-2008. Sacramento Area Council of Governments (SACOG). With Mark Bradley. Designed, developed, programmed and implemented a new activity-schedule-based travel demand model system with detailed treatment of time and space dimensions (DaySim). Primary developer of the location choice models (usual work and school locations, tour destinations, and intermediate stop locations), all of which use parcels as the choice alternatives, and parcel attributes to explain the choices. Participated in the integration of that system with the traffic assignment models. Specified the calibration procedure for the entire model system, and participated heavily in the calibration activity. Guided the implementation of equilibration procedures. Implementing enhancements over time, including distributed processing capabilities, as SACOG continues to use the model system.

2001-2004. Atlanta Regional Commission (ARC). Designed model system with Mark Bradley and Peter Vovsha.

2001-2003. Mid-Ohio Regional Planning Commission (MORPC). Assisted in design and model estimation of new activity-based travel demand forecasting model system.

2001. Portland Metro. With Mark Bradley. Redesigned and re-estimated models for the activity-based travel demand model system for Portland, Oregon.

1996. Portland Metro. Designed the Portland Metro activity-based model system, the first practical modern activity-schedule-based model system used for policy analysis. This design was subsequently adapted and used (with only minor input from John) for the implementation of the San Francisco County activity-schedule-based model system.

1993-1998. Massachusetts Institute of Technology (MIT). For Masters and PhD theses, developed the first modern integrated activity-schedule-based travel demand model, demonstrating the

correlation of activity schedule choices with transport level of service. Also, developed an integrated discrete choice model system of a household's residential location choice and its members' activity and travel schedules, demonstrating how activity-based accessibility impacts residential location.

Other research and consulting

2008. Prepared experimental design, guided survey development, developed demand models and developed market share simulator to forecast small business market acceptance of small business internet service delivery with optional automated services such as network configuration, security and backup for a major US telecommunications provider. Simulator includes simulated annealing search for optimal configuration of product attributes.

2006-2007. Developed demand models to predict future customer behavior based on past customer behavior, for a major U.S. mutual fund company.

2006. Researched the current state of the practice in land use modeling as advisor to the Atlanta Regional Commission.

2006. Provided design and development advice, and prepared experimental design, for a stated choice study of the effects of benefit programs on employee retention, for a major North American hospital system.

1998-2004. Prepared experimental designs, guided survey development, developed demand models and implemented interactive market share simulators to forecast consumer acceptance of broadband (TV, internet, telephone, triple-play), wireless, investment brokerage and credit card products for telecommunications companies, banks and investment firms operating in various North American and European markets.

2002. Advised on survey design and developed mode choice models to forecast demand for proposed Sacramento airport rail transit access.

2000. Developed discrete choice model to forecast effect of airline alliance brand name and features on international travelers' carrier choice in 16 countries worldwide.

1999. Analyzed available data, developed demand model, calibrated, and predicted ridership under alternative scenarios for a recently privatized major commuter rail system (South America).

1998-2002. Designed survey instruments, developed demand models, and implemented interactive decision-support tools for transportation projects involving bus and rail transit, and commuter rail for private and public sector clients in North America and Western Europe.

1999-2001. Technically evaluated travel demand forecasts made by other consulting firms for urban rail transit and inter-city passenger rail systems in North America and Southeast Asia, providing expert advice to litigators and estimates of bias and uncertainty for the placement of revenue guarantee insurance.

1999. Prepared stated choice survey experimental design and developed mode choice model for high speed rail pricing study (Europe). Employed nested logit structure, estimation with simultaneous use of revealed and stated choice data, and WESML estimation techniques for choice-based sample.

1998. For a commuter rail demand analysis project in Mexico: designed survey, selected survey intercept sites, designed demand models, developed EMME2 network model, calibrated and applied the model system under alternative forecast scenarios. Employed computer-based personal interviews, demand models with inter-modal choice alternatives, and transit path assignment techniques to accommodate intermodal choices.

1997. Developed demand models for infrastructure project evaluation (Brazil and Uruguay) and airport access (Portland, Oregon).

Relevant student and summer employment

Summer, 1997. Cambridge Systematics. Developed demand models for infrastructure project evaluation (Brazil and Uruguay) and airport access (Portland, Oregon).

Summer, 1996. Cambridge Systematics. Designed an activity based travel demand model system for Metro, the Metropolitan Planning Organization of Portland, Oregon.

1994-1996. Massachusetts Institute of Technology. Proposed, awarded, and conducted two University Transportation Centers research projects on activity based travel and land use models.

Summer, 1994. Cambridge Systematics. Participated in demand modeling projects for New York and Los Angeles Metropolitan Planning Organizations. Retrieved and analysed census data, designed sampling plan for household survey, and estimated nested logit mode choice models.

Summer, 1993. Central Transportation Planning Staff (Boston). Researched the congestion management and intermodal data and modeling requirements of the Intermodal Surface Transportation Efficiency Act.

1992. Massachusetts Institute of Technology. Examined congestion management options for Beirut.

TEACHING

Spring, 1997-present. Massachusetts Institute of Technology. Substitute instructor in the core graduate demand modeling course. Course covers theory and application of linear regression and discrete choice models. Specific topics include least squares, generalized least squares, instrumental variables, maximum likelihood, random utility theory, multinomial choice, probit, logit, GEV, multidimensional choice with nested logit, stated preferences, model specification and testing, sampling, estimation under alternative sampling strategies, forecasting, iterative proportional fitting.

Spring, 1996, 2003. Massachusetts Institute of Technology. Instructor in charge of the core graduate demand modeling course. Taught all sessions in 1996, and 35% of sessions in 2003.

September, 2001. Using the Portland activity-based model system as a case study, gave a one-week one-on-one tutorial to Goran Jovicic of the Danish Transport Research Institute. The tutorial covered all aspects of the demand models, including design of the model system structure, programs for the preparation of estimation files from survey data, ALOGIT specifications of all models, results of model estimation, and application program.

Summer, 1996. United States Department of Transportation. Instructor for primer course in activity based travel demand forecasting.

Summer, 1995. Massachusetts Institute of Technology. Teaching assistant in demand modeling summer course.

Spring, 1995. Massachusetts Institute of Technology. Teaching assistant in graduate demand modeling course.

PUBLICATIONS AND WORKING PAPERS

(copies of most of these documents are available at www.JBowman.net)

Refereed publications

M. Bradley, J.L. Bowman and B. Griesenbeck, "SACSIM: An applied activity-based model system with fine-level spatial and temporal resolution", *Journal of Choice Modeling* (publication pending), 2010.

X. Dong, M.E. Ben-Akiva, J.L. Bowman and J. Walker, "Moving from Trip-Based to Activity-Based Measures of Accessibility", *Transportation Research A*, 40: 163-180, 2006.

J. Bowman and M. Ben-Akiva, "Activity-based Disaggregate Travel Demand Model System with Activity Schedules", *Transportation Research A* 35: 1-28, 2001.

J. Bowman, M. Bradley, Y. Shiftan, T.K. Lawton and M. Ben-Akiva, "Demonstration of an Activity Based Model System for Portland", in *Proceedings of the 8th World Conference on Transport Research (WCTR)*, Antwerp, Belgium, Vol. 3: 171, Pergamon, 1999.

M. Ben-Akiva and J. Bowman, "Activity Based Travel Demand Models", in *Equilibrium and Advanced Transportation Modeling*, P. Marcotte and S. Nguyen, eds., Kluwer Academic Publishers, 1998.

M. Ben-Akiva and J. Bowman, "Integration of an Activity-based Model System and a Residential Location Model", *Urban Studies* 35 (7): 1231-1253, 1998.

M. Ben-Akiva, J. Bowman and D. Gopinath, "Travel Demand Model System for the Information Era", *Transportation* 23: 241-266, 1996.

Other publications and working papers

J.L. Bowman. "Historical Development of Activity Based Model Theory and Practice" (part 2), *Traffic Engineering and Control*, Vol. 50 No. 7: 314-318, 2009.

J.L. Bowman. "Historical Development of Activity Based Model Theory and Practice" (part 1), *Traffic Engineering and Control*, Vol. 50 No. 2: 59-62, 2009.

M. Bradley, J.L. Bowman and B. Griesenbeck, "Activity-Based model for a medium sized city: Sacramento", *Traffic Engineering and Control*, Vol. 50 No. 2: 73-79, 2009.

J.L. Bowman. "Population Synthesizers", *Traffic Engineering and Control*, Vol. 49 No. 9: 342, 2008.

J.L. Bowman and M.A. Bradley. Activity-Based Models: Approaches used to achieve integration among trips and tours throughout the day", presented at the 2008 European Transport Conference, Leeuwenhorst, The Netherlands, October, 2008.

M.A. Bradley, J.L. Bowman and B. Griesenbeck. Development and application of the SACSIM activity-based model system, presented at the 11th World Conference on Transport Research, Berkeley, California, USA, June, 2007.

J.L. Bowman, M.A. Bradley and J. Gibb, "The Sacramento Activity-Based Travel Demand Model: Estimation And Validation Results", presented at the European Transport Conference, September 18-20, 2006, Strasbourg, France, 2006.

J.L. Bowman and M.A. Bradley, "Upward Integration of Hierarchical Activity-based Models", working paper, 2006.

J.L. Bowman and G. Rousseau, "Validation of the Atlanta (ARC) Population Synthesizer (PopSyn)", white paper presented at the TRB Conference on Innovations in Travel Modeling, May 21-23, 2006, Austin, Texas, 2006.

M.A. Bradley and J.L. Bowman, "A Summary of Design Features of Activity-Based Microsimulation Models for U.S. MPOs", white paper presented at the TRB Conference on Innovations in Travel Demand Modeling, May 21-23, 2006, Austin, Texas, 2006.

J. L. Bowman and M. A. Bradley, "Disaggregate treatment of purpose, time of day and location in an activity-based regional travel forecasting model", presented at the European Transport Conference, October 3-5, 2005, Strasbourg, France, 2005.

J.L. Bowman, "Logit kernel (or mixed logit) models for large multidimensional choice problems: identification and estimation", presented at the European Transport Conference, October 3-5, 2005, Strasbourg, France, 2005, and at Transportation Research Board Annual Meeting, Washington, D.C., January, 2004.

J.L. Bowman, "A comparison of population synthesizers used in microsimulation models of activity and travel demand", working paper, 2004.

P. Vovsha, M. Bradley, and J.L. Bowman, "Activity-based travel forecasting models in the United States: Progress since 1995 and Prospects for the Future", presented at the EIRASS Conference on Progress in Activity-Based Analysis, May 28-31, 2004, Vaeshartelt Castle, Maastricht, The Netherlands, 2004.

J. L. Bowman, D. Gopinath and M. Ben-Akiva, "Estimating the probability distribution of a travel demand forecast", working paper, 2002.

M. Bradley, J. Bowman and T. K. Lawton, "A Comparison of Sample Enumeration and Stochastic Microsimulation for Application of Tour-Based and Activity-Based Travel Demand Models", European Transport Conference, September 1999, Cambridge, UK.

J. Bowman and M. Ben-Akiva, "Incorporating Activity Utility, At-home Activities and Lifestyle in an Activity-based Travel Demand Model", working paper, April, 1999.

J.L. Bowman and M. Ben-Akiva, "Activity-Based Travel Forecasting", in Activity-Based Travel Forecasting Conference, June 2-5, 1996, Summary, Recommendations and Compendium of Papers, U.S. Department of Transportation report number DOT-T-97-17, 1997.

Presentations

J.L. Bowman. "Activity Model Development Experiences", TMIP Webinar, June 18, 2009.

J.L. Bowman. "Activity-Based Models: 1994-2009", presented at the MIT ITS Lab, March 10, 2009.

J.L. Bowman. "How is an Activity-Based Model Set Developed?" presented at the Chicago Metropolitan Agency for Planning Symposium on Developing and Implementing an Activity-Based Travel Demand Model, August 27, 2008.

J.L. Bowman. "The Day Activity Schedule Approach of Bowman, Ben-Akiva and Bradley: 1994-2008", presented at the Transportation Research Board Innovations in Travel Modeling Conference, June 22-24, 2008.

J.L. Bowman. "From Theory To Practice: What can we learn from our U.S. experience?" presented at the Transportation Research Board Annual Meeting Task Force on Moving Activity-based Approaches into Practice, January 13, 2008.

PROJECT DOCUMENTS

(copies of most of these documents are available at www.JBowman.net)

Sacramento

J.L. Bowman, M.A. Bradley and J. Gibb. SacSim (2005 and 2006) A series of technical reports describing the regional travel forecasting model system developed in 2005 and implemented in 2006 for the Sacramento (California) Area Council of Governments (SACOG).

Seattle

Puget Sound Regional Council (PSRC) is implementing an activity-based travel demand model system, using an enhanced version of DAYSIM. When completed, it will be integrated with the

PSRC UrbanSim land use model within the OPUS software environment. While the new model system was being designed, a preliminary version consisting of an activity generator was integrated with the existing four-step model. This hybrid model system is being used while the full AB model system is under development. Technical reports are available that have been produced during this project.

Planning studies for advanced model development

Planning and design studies have been conducted for the Southern California Association of Governments (SCAG) and for the Tampa Bay region of Florida. Technical reports from those studies are available.

EDUCATION

Massachusetts Institute of Technology

Cambridge, MA

1998. Ph.D. in Transportation Systems and Decision Sciences.

1995. M.S. in Transportation.

Theses

Ph.D. Supervisor: Professor Moshe Ben-Akiva

“The Day Activity Schedule Approach to Travel Demand Analysis”. Specified the discrete choice activity schedule model, emphasizing (a) the influence of activity accessibility on activity participation, at-home vs on-tour decisions, trip chaining and inter-tour trade-offs, and (b) the influence of lifestyle on activity and activity pattern utility. Includes an empirical implementation for Portland, Oregon.

M.S. Supervisor: Professor Moshe Ben-Akiva

"Travel demand model system with daily activity schedules". Developed an integrated discrete choice model of an individual's daily activity and travel schedule, for use in forecasting travel demand. Design chosen for implementation by Metro, the Portland, Oregon, metropolitan planning organization.

Courses (GPA: 4.8/5.0)

Demand Modeling	Methods for Transportation Systems Analysis
Advanced Demand Modeling	Transportation Systems Analysis
Econometric Theory	Linear Programming
Econometrics II: Simultaneous Equations	Transport Networks Equilibrium Analysis
Nonlinear Econometric Analysis	Nonlinear Programming (audit)
Applied Econometrics	Transportation Economics
Probability and Statistics	Urban and Spatial Economics
Sampling, Simulation and Monte Carlo	Consumer and Producer Theory
Multivariate Statistical Analysis	General Equilibrium Economics

Honors

1995-1998. Eisenhower Doctoral Fellow.

1995. Student of the Year, USDOT Region I University Transportation Centers program.

Marietta College

Marietta, OH

B.S. in Mathematics, 1977

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Honors: Summa cum Laude, Phi Beta Kappa, Outstanding math major in class of 1977

PRIOR EMPLOYMENT

1988-1992. Mennonite Mutual Aid (MMA), an insurance and financial services organization, Goshen, Indiana. Developed and managed insurance products.

1982-1988. MMA. Managed firm's software systems development, supervising staff of 20+ professionals.

1978-1982. MMA. Developed software for insurance administration.

SERVICE

Paper reviews for the following journals and conferences: Transportation Research, Transportation Research Record, Transportation Science, Journal of Consumer Research, Geographical Analysis, Marketing Science, Journal of Choice Modeling, IATBR, Journal of Transport Engineering, World Conference on Transport Research

Memberships: Transportation Research Board Committee on Passenger Travel Demand Forecasting, European Transport Conference Innovative Methods Programme Committee.