

John L. Bowman, Ph. D.

Transportation Systems and Decisions Sciences
Bowman Research and Consulting
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SUMMARY

John 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 also develops market demand simulators (based on customer data and stated choice data), airport access models and commuter rail demand forecasts, and evaluates models developed by others, including the estimation of uncertainty and bias of model-based forecasts. In addition to his research and consulting, Dr. Bowman contributes to the field through publications, presentations and as a reviewer for several journals, and has taught occasionally at MIT. He earned an MS degree in Transportation from MIT in 1995, and a PhD in Transportation Systems and Decision Sciences from MIT in 1998.

Dr. Bowman's technical contributions include behavior-based model system design; demand model estimation, testing and validation; model-based microsimulation software for activity-based travel forecasting (DaySim), population synthesis (PopSyn), and market demand analysis; transit network model development; technical evaluation and uncertainty analysis of models and model-based forecasts; experimental design; survey and sample design and weighting; combination of revealed and stated choice data.

RESEARCH AND CONSULTING

Experience with activity-schedule-based travel demand modeling

2008. (With Mark Bradley and Joe Castiglione for Puget Sound Regional Council.) Implementing a day-activity schedule microsimulation model and integrating it with PSRC's existing trip-based model system as a first step into activity-based travel demand forecasting. Conducting 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.

2005-present. Designed, developed, programmed and implemented (with Mark Bradley) a new activity-schedule-based travel demand model system (DaySim) for Sacramento Area Council of Governments. Primarily 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.

2003-present. Designed, wrote core logic, oversaw implementation, and trained user in the application of a flexible validatable population synthesizer for Atlanta Regional Commission that can be applied in other US census regions. Helped Denver Regional Council of Governments and Puget Sound Regional Council implement it for their regions. Continuing to maintain and enhance it.

2006-2008. Contributed to the design and development of a new activity-schedule-based travel demand model system for Denver Regional Council of Governments. Guided the development of model components by DRCOG staff.

2001-2005. Designed (with Mark Bradley, and subsequently with Peter Vovsha) a new activity-based travel demand model system for Atlanta Regional Commission. Participated in model estimation.

2001-2003. Participated in the design and estimated destination choice models of new activity-based travel demand forecasting model system for the Mid-Ohio Regional Planning Commission.

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

1997-1998. For PhD thesis at MIT, improved and formalized the 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. Implemented the activity pattern model for Portland, Oregon. [Bowman, John L. (1998) *The day activity schedule approach to travel demand analysis*, Ph.D. Dissertation, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA. 185 pages.]

1997. 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. [Ben-Akiva, Moshe E. and John L. Bowman (1998) *Integration of an activity-based model system and a residential location model*, *Urban Studies*, 35(7), pp. 1231-1253.]

1996. Designed the Portland Metro activity-based model system, the first practical modern activity-schedule-based model system used for policy analysis [Bowman, John L., Mark A. Bradley, Yoram Shiftan, T. Keith Lawton and Moshe E. Ben-Akiva (1998) *Demonstration of an activity based model system for Portland*, 8th World Conference on Transport Research, July 12-17, 1998, Antwerp, Belgium.] This design was also subsequently adapted and used (with only minor input from John) for the implementation of the San Francisco County activity-schedule-based model system.

1993-1995. For masters thesis at MIT, using Boston household survey and network skim data, developed the first modern activity-schedule-based travel demand model: designed it, processed all survey data, estimated all models, demonstrated the feasibility of developing an integrated activity-based model system, and demonstrated the correlation of activity schedule choices with transport level of service. [Bowman, John L. (1995) *Activity based travel demand model system with daily activity schedules*, Master of Science Thesis in Transportation, Massachusetts Institute of Technology, 92 pages]

Other research and consulting experience

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..

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), 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 EMM2 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, 1997-2007. 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

Refereed publications

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, pages 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, p. 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

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, SacSim, a regional travel forecasting model system developed in 2005 and implemented in 2006 for the Sacramento (California) Area Council of Governments (SACOG), a series of technical reports available at <http://JBowman.net>, 2006.

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.

M. Bradley, P. Vovsha 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.

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

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: Transportation Research, Transportation Research Record, Transportation Science, Journal of Consumer Research, Geographical Analysis and Marketing Science

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