

PROMOTION RECOMMENDATION
The University of Michigan
School of Public Health
Department of Biostatistics

Timothy D. Johnson, associate professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health, is recommended for promotion to professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health.

Academic Degrees:

Ph.D.	1997	University of California, Los Angeles
M.S.	1986	University of California, Riverside
B.S.	1984	University of California, Riverside

Professional Record:

2011-present	Associate Professor, Department of Biostatistics, University of Michigan,
2006-2011	Research Associate Professor, Adjunct Associate Professor, Department of Biostatistics, University of Michigan
2001-2006	Assistant Research Scientist, Department of Biostatistics, University of Michigan
1998-2001	Assistant Adjunct Professor, UCLA Department of Biomathematics
1997-1998	Senior Statistician, UCLA Department of Biomathematics
1995-1997	Graduate Student Researcher, UCLA Department of Dytology and Cellular Immunology
1993-1996	Graduate Student Researcher, UCLA Department of Radiological Sciences
1984-1991	Software Engineer, Logicon, Inc. San Pedro, CA

Summary of Evaluation:

Teaching: Since his arrival at Michigan, Professor Johnson has made solid contributions to our teaching program. He has taught 500, 600 and 800 level courses and has obtained excellent evaluations. Teaching Biostat 503 to a collection of students with heterogeneous backgrounds and some with limited numerical ability has been a challenging problem. Very few professors have succeeded in teaching this course effectively. Professor Johnson did very well in Biostat 524: a course that uses the same textbook and covers the same material, but is for the OJOC students. His 800 level courses are outstanding and make students think much more fundamentally. Many students have picked up thesis topics based on their course projects.

Professor Johnson has been a superb mentor for our Ph.D. students. He is currently supervising five Ph.D. students and seven students have already graduated under his supervision. He is extremely popular in attracting students who write outstanding dissertations. Four of his students have received Rackham pre-doctoral fellowships and outstanding student paper awards at the Eastern North American Regional (ENAR) meetings of the International Biometric Society. Three of his other students have won awards from the International Biometric Society and the American Statistical Association. He has supported numerous students through Graduate Student Research Assistantships.

Research: Professor Johnson has an outstanding research record. He has 81 publications with 14 publications occurring after his appointment to the instructional track in 2011. He is the first author on seven articles, in addition to two articles based on his dissertation with authors listed alphabetically (a tradition maintained by some dissertation chairs), and eight articles with his Ph.D. students as the first author. Following the Department of Biostatistics convention, these count as equivalent to first author papers. The composition of his methodological and collaborative papers reflects the fact that he was funded on collaborative grants as a research faculty for the bulk of his time at Michigan. His articles have

appeared in highly reputed journals such as the *Journal of the American Statistical Association*, *Biometrics*, and *Annals of Applied Statistics*. He has several more submitted and under preparation as first author, or his student as a first author. By any counting measure, this is an impressive record.

Professor Johnson has made contributions in the following three main areas: analysis of imaging data, intense time series analysis, and spatial analysis. His image analysis research involves PET, fMRI and qMRI data to assess the signal detection and assess the association of the signal detection across subjects grouped by disease or some other characteristics. The current methods use the two-stage approach where the large data on each subject is summarized into few descriptive statistics and then these statistics are then compared across subjects. Such simple-minded analysis ignores the variability within subjects and spatial correlation. Professor Johnson has developed a joint modeling framework where within-subject and between-subject components of variation are incorporated in estimating the relevant parameters. He has developed a Bayesian approach for the joint modeling as well as incorporating spatial correlation. He is also developing computational algorithms to handle massive amounts of data using graphical processing units (GPUs). Professor Johnson is implementing these methodologies to predict tumor control and survival based on characteristics measured by fMRI and qMRI. These are then used to adapt treatment choices. More recently, he has been developing methods for marked spatial point process which allows modeling lesion volume. He is also focusing on modeling 3-D images and developing efficient computational strategies.

Professor Johnson has also contributed towards methodology for analyzing pulsatile hormone time series data. These are densely measured time series data and the patterns are modeled using the complex stochastic processes. He has written three articles on this topic and the fourth one is under preparation. Again, the Bayesian framework is used to analyze the pulses and characteristics of the pulses differ between disease and other risk factor groups.

His research methodology encompasses many areas including meta-analysis and spatio-temporal analysis disease incidence and mapping, model selection and diagnostics, cluster and classification analysis all principally motivated by the Bayesian framework. His collaborative research has been in the area of medical imaging. His methodological and collaborative research has been synchronized and has achieved leadership in this area.

Professor Johnson's research compliments that of others in the department and thus adds significant dimensionality to the intellectual diversity of the department. He is well funded with a healthy combination of methodological and collaborative research grants. He has received two R-01s as a PI with one recently funded grant on Bayesian Spatial Point Process Modeling Neuroimage Data. He supports students routinely and is a tremendous resource in the Department of Biostatistics, both for faculty and students.

Recent and Significant Publications:

- Cao, Y., Wang, H., Johnson, T.D., Pan, C., Hussain, H., Balter, J.M., Normolle, D., Ben-Joseph, B., Ten Haken, R.K., Lawrence, T.S., Feng, M. (2013) Prediction of Liver Function Using MR-based Portal Venous Perfusion Imaging. *International Journal of Radiation Oncology Biology Physics*, 85(1): 258-263.
- Hoff, B.A., Kozloff, K.M., Boes, J.L., Brisset, J-C., Galbán, S., Van Poznak, C.H., Jacobson, J.A., Johnson, T.D., Meyer, C.R., Rehemtulla, A., Ross, B.D., Galb'an, C.J. (2012) Parametric Response Mapping of CT Images Provides Early Detection of Local Bone Loss in a Rat Model of Osteoporosis. *Bone*, 51(1): 78-84.

- Johnson, T.D., Liu, Z., Bartsch, A.J., Nichols, T.E. (2012) A Bayesian Non-parametric Potts Model with Application to Pre-surgical fMRI Data. *Statistical Methods in Medical Research*. Published online 23 May 2012: DOI:10.1177/0962280212448970.
- Taylor, S.F., Kang, J., Brege, I.S., Tso, I.F., Hosanagar, A., Johnson, T.D. (2012) Meta-analysis of Functional Neuroimaging Studies of Emotion Perception and Experience in Schizophrenia. *Biological Psychiatry*, 71(2):136-145.
- Wu, J., Johnson, T.D., Galbán, C.J., Chenevert, T.L., Meyer, C.R., Rehemtulla, A., Hamstra, D.A., Ross, B.D. (2012) A Bayesian Generalized Non-linear Predictive Model of Treatment Efficacy Using qMRI. *Journal of the Royal Statistical Society, Series C*, 61(1): 83-98. NIHMS321498.
- Kang, J., Johnson, T.D., Nichols, T.E., Wager, T.D. (2011) Meta Analysis of Functional Neuroimaging Data Via Bayesian Spatial Point Processes. *Journal of the American Statistical Association*, 106(493):124-134. PMID: PMC3119536.
- Zhang, X., Johnson, T.D., Little, R.J.A., Cao, Y. (2010) Longitudinal Image Analysis of Tumor/Brain Change in Contrast Uptake Induced by Radiation. *Journal of the Royal Statistical Society, Series C*, 59:821-830. PMID: PMC2995925.

Service: Professor Johnson routinely serves on departmental committees, serving on computing, admissions, candidacy, and faculty search committees. All these committees involve a significant time commitment. He is also willing to contribute whenever his services are needed. He currently serves on the School's advisory committee on academic programs and also chairs the departmental curriculum committee. He has served as the SPH representative on University Senate Assembly since 2009.

He served on numerous committees at the Cancer Center. He served as a member of the executive board of the Biostatistics Training in Cancer Research for five years. He also served on protocol review committees at the Cancer Center, DSMB board for clinical trials and several other ad hoc committees.

Professionally, Professor Johnson is a well-established, high profile faculty member. He has organized sessions at various conferences. He serves as section chair of the biometrics section of the American Statistical Association, Chair-elect for the Section on Statistics in Imaging, and as associate editor of *Biometrics*.

External Reviewers:

Reviewer (A): "If Tim were considered for a comparable promotion here at [my institution], his dossier would be a very easy promotion case. We would value his exemplary research credentials, his impressive publication record and his proven success in external funding and collaborative research."

Reviewer (B): "His research program is very strong with over fifteen statistical methodology papers and many other papers in subject matter journals based on his collaborations. The impact of his research is very high. His mentoring of graduate students is exemplary."

Reviewer (C): "He meets the criterion of a true statistics scholar, a researcher who can bring in novel statistical ideas for solving problems of real scientific interest. I regard Tim in the forefront of his peer group doing interdisciplinary research. ... what amazes me most is that in spite of his heavy consulting load, Tim has found time to teach some basic courses including categorical data."

Reviewer (D): "I am very impressed by his work that shows deep understanding of the underlying problem and ingenious creativity in the approach. Dr. Johnson has clearly established himself as an international leader in statistical imaging analysis and a successful teacher. I strongly recommend that he be promoted at your institution."

Reviewer (E): "...I have read many of Tim's articles, and I find them to be innovative, practically important, and of excellent quality. He is publishing timely, cutting-edge work in the very top journals, including some, like JASA, that are highly selective."


Reviewer (F): "Dr. Johnson is a leading researcher in Bayesian methods for statistical image analysis. In my opinion both the quantity of work and quality of work...support the proposed promotion to professor. There is also evidence of national and international recognition of the kind which one expects for a promotion of this type."

Reviewer (G): "He has been very successful in obtaining research funding to support his methodological work in an increasingly competitive external funding environment. His work highlights new areas of research in both neuroimaging and statistics, and provides a rich opportunity for future work in both."

Reviewer (H): "The quality and quantity of Dr Johnson's work place him among the top biostatisticians with expertise on neuroimaging statistics in his cohort. For the same reason, he enjoys a significant international profile. He is very talented in subject matter applications, and has been quite productive in the past publishing in the leading journals."

Summary of Recommendation:

Professor Johnson has an outstanding record of methodological and collaborative research, is a superb teacher, and an excellent academic citizen. He is renowned both nationally and internationally for his research. I am pleased to recommend Professor Timothy D. Johnson for promotion to professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health.



Martin A. Philbert, Ph.D.
Dean, School of Public Health

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