Peter J. Thomas

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Education

The Salk Institute for Biological Studies, La Jolla, Calif.
Postdoctoral: Computational Neuroscience and Computational Cell Biology. 2000-2004.

The University of Chicago, Chicago, Ill.
Ph.D. in Mathematics, August 2000.

The University of Chicago, Chicago, Ill.
Master of Arts in Conceptual Foundations of Science, March 2000.

The University of Chicago, Chicago, Ill.
Master of Science in Mathematics, June 1994.

Yale University, New Haven, Conn.
Bachelor of Arts in Physics and Philosophy, *cum laude*, June 1990.

Employment

Assistant Professor of Mathematics, Biology and Cognitive Science, 2006-2011
Case Western Reserve University, Departments of Mathematics.
Co-Director, Undergraduate Program in Research at the Interface of the Mathematical and Biological Sciences (RIBMS).
Teaching: Applied Probability and Stochastic Processes for Biology. Computational Neuroscience. Ordinary Differential Equations. Multivariate Calculus. Classical Analysis.
Research: Mathematical Modeling of Biological Communication and Control: Gradient Sensing in Eukaryotic Cells, Signal Transduction and Information Theory. Noise and Reliability in Neural Spike Time Patterns. Malaria Bioinformatics. Pattern Formation.

Research Associate, 2006-2011
Oberlin College, Department of Neuroscience.
This is an unpaid research affiliation carrying no teaching responsibilities.

Assistant Professor of Mathematics and Neuroscience, 2004-2006.
Oberlin College, Departments of Mathematics and Neuroscience.
Teaching: Applied Mathematics (Linear Algebra, Ordinary and Partial Differential Equations). Mathematical Methods for Computational Neuroscience. Mathematical Biology. Calculus. Applied Complex Analysis.
Research: Established Computational Biomathematics Laboratory. Supervised student research projects in computational neuroscience and computational cell biology. Founding member, Oberlin Center for Computation and Modeling (OCCaM).

Adjunct Assistant Professor of Biology, 2004-2006.
Case Western Reserve University, Department of Biology.

Howard Hughes Medical Institute Research Associate, 2002-2004.
Salk Institute for Biological Studies, Computational Neurobiology Laboratory.
Studied conditions for reliable and precise communication between neurons. Conducted research on the mathematical foundations of biological signal transduction in neurons and microorganisms. Assisted in preparation of NIH grant proposals (R-01 and Program Project, both successful). Reviewed manuscripts submitted to BioSystems, J. Neurophysiology, and Neural Computation.

Sloan-Swartz Center Fellow, 2000-2002.
Salk Institute for Biological Studies, Sloan-Swartz Center for Theoretical Neurobiology and Computational Neurobiology Laboratory.
Studied biological information processing in signal-transduction networks for chemotaxis. Designed and implemented numerical platform for modeling spatial reaction-diffusion processes. Assisted in preparation of multiple NIH R-01 grant proposals. Reviewed manuscripts submitted to J. Neurophysiology, Neuroreport, Neural Computation, Nature Reviews Neuroscience, Phil. Trans. Roy. Soc. B, and Physica D.

National Institutes of Health Graduate Trainee, 1999-2000.
University of Chicago, Department of Mathematics and Center for Computational Neuroscience.
Studied pattern formation in models of cortical maps using computational and analytic methods.

Teaching Assistant, 1998-1999.
University of Chicago, Program in Financial Mathematics.

Tutored M.S. candidates in stochastic processes and stochastic differential equations. Conducted review sessions, graded papers and exams. Taught MATLAB techniques and neural network design for analysis of financial data.

Lecturer, 1994-1998.
University of Chicago, Department of Mathematics
Taught courses in introductory and advanced calculus, linear algebra and mathematical methods for the biological and social sciences. Prepared lectures and exams; evaluated students.
1994-1996: Mathematical Methods for the Social and Biological Sciences; Linear Algebra.
1996-1998; Introductory Calculus.

High School Science Teacher, 1990-1992.
Baton Rouge Magnet High School, Baton Rouge, La.
Participated in creation of *Teach for America*, the national teacher corps. Taught secondary school physics and chemistry. Faculty sponsor, boys soccer team.

Honors and Awards

Long Term Visitor, Mathematical Biosciences Institute at The Ohio State University (Columbus, Ohio), August 15-December 15, 2011.

Nominated for a J. Bruce Jackson MD Award for Excellence in Undergraduate Mentoring (Case Western Reserve University). 2011.

Finalist for a Carl F. Wittke Award for Excellence in Undergraduate Teaching (Case Western Reserve University). 2011.

T. Keith Glennan Fellowship. This CWRU program honors tenure-track faculty for excellence in teaching and scholarship. 2010-2011.

Invited Participant, National Cancer Institute Think Tank: *Physical Sciences-Based Frontiers in Oncology: The Coding, Decoding, Transfer, and Translation of Information in Cancer.* October 29-31, 2008.

NIH External Review Board, Undergraduate Program in Computational Neuroscience, The University of Chicago. October 23-24, 2008.

Andrew W. Mellon Foundation Summer Research Stipend. *Computational Cell Biology: Modeling Protein Polymerization using the Gillespie Algorithm*, 2005.

Fellow, American Mathematical Society's Project NExT (New Experiences in Teaching), 2004-2005.

Participant, 1st Annual National Academies Keck *Futures Initiative* Conference, "Signals, Decisions and Meaning in Biology, Chemistry, Physics, and Engineering", 2003.

Howard Hughes Medical Institute Postdoctoral Fellowship Recipient, 2002.

Best Poster Award, Gordon Research Conference on Theoretical Biology and Biomathematics, 2002.

Sloan Foundation Postdoctoral Fellowship Recipient, 2000-2002.

NIH Computational Neuroscience Graduate Training Award Recipient, 1999.

Teach for America Charter Corps Member, 1990.

Eagle Scout, Boy Scouts of America, 1986.

Professional Activities

Editorial Work: co-Guest Editor (with H. Chiel), *Journal of Neural Engineering*, Special Issue *Applied Dynamics: From Neural Dynamics to Neural Engineering*, 2011.

Scholarly Review: Reviewer for Biological Cybernetics, Biophysical Journal, Entropy, IET Systems Biology, Journal of Computational Neuroscience, Neural Computation, Science, PLoS Computational Biology, Trends in Neural Networks, and World Scientific Publishing.
Reviewer for the National Science Foundation.

Conference Presentations:

- 2011 SIAM Dynamical Systems Meeting. Talk: *Phase Resetting in Phaseless Systems.*
- 2011 Gordon Research Conference on Stochastic Physics and Biology, Ventura, Calif. Poster: *Eukaryotic Gradient Sensing as a Statistical Estimation Problem.*
- 2011 American Mathematical Society Annual Meeting, New Orleans, La. Talk: *Synchronization of periodically forced Ornstein Uhlenbeck processes with reset.*
- 2010 Society for Neuroscience Annual Meeting, San Diego, Calif. Poster: *Evidence for a Stable Heteroclinic Channel Underlying a Central Pattern Generator*, with K. Shaw, H.J. Chiel, and others.
- 2010 MAA (Mathematical Association of America) Mathfest, Pittsburgh, Penna. Talk: *Synchronization of Noisy Integrate and Fire Neurons.*
- 2010 Society for Industrial and Applied Mathematics, Life Sciences Meeting, Pittsburgh, Penna.; Minisymposium on Stochastic Phenomena in Neural Dynamics. Talk: *Synchronization of Periodically Driven Noisy Integrate and Fire Neurons.*
- 2010 American Mathematical Society, Central Section Meeting, Notre Dame, In.; Special Session on Applications of Stochastic Processes in Cell Biology. Talk: *Gradient Sensing as a Statistical Estimation Problem: Comparison with Experimental Data.*
- 2010 Society for Industrial and Applied Mathematics, Great Lakes Regional Meeting, Dearborn, Mi. Talk: *Effects of Fluctuations in a 2D Model of Gradient Sensing.*
- 2010 COSYNE (**Co**mputational and **Sy**stems **Ne**uroscience) Meeting, Salt Lake City, Utah. Poster: *Evidence for a central pattern generator built on a heteroclinic channel instead of a limit cycle*, with K. Shaw, H. Chiel and others. Poster: *Multiple spike time patterns occur at bifurcation points of membrane potential dynamics*, with V. Toups, J-M Fellous, T. Sejnowski and P. Tiesinga.

- 2009 American Institute of Chemical Engineers Annual Meeting, Nashville, Tenn. *Accuracy of chemotactic response to transient gradient signals studied in silico.* With H. Baskaran (presenting), S. Chuechote and others.
- 2009 American Mathematical Society Eastern Regional Meeting, State College, Penna. *The periodically forced Ornstein Uhlenbeck process with reset: Preliminary Report.*
- 2009 Society for Neuroscience Annual Meeting, Chicago, Ill. Posters: *A Dynamical Model of Feeding Neuromechanics in Aplysia californica* (with K. Shaw, H. Chiel and others). *On the relative contributions of nodal currents to conduction block of the mammalian axon using high frequency alternating currents* (with D.M. Ackerman and N. Bhadra).
- 2009 Society for Mathematical Biology Annual Meeting, Vancouver, BC. Session Chair, Systems Biology Session. Talk: *On the Information Capacity of Diffusion Mediated Signal Transduction.* Posters: *Food for Thought: When Infomax Fails to Optimize Utility* (with E.K. Agarwala); *Effects of Fluctuations in a 2D Model of Gradient Sensing* (with S. Chuechote); *Accuracy of Gradient Sensing Based on Maximum Likelihood* (with S.J. Fleming, H.F. McGinnis and H. Baskaran); *Precision of burst timing in conditional pacemakers of the pre-Botzinger complex studied in silico* (with W. Smith and others).
- 2009 American Academy of Neurology Seattle, Washington. *Using Category Fluency Data to Create Phylogenetic Trees of Cognitive Phenotypes*, A. Lerner, J. Messer, T. Singh, J. Leverenz, C. Zabetian, P.J. Thomas, W.A.Woyczynski. (Platform presentation, given by A. Lerner.)
- 2008 12th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS) San Diego, Calif. *PCM-Programmable Arbitrary Gradient Generator for Cell Chemotaxis*, Y.Xie, S. Sarkar, F. Azizi, P.J.Thomas, H. Baskaran and C.H. Mastrangelo. (Platform presentation, given by Y. Xie and C.H. Mastrangelo.)
- 2008 Aspen Center for Physics Workshop on Decision Making in Single Cells (Aspen, Colo.): *Information Processing in Eukaryotic Chemotaxis.*
- 2007 Joint Okinawa – Salk Institute Neuroscience Workshop. *Information, Timing and Perception in Chemotaxis.*
- 2007 Society for Neuroscience Annual Meeting: P.J. Thomas and H. J. Chiel, *Noise Facilitated Transitions in a Model Central Pattern Generator Network* (poster).
- 2007 Society for Mathematical Biology and Japanese Society of Mathematical Biology joint meeting: *Information Theoretic Analysis of Eukaryotic Gradient Sensing.*
- 2007 Midwest Regional Meeting of the American Mathematical Society (Chicago, Ill.) Special Session on Networks. *Preliminary Report: Noise-induced limit cycle transitions in a coupled oscillator network.*

- 2007 Society for Industrial and Applied Mathematics (SIAM) and the International Council for Industrial and Applied Mathematics (ICIAM) joint meeting: *Information Theoretic Analysis of Eukaryotic Gradient Sensing.*
- 2007 Gordon Research Conference on Gradient Sensing and Directed Cell Migration: J.M.Kimmel, R.M.Salter, P.J.Thomas. *An Information Theoretic Framework for Eukaryotic Gradient Sensing* (poster).
- 2006 Society for Neuroscience Annual Meeting: J.V. Toups, J. Fellous, P.J. Thomas, P. Tiesinga and T.J. Sejnowski. *Stability of in vitro spike patterns under variation of stimulus amplitude.* Program No. 237.18.
- 2005 American Society for Cell Biology Meeting: A. Bartholomew, R. Ganetzky, E. Miraldi, P.J. Thomas and L. Romberg. *Creation of a Computational Model to Study Cooperativity in Single-stranded Polymers* (poster).
- 2005 Society for Neuroscience Meeting: P. B. Kruskal,J. J. Stanis, B.L. McNaughton and P.J. Thomas. *A binless correlation measure reduces the variability of memory reactivation estimates* (poster).
- 2003 Fields Institute Workshop on Patterns in Physics: *Pattern Formation in the Development of Primary Visual Cortex* (talk).
- 2003 Society for Neuroscience Meeting: *Experimental Characterization of Spike-Time Patterns*, and *Information Capacity of a Single Ligand-Receptor Signal-Transduction Relay* (poster).
- 2003 Banff International Research Station Conference on Symmetry and Bifurcation in Biology: *Symmetry-Induced Coupling of Cortical Feature Maps* (talk).
- 2003 American Physical Society March Meeting: *Spike-Time Attractors in Cortical Neurons* (talk).
- 2002 Gordon Research Conference on Theoretical Biology and Biomathematics: *Fast Directional Sensing Using a Rapidly Diffusing Inhibitor* (poster).

Invited Talks (Selected):

- September 21, 2011: Oberlin College Neuroscience Seminar (Oberlin, Ohio). *Applications of Dynamical Systems Theory in Neuroscience: Insights into Robust Control of Central Pattern Generators.*
- May 22, 2010: University of Notre Dame Center for Biocomplexity Colloquium (South Bend, Indiana). *Fluctuation Effects in 2D Models of Gradient Sensing.*
- May 14, 2009: Ohio Supercomputer Center Statewide User's Group meeting, keynote address (Columbus, Ohio). *Two Perspectives on Computational Biology.*
- April 28, 2009: New Jersey Institute of Technology (New Brunswick, NJ). *Stochastic Phenomena in Chemotaxis.*

- April 21, 2009: Baldwin Wallace College speakers series on Careers in Mathematics (Berea, Ohio). *Mathematics and Biology.* This was a public outreach talk for an audience of 70 junior high, high school and college students.
- October 15, 2008: Mathematical Biosciences Institute (Columbus, Ohio). *Stochastic Phenomena in Chemotaxis.*
- December 3, 2007: Okinawa Institute of Science and Technology Seminar Series (Okinawa, Japan). *The Mathematical Biology of Hallucination.*
- November 29, 2007: Okinawa Institute of Science and Technology Seminar Series (Okinawa, Japan). *An Information Theoretic Framework for Eukaryotic Gradient Sensing.*
- October 29, 2007: Mathematical Biosciences Institute (Ohio State University). *Noise-induced limit cycle transitions in coupled oscillator networks.*
- May 8, 2007: The University of Chicago Center for Integrative Neuroscience and Neuroengineering Research Seminar Series (hosts: Committee on Computational Neuroscience). *Spike Time Patterns.*

Conference Organizing

- 2011 SIAM Dynamical Systems meeting (Snowbird, Utah). Minisymposium: *Flows Structured by Multiple Fixed Points.*
- 2011 Annual AMS-MAA Joint Mathematics Meeting (New Orleans). Special Session: *Applications of Stochastic Processes in Neuroscience.*
- 2010 AMS Central Section meeting (Notre Dame). Special Session: *Applications of Stochastic Processes in Cell Biology.*
- 2010 SIAM Life Sciences meeting (Pittsburgh). Minisymposium: *Stochastic Phenomena in Neural Dynamics.*
- 2007 Society for Mathematical Biology / Japanese Society of Mathematical Biology joint meeting (San José, Calif.). Double Minisymposium: *Mathematical Models of Biological Communication, Chemotaxis & Control.*
- 2007 ICIAM/SIAM joint applied mathematics meeting (Zurich). Minisymposium: *Stochastic Biochemical Systems.*
- 2005 Oberlin Conference on Computation and Modeling. Chair, scientific program committee.

Mentoring of Undergraduate Research Students (selected):

- 2008-2010. Stephen J. Fleming. BS. Physics and BS. Biochemistry (CWRU '11). Entered Ph.D. program in Physics, Cambridge University. **Winner of a Churchill Fellowship**.

- 2006-2008. Drew P. Kouri. MS/BS. Mathematics (Case Western Reserve University '08). Entered Ph.D. program in Computational and Applied Mathematics, Rice University.
- 2005-2006. Emily R. Miraldi. BS. Biochemistry (Oberlin College '06). Entered Ph.D. program in Biomedical Engineering, Massachusetts Institute of Technology.
- 2004-2006. Peter B. Kruskal. BS. Mathematics (Oberlin College '06). Entered Ph.D. program in Computational Neuroscience, The University of Chicago.
- 2004-2006. Joseph P. Kimmel. BS. Composition (Oberlin Conservatory '06). BS. Computer Science (Oberlin College '06). Entered Ph.D. program in Computational Neuroscience, The University of Chicago.
- 2004-2005. Andrew Bartholomew. BS. Computer Science (Oberlin College '06). Entered Ph.D. program in Computer Science, Brown University. **Winner of a Goldwater Scholarship**.

Courses Taught:

- Introductory Calculus (2005)
- Multivariate Calculus (2008, 2009, 2010)
- Differential Equations (2004, 2006)
- Linear Algebra (2004, 2005)
- Partial Differential Equations and Applied Complex Analysis (2006)
- Fundamentals of Analysis I (2010)
- Fundamentals of Analysis II (2011)
- Preparation for Research in Mathematical Biology (2007)
- Mathematical Biology (2006)
- Computational Neuroscience (2005, 2008, 2010)
- Applied Probability and Stochastic Processes for Biology (2007, 2008, 2011)
- Differential Equations (Graduate Level) (2010)

Teach For America Alumni Network: recruiting science and mathematics majors from selective colleges to become teachers in under-resourced public schools.

Active Memberships: Society for Industrial and Applied Mathematics, Society for Mathematical Biology, Society for Neuroscience.

Vitals

U.S. Citizen (b. Kansas City, Missouri).

External Funding

Principal Investigator (100% responsibility), NSF-DMS 0720142. *AMC-SS: Stochastic Simulation and Analysis of Biochemical Reaction Networks.* 9/1/2007 - 8/31/2010. $120,000.

co-Principal Investigator (50% responsibility), NSF-DUE 0634612. *UBM: Undergraduate Research at the Interface of Mathematics and Biology.* 1/1/2007 - 12/31/2010. $240,000.

co-Principal Investigator (33% responsibility), NSF-EF 1038677. *Revealing Structure via Dynamics: Biological Networks from Protein Folding to Food Webs.* 9/1/2010 - 8/31/2013 $660,000.

co-Principal Investigator (50% responsibility), NSF-DMS 1010434. *CRCNS: Robust Dynamics of a Feeding Pattern Generator.* 9/1/2010 - 8/31/2013. $500,000.

Theses Supervised

Suparat Chuechote, "Amplification and Accuracy in a Stochastic 2D Gradient Sensing Pathway Model", Masters's thesis, May 2010.

Edward Agarwala, "Food for Thought: When Information Maximization Fails to Optimize Utility", Master's thesis, May 2009.

Matthew Garvey, "Diffusion Mediated Signaling: Information Capacity and Coarse Grained Representations", Master's thesis, December 2008.

Drew P. Kouri, "A nonlinear response model for single nucleotide polymorphism detection assays", Master's thesis, June 2008.

Invited Reviews

Peter J. Thomas, "Every Bit Counts". *Science* (Perspective). **in press**. 2011.

Hillel J. Chiel and **Peter J. Thomas**, "Applied Neurodynamics: From Neural Dynamics to Neural Engineering". Introduction to special issue, *Journal of Neural Engineering.* **in press**. 2011.

Refereed Publications

J. Vincent Toups, Jean-Marc Fellous, **Peter J. Thomas**, Terrence J. Sejnowski, Paul H. Tiesinga, "Multiple Spike Time Patterns Occur at Bifurcation Points of Membrane Potential Dynamics." **in preparation**.

Kendrick M. Shaw, Hillel J. Chiel and **Peter J. Thomas**, "Phase Resetting in an Asymptotically Phaseless System: On the Phase Response of Limit Cycles Verging on a Heteroclinic Orbit." *SIAM Journal on Applied Dynamical Systems*, **under review**.

Céline Barnadas, David Kent, Lincoln Timinao, Jonah Iga, Laurie Gray, Peter Siba, Ivo Mueller, **Peter J. Thomas** and Peter A. Zimmerman, "A new high through-put method for simultaneous detection of mutations associated with *Plasmodium vivax* drug resistance in *pvdhfr*, *dhps* and *mdr1* genes." *Malaria Journal*, **10**:282 (2011).
`http://www.malariajournal.com/content/10/1/282`

D. Michael Ackermann, Niloy Bhadra, Meana Gerges and **Peter J. Thomas**, "Dynamics and Sensitivity Analysis of High Frequency Conduction Block". *Journal of Neural Engineering*, **in press**. 2011.

Edward K. Agarwala, Hillel J. Chiel, **Peter J. Thomas**, "Information Maximization Fails to Maximize Expected Utility in a Simple Foraging Model". *Journal of Theoretical Biology*, **in revision**.

Peter J. Thomas, Jack D. Cowan, "Generalized Spin Models for Coupled Cortical Feature Maps Obtained by Coarse Graining Correlation Based Synaptic Learning Rules". *Journal of Mathematical Biology*, **in press**. 2011.

David J. Meyer, Jason Messer, Tanya Singh, **Peter J. Thomas**, Wojbor A. Woyczynski, Jeffrey Kaye, Alan J. Lerner. "Random Local Temporal Structure of Category Fluency Responses". *Journal of Computational Neuroscience*, **in press**. [2011 Jul 8. Epub ahead of print]

Peter J. Thomas, "A Lower Bound for the First Passage Time Density of the Suprathreshold Ornstein-Uhlenbeck Process". *Journal of Applied Probability* **48**(2):420-434, June 2011. **Preprint:** `http://arxiv.org/abs/1101.3915`.

J. Vincent Toups, Jean-Marc Fellous, **Peter J. Thomas**, Terrence J. Sejnowski, Paul H. Tiesinga, "Finding the event structure of neuronal spike trains". *Neural Computation*, 2011 Sep;**23**(9):2169-208. Epub 2011 Jun 14.
`http://www.ncbi.nlm.nih.gov/pubmed/21671786`

Jeana T. Da Re, Drew P. Kouri, Peter A. Zimmerman, **Peter J. Thomas**, "Differentiating *Plasmodium falciparum* Alleles by Transforming Cartesian X,Y Data to Polar Coordinates", *BMC Genetics*, **11**:57, 29 June 2010.
Reprint: `http://www.biomedcentral.com/1471-2156/11/57`.

Klaus M. Stiefel, Jean-Marc Fellous, **Peter J. Thomas** and Terrence J. Sejnowski, "Intrinsic Sub-threshold Oscillations Extend the Influence of Inhibitory Synaptic Inputs on Cortical Pyramidal Neurons." *European Journal of Neuroscience* **31**(6):1019-26, March 2010. (Epub Mar 8, 2010).

A.J. Lerner, P.K. Ogrocki, **P.J. Thomas**, "A Network Graph Analysis of Category Fluency Testing", *Cognitive and Behavioral Neurology*, **22**(1):45-52, March 2009.

E. Miraldi, **P.J. Thomas**†, L. Romberg†, "Allosteric Models for Cooperative Polymerization of Linear Polymers", *Biophysical Journal* **95**(5): 2470-86, Sep 2008 (Epub 2008 May 23). †denotes equal author contributions.

P.B. Kruskal, J.J. Stanis, B.L. McNaughton, **P.J. Thomas**, "A binless correlation measure reduces the variability of memory reactivation estimates", *Statistics in Medicine*, **26** (21): 3997-4008, Sep 20, 2007 (Epub June 26, 2007).

J.M. Kimmel, R. M. Salter, **P.J. Thomas**, "An Information Theoretic Framework for Eukaryotic Gradient Sensing", *Advances in Neural Information Processing Systems 19*, MIT Press, pp 705-712, 2007.

P.J.Thomas, J.D. Cowan, "Simultaneous constraints on pre- and post-synaptic cells couple cortical feature maps in a 2D geometric model of orientation preference", *Mathematical Medicine and Biology*, **23** (2):119-138, June 2006. (Epub April 20, 2006.)

P.J. Thomas, J.D. Cowan, "Symmetry induced coupling of cortical feature maps", *Physical Review Letters*, **92** (18):188101, May 7, 2004. (Epub May 2004.)

J.M. Fellous, P.H.E. Tiesinga, **P.J. Thomas** and T.J. Sejnowski, "Discovering Spike Patterns in Neuronal Responses", *Journal of Neuroscience*, **24** (12), 2989-3001, March 24, 2004.

P.J. Thomas, D.J. Spencer, S.K. Hampton, P. Park and J. Zurkus, "The Diffusion-Limited Biochemical Signal-Relay Channel", *Advances in Neural Information Processing Systems 16*, MIT Press, 2004.

Peter J. Thomas, Paul H. E. Tiesinga, Jean-Marc Fellous and Terrence J. Sejnowski, "Reliability and Bifurcation in Neurons Driven by Multiple Sinusoids", *Neurocomputing* **52-54**, 955-961, 2003.

Wouter-Jan Rappel, **Peter J. Thomas**, Herbert Levine and William F. Loomis, "Establishing Direction during Chemotaxis in Eukaryotic Cells", *Biophysical Journal* **83**, 1361-1367, September 2002.

P.C. Bressloff, J.D. Cowan, M. Golubitsky, **P.J. Thomas** and M.C. Wiener, "What geometric visual hallucinations tell us about the visual cortex", *Neural Computation* **14**, 473-491, 2002.

P.C. Bressloff, J.D. Cowan, M. Golubitsky, **P.J. Thomas** and M.C. Wiener, "Geometric visual hallucinations, Euclidean symmetry, and the functional architecture of striate cortex", *Phil. Trans. R. Soc. Lond. B* **356**, 299-330, 2001.

P.C. Bressloff, J.D. Cowan, M. Golubitsky and **P.J. Thomas**, "Scalar and pseudoscalar bifurcations motivated by pattern formation on the visual cortex", *Nonlinearity.* **14**, 739-775, 2001.

P.J. Thomas "Order and Disorder in Visual Cortex: Spontaneous Symmetry-Breaking and Statistical Mechanics of Pattern Formation in Vector Models of Cortical Development", *Dissertation, University of Chicago Department of Mathematics*, August 2000.

J.D. Hunter, J.G. Milton, **P.J. Thomas** and J.D. Cowan, "A Resonance Effect for Neural Spike Time Reliability", *J. Neurophysiol.* **80**, 1427-1438, 1998.

P.J. Thomas, B.E. Wendelburg, S.E. Venuti, G.M. Helmkamp Jr., "Mature rat testis contains a high molecular weight species of phosphatidylinositol transfer protein", *Biochim Biophys Acta* **982**(1):24-30, June 26, 1989