

# Peter J. Thomas

*Applied Mathematics & Computational Biology*

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Computational Neurobiology Laboratory  
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## Education

**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.

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## Employment

### **Howard Hughes Medical Institute Research Associate, 2002-**

*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 multiple NIH grant proposals. 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 national teacher corps. Taught secondary school physics and chemistry. Faculty sponsor, boys soccer team.

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**Honors and Awards**

Participant, 1<sup>st</sup> 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.

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## Professional Activities

### Recent Conference Presentations:

2003 Neural Information Processing Systems Conference: *The Diffusion-Limited Biochemical Signal-Relay Channel.*

2003 Fields Institute Workshop on Patterns in Physics: *Pattern Formation in the Development of Primary Visual Cortex.*

2003 Society for Neuroscience Meeting: *Experimental Characterization of Spike-Time Patterns, and Information Capacity of a Single Ligand-Receptor Signal-Transduction Relay.*

2003 Banff International Research Station Conference on Symmetry and Bifurcation in Biology: *Symmetry-Induced Coupling of Cortical Feature Maps.*

2003 American Physical Society March Meeting: *Spike-Time Attractors in Cortical Neurons.*

2002 Gordon Research Conference on Theoretical Biology and Biomathematics: *Fast Directional Sensing Using a Rapidly Diffusing Inhibitor.*

2002 San Diego Cell Biology Meeting: *Adaptation and Deadaptation in a Three-State Model of Dictyostelium Chemotaxis.*

2001 Society for Neuroscience Meeting: *Fanout Constraints Couple Orientation and Retinotopic Distortion Maps.*

### Recent Invited Talks (Selected):

June 17, 2003: Center for Magnetic Recording Research Special Seminar, UCSD Department of Electrical and Computer Engineering. *Biological Information Channels*

May 27, 2003: IBM Almaden Research Center Seminar. *Inside the Mind of the Amoeba: Simulation and Analysis of Biochemical Signal-Transduction Networks.*

**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 Neuroscience, American Society for Cell Biology, American Physical Society, American Mathematical Society, Society for Mathematical Biology, Society for Industrial and Applied Mathematics, American Association for the Advancement of Science.

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**Vitals**

Born 1968 in Kansas City, Missouri.

U.S. Citizen.

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## Publications

**P.J. Thomas**, J. D. Cowan, “Symmetry Induced Coupling of Cortical Feature Maps”, *Physical Review Letters*, **accepted**.

J.M. Fellous, P.H.E. Tiesinga, **P.J. Thomas** and T.J. Sejnowski, “Discovering Spike Patterns in Neuronal Responses”, *Journal of Neuroscience*, **conditionally accepted**.

**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*, **to appear 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