DAVID WOLPERT

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EDUCATION:

Ph.D., UNIVERSITY OF CALIFORNIA, SANTA BARBARA, Physics, 1989.
   Dissertation: Neural networks and generalization theory.

SANTA FE SUMMER SCHOOL ON COMPLEX SYSTEMS, 1988.

M.A., UNIVERSITY OF CALIFORNIA, SANTA BARBARA, Physics, 1987.

B.A., PRINCETON UNIVERSITY, Physics, 1984 (Cum Laude).
   Thesis: Filamentary structure of large scale galaxy distributions.

WORK EXPERIENCE:

June 2005 to present	<u>Stanford University Aeronautics and Astronautics Dept.</u> *Consulting Professor.* Supervise students in several departments on topics including adaptive distributed control and bounded rational game theory.
May 1997 to present	<u>NASA Ames Research Center</u>. *Senior Computer Scientist.* Supervise and conduct academic research on probability collectives, combinatorial optimization, machine learning and statistics, complexity measures, and the the physics of information. Supervise a group to implement collective intelligence systems inside distributed computational networks.
April 1996 to May 1997	<u>IBM Almaden Research Center</u>. *DataMining Solutions, Research Manager.* Supervise and conduct product-driven and academic research on machine learning and statistics. In particular developed several products implementing machine learning algorithms inside the internet, and in conjunction with Los Alamos National Laboratory developed a product performing fraud detection in the health care industry.

July 1995 to March 1996	TXN Inc. *Director of Research*. Conducted product-driven and academic research on machine learning and statistics. In particular developed a run-time fraud detection system for telecommunications networks.
November 1991 to March 1996	SANTA FE INSTITUTE, *Postdoc*. Conducted research on supervised learning, Bayesian statistics, and the thermodynamics of computation.
January 1994 to June 1995	PEDIATRIC AIDS FOUNDATION and NIH CORRELATES OF HUMAN IMMUNO-DEFICIENCY PROGRAM. *Research Associate*. With Bette Korber of Los Alamos conducted statistical analysis and research on several HIV-related epidemiological datasets.
May 1993 to June 1995	TXN Inc. *Consultant*. Conducted product-driven research on machine learning and statistics.
March 1989 to November 1991	THEORETICAL DIVISION and CENTER FOR NONLINEAR STUDIES, Los Alamos National Laboratory. *Postdoc (Director's fellow)*. Performed academic research on supervised learning, Bayesian statistics, and the thermodynamics of computation in J. Doyne Farmer's Complex Systems Group.
January 1988 to January 1989	UNIVERSITY OF CALIFORNIA, Department of Computer Science, Santa Barbara, CA., *Research Assistant*. With Dr. Terrence Smith investigated connectionist models, especially as applied to path-finding
September 1985 to December 1987	UNIVERSITY OF CALIFORNIA, Department of Physics, Santa Barbara, CA., *Teaching Assistant*. Led discussion sections for graduate and undergraduate physics courses.
January 1985 to August 1985	PRINCETON TELECOM Inc. *Programmer-analyst*. Worked on telecommunications and home banking software for personal computers.
August 1984 to December 1984	NEUROSCIENCES INSTITUTE, Rockefeller University. *Research Associate*. Conducted Artificial Intelligence research and ran the NSI's IBM 4331, linked to IBM's research computers at Yorktown Heights.

REFEREED PUBLICATIONS:

Science of Collectives/

Macready, W., Wolpert, D.H., "Distributed Constrained Optimization with Semicoordinate Transformations", in *Operations Research*, in press.

Lawson, J and Wolpert, D.H., "Adaptive Programming of Unconventional Nano-Architectures", *Journal of Computational and Theoretical Nanoscience*, **3**, 272-279 (2006)

Wolpert, D.H., Strauss, C.E.M., Rajnarayan, D., "Advances in Distributed Optimization using Probability Collectives", *Advances in Complex Systems*, in press.

Bieniawski. S., Kroo, I., and Wolpert, D.H. "Flight Control with Distributed Effectors," AIAA Paper 2005-6074, Proceedings of the *2005 AIAA Guidance, Navigation, and Control Conference*, San Francisco, CA, August 15-18, 2005.

Wolpert, D.H., Bieniawski, S.R., "Distributed Control by Lagrangian Steepest Descent", in *Proceedings of IEEE Conference on Decision and Control*, 2004.

Wolpert, D.H., Huang, C.F, Bieniawski, S. and Strauss, C.E.M., "A comparative study of Probability Collectives-based Multi-agent Systems and Genetic Algorithms", *Proceedings of 2005 GECCO conference.*

Bieniawski, S., Kroo, I., and Wolpert, D. H., "Discrete, Continuous, and Constrained Optimization Using Collectives," AIAA Paper 2004-4580, *10th AIAA/ISSMO Multi-disciplinary Analysis and Optimization Conference*, Albany, NY, August 30-September 1, 2004.

Wolpert, D.H., Bieniawski, S., "Distributed Adaptive Control: Beyond Single-Instant, Discrete Variables", in *MSRAS 04*, Springer-Verlag, 2004.

Wolpert, D.H., "What Information Theory says about Bounded Rational Best Response", in *WEHIA 04,* A. Namatame (Ed.), Springer-Verlag, 2004.

Bieniawski, S.R., Wolpert, D.H., "Adaptive, distributed control of constrained multi-agent systems", in *Autonomous Agents and Multi-Agent Systems 2004*, 2004.

Lee, C.F., Wolpert, D.H., "Product distribution theory for control of multi-agent systems", in *Autonomous Agents and Multi-Agent Systems 2004*, 2004.

Wolpert, D.H., Lee, C.F., "Adaptive Metropolis Sampling with Product Distributions", in *International Conference on Complex Systems 2004*, Y. Bar-Yam (Ed.), Perseus books, 2004.

Bieniawski, S.R., Wolpert, D.H., "Product Distributions for Distributed Optimization", in *International Conference on Complex Systems 2004*, Y. Bar-Yam (Ed.), Perseus books, 2004.

Macready, W., Wolpert, D.H., "Distributed Constrained Optimization", in *International Conference on Complex Systems 2004*, Y. Bar-Yam (Ed.), Perseus books, 2004.

Wolpert, D.H., "Information theory - the bridge connecting bounded rational game theory and statistical physics", in *Complex Engineering Systems*, D. Braha and Y. Bar-Yam (Ed.'s), Perseus books, 2004.

Tumer, K., Wolpert, D.H., "Coordination in Large Collectives", in *International Conference on Complex Systems 2004*, Y. Bar-Yam (Ed.), Perseus books, 2004.

Antoine, N.E., Bieniawski, S.R., Kroo, I.M., Wolpert, D.H., "Fleet Assignment using collective intelligence", AIAA-2004-0622, Presented at the 42nd Aerospace Sciences Meeting, 2004.

Wolpert, D.H., Tumer, K., Bandari, E. "Improving search algorithms by using intelligent coordinates", *Physical Review E (Brief Communications)*, **69**, 017701, 2004.

Tumer, K., Wolpert, D.H., "A Survey of Collective Intelligence", in Tumer, K., and Wolpert, D.H. (Ed.'s) *Collectives and the Design of Complex Systems*, Springer-Verlag, 2004.

Wolpert, D.H., "The Theory of Collectives", in Tumer, K., and Wolpert, D.H. (Ed.'s) *Collectives and the Design of Complex Systems*, Springer-Verlag, 2004.

Wolpert, D., *Factoring a Canonical Ensemble*, cond-mat/0307630, 2003.

Airiau, S., Wolpert, D.H., Sen, S., and Tumer, K., "Providing effective access to shared resources: a COIN approach", *Proceedings of ESOA '03,* A. Karageorgos et al., 2003.

Wolpert, D.H., and Tumer, K., "Beyond Mechanism Design", *International Congress of Mathematicians 2002 Proceedings*, H. Gao et al. (Ed.s), Qingdao Publishing, 2002.

Lawson, J., and Wolpert D. H., "The Design of Collectives of Agents to Control Non-Markovian Systems", *Proceedings of American Association of Artificial Intelligence Conference 2002*, 2002.

Wolpert, D.H, and Lawson, J., "Designing Agent Collectives For Systems With Markovian Dynamics", in *Proceedings of First International Joint Conference on Autonomous Agents and Multi-Agent Systems*, 2002.

Tumer, K., Agogino, A, and Wolpert, D.H., "Learning Sequences of Actions in Collectives of Autonomous Agents", in *Proceedings of First International Joint Conference on Autonomous Agents and Multi-Agent Systems*, 2002.

Wolpert, D.H., and Tumer, K., "Optimal Reward Functions in Distributed Reinforcement Learning", *Intelligent Agent Technology* 2001, 2002.

Wolpert, D.H., Tumer, K. "Collective Intelligence, Data Routing, and Braess' Paradox", *Journal of Artificial Intelligence Research*, 2002.

Wolpert, D.H., "Collective Intelligence", in *Computational Intelligence Beyond 2001: Real and Imagined*, D. Fogel and D. Robinson (Ed.), Wiley, 2001.

Wolpert, D., and Tumer, K., "Optimal Payoff Functions for Members of Collectives", *Advances in Complex Systems*, Vol. 4, pp. 265-280, 2001.

Wolpert, D.H., Sill, J., and Tumer, K., "Using Collective Intelligence to Control Data Flow Across a Constellation of Satellites", *Proceedings International Joint Conference on AI* 2001, Morgan Kauffman, 2001.

Wolpert, D.H., and Tumer, K., "An Illustration of the COIN Approach to Design of Multi-Agent Systems", *Proceedings of the Agents 00 and ECML 00 Workshop on Learning in Agents*, Sen. S et al. (Ed.'s), 2000.

Tumer, K., and Wolpert, D.H. "Collective Intelligence and Braess' Paradox", in *Proceedings of AAAI 2000*, Morgan Kauffman, 2000.

Wolpert, D.H., Tumer, K., "Collective Intelligence for Optimization", in "Statistical Machine Learning for Large-Scale Optimization", J. Boyan, et al. (Ed.'s), *Neural Computing Surveys*, 2000.

Wolpert, D.H., Kirshner, S., Tumer, K., Merz, C., "Adaptivity in Agent-Based Routing for Data Networks", in *Proceedings of Agents 00*, Sierra, C., et al, (Ed.s), 2000.

Wolpert, D.H., Wheeler, K., Tumer, K., "Collective Intelligence for Control of Distributed Dynamical Systems", *Europhysics Letters*, vol. 49 issue 6, 708-714, 2000.

Wolpert, D.H., Wheeler, K., Tumer, K., "General Principles of Learning-based Multi-Agent Systems", *Third International Conference of Autonomous Agents*, J.E. Bradshaw (Ed.), ACM Press, 77-83, 1999.

Wolpert, D.H., Tumer, K., Frank, J. "Using collective intelligence to route internet traffic", *Neural Information Processing Systems 11*, Kearns et al. (Eds), MIT Press, 952-958, 1999.

Statistical Inference/

Wolpert, D.H., "Supervised Learning Theory", invited contribution to *Encyclopedia of Cognitive Science*, Robert French et al. (Ed.'s), Macmillian Press, in press.

Wolpert, D.H. "The Supervised Learning No-Free-Lunch Theorems", invited contribution to *World conference on Soft Computing* 2001, in press.

Smyth, P. and Wolpert, D. H., "Linearly Combining Density Estimators via Stacking", *Machine Learning Journal*, **36**, 59-83, 1999.

Wolpert, D.H., and Macready, W.G., "An Efficient Method to Estimate Bagging's Generalization Error", *Machine Learning Journal*, **35**, 41-55, 1999.

Smyth, P. and Wolpert, D. H., "Stacked Density Estimation", *Neural Information Processing Systems 10*, MIT Press, 1998.

Wolpert, D.H., Knill, E., and Grossman, T., "Some results concerning off-training-set and IID error for the Gibbs and Bayes optimal generalizers", *Statistics and Computing*, **8**(1), March 1998, pp. 35--54.

Delwart, E.L., Pan, H., Sheppard, H.W., Wolpert, D.H.,Neumann, A.U., Korber, B.T., Mullins, J.I., "Slower Evolution of HIV-1 quasispecies evolution during progression to AIDS", *J. Virol*, October, 71(10), 7498-7508, 1997.

Smyth, P. and Wolpert, D. H., "Anytime Exploratory Data Analysis for Massive Data Sets", *The Third International Conference on Knowledge Discovery and Data Mining*, AAAI Press, 1997.

Wolpert, D.H., "On Bias plus Variance", *Neural Computation*, **9**, 1997.

Wolpert, D.H., "The Lack of A Priori Distinctions between Learning Algorithms", *Neural Computation*, **8**, 1341 - 1390, 1996.

Wolpert, D.H., "The Existence of A Priori Distinctions between Learning Algorithms", *Neural Computation*, **8**, 1996.

Wolpert, D.H., "Determining Whether Two Data Sets are from the Same Distribution", in *Maximum Entropy and Bayesian Methods 1995*, Ed. K. Hanson and R. Silver, Kluwer Academic press, 1996.

Wolpert, D.H., "The Bootstrap is Inconsistent with Probability Theory", in *Maximum Entropy and Bayesian Methods 1995*, Ed. K. Hanson and R. Silver, Kluwer Academic press, 1996.

Wolpert, D.H., Strauss, C.E., "What Bayes has to say about the evidence procedure", in *Maximum Entropy and Bayesian Methods 1993*, Ed. G. Heidbreder, Kluwer Academic press, 1996.

Wolpert, D.H., "Reconciling Bayesian and non-Bayesian analysis", in *Maximum Entropy and Bayesian Methods 1993*, Ed. G. Heidbreder, Kluwer Academic press, 1996.

Kohavi, R., and Wolpert, D.H., "Bias Plus Variance Decomposition for Zero-One Loss Functions", *Proceedings of the International Machine Learning Conference 13*, Ed. Lorenza and Saiita, Morgan Kauffman,1996.

Wolpert, D.H., and Wolf, D.R., "Estimating Functions of Probability Distributions from a Finite Set of Samples", *Physical Review E*, **52**, p. 6841, 1995. (Note subsequent erratum.)

Wolpert, D.H., "Horizontal Generalization", in *Proceedings of the International Machine Learning Conference 12*, Ed. A. Prieditis and S. Russell, Morgan Kauffman, 1995.

Wolpert, D.H., "On the Bayesian 'Occam Factors' Argument for Occam's Razor", in *Computational Learning Theory and Natural Learning Systems III*, Ed. T. Petsche et al., MIT Press, 1995.

Wolpert, D.H., "The Relationship Between the Various Supervised Learning Formalisms", in *The Mathematics of Generalization*, Ed. D. Wolpert, Addison-Wesley, 1994.

Wolpert, D.H., and Lapedes, A.S., "A Rigorous Investigation of Exhaustive Learning", in *The Mathematics of Generalization*, Ed. D. Wolpert, Addison-Wesley, 1994.

Wolpert, D.H., "Filter Likelihoods and Exhaustive Learning", in *Computational Learning Theory and Natural Learning Systems II*, Ed. S. Hanson et al., MIT Press,1994.

Wolpert, D.H., "Bayesian back-propagation over I-O functions rather than weights", in *Advances in Neural Information Processing Systems VI*, Ed. S. Hanson et al., Morgan Kauffman, 1994.

Strauss, C.E., Wolpert, D.H., Wolf, D.R., "Alpha, Evidence, and the Entropic Prior", in *Maximum Entropy and Bayesian Methods 1992*, Ed. A. Mohammed-Djafari, Kluwer, 1994.

Wolpert, D.H., "Combining Generalizers Using Partitions of the Learning Set", in *1992 Lectures in Complex Systems*, Ed. L. Nadel et al., Addison-Wesley, 1994.

Wolpert, D.H., "On the Use of Evidence in Neural Networks", in *Advances in Neural Information Processing Systems V*, Ed. S. Hanson et al., Morgan Kauffman, 1993.

Korber, B.T., Farber, R.M., Wolpert, D.H., and Lapedes, A.S., "Covariation of Mutations in the V3 Loop of HIV-1: An Information-Theoretic Analysis", *Proceedings of the National Academy of Sciences*, **90**, 7176-7180, 1993.

Wolpert, D.H., "How to Deal with Multiple Possible Generalizers", in *Fast Learning and Invariant Object Recognition*, Ed. B. Soucek, Wiley and Sons, 1992.

Wolpert, D.H., "Stacked Generalization", *Neural Networks*, **5**, 241-259, 1992.

Wolpert, D.H., "On the Connection Between In-Sample Testing and Generalization Error", *Complex Systems*, **6**, 47-94, 1992.

Wolpert, D.H., "The Relationship Between Occam's Razor and Convergent Guessing", *Complex Systems*, **4**, 319-368, 1990.

Wolpert, D.H., "Using a Mathematical Theory of Generalization to Construct a Generalizer Superior to NETtalk", *Neural Networks*, **3**, 445-452, 1990.

Wolpert, D.H., "A mathematical Theory of Generalization: part I, part II", *Complex Systems*, **4**,151-200, 201-249, 1990.

Wolpert, D.H., "A benchmark for how well neural nets generalize", *Biological Cybernetics*, **61** 303-313, 1989.

Physics and Computation/

Wolpert, D. "Computational Capabilities of Physical Systems", *Physical Review E*, Vol. 65, 016128, 12/20/01.

Wolpert, D.H., "The Second Law, Computation, and the Temporal (A)symmetry of Memory", in *Advances in the Physics of Computation*, Ed. D. Matzke, IEEE press, 1993.

Wolpert, D.H. "Memory Systems, Computation, and The Second Law of Thermodynamics", *International Journal of Theoretical Physics*, **31**, 743-785, 1992.

Wolpert, D.H., "Reversible Computing and Physical Law", *PHYSICS TODAY*, 98-99 (March 1992).

Wolpert, D.H., "Chaos of the Brussels School is not irreversible", *Nature*, **335**, 595, 1988.

Optimization and Search/

Wolpert, D.H., and Macready, W.G., "Coevolutionary Free Lunches", *IEEE Transactions on Evolutionary Computation*, **9**, 721-735, 2005.

Koeppen, M., Wolpert, D. H., Macready, W. G., "Remarks on a Recent Paper on the 'No Free Lunch' Theorems", *IEEE Transactions on Evolutionary Computation*, **5**, pp. 295-296, June 2001.

Macready, W.G., and Wolpert, D.H., "Bandit Problems and the Exploration/Exploitation Tradeoff", *IEEE Transactions on Evolutionary Computation*, **2**, 2-22, 1998.

Wolpert, D.H., and Macready, W.G., "No Free Lunch Theorems for Optimization", *IEEE Transactions on Evolutionary Computation*, **1**, 1997.

Macready, W.G., and Wolpert, D.H. "What Makes an Optimization Problem Hard?", *Complexity*, **5**, 1996.

Other topics/

Wolpert, D.H., Macready, W., "Using Self-dissimilarity to Quantify Complexity", *Complexity*, in press.

Wolpert, D.H., Macready, W., "Self-dissimilarity as a high dimensional complexity measure", in *International Conference on Complex Systems 2004*, Y. Bar-Yam (Ed.), Perseus books, in press.

Wolpert, D.H., "Metrics for more than two points at once", in *International Conference on Complex Systems 2004*, Y. Bar-Yam (Ed.), Perseus books, in press.

Wolpert, D.H., MacLennan, B. J., "A Computationally Universal Field Computer with Linear Dynamics", *Neural Computation*, in press.

Wolpert, D.H., and Macready, W.G., "Self-Dissimilarity: An Empirically Observable Measure of Complexity", *Unifying Themes in Complex Systems"*, Y. Bar-Yam (Ed.), Perseus books, 2000.

Wolpert, D.H., and Maclennan, B., "A Computationally Universal Field Computer that is Purely Linear", in *Proceedings of the 5th Joint Conference on Information Sciences"*, *(Atlantic City, NJ, Feb. 27 - Mar. 3, 2000),* **I**, pp. 782-5, Paul P. Wang (Ed.), ACM Press, 2000.

BOOKS:

Wolpert, D.H. (Ed.), *The Mathematics of Generalization*, Addison-Wesley, 1994.

Tumer, K. and Wolpert, D.H. (Ed.), *Collectives And The Design Of Complex Systems*, Springer, 2004.

MISCELLANEOUS:

Associate Editor for
> *Advances in Complex Systems* and *IEEE,*
> *Transactions on Evolutionary Computation.*

Member of Editorial Board of
> *Journal of Artificial Intelligence Research*,
> *Theory in Biosciences*,
> *ACM Transactions on Autonomous and Adaptive Systems*,
> *Journal of Economic Interaction and Coordination.*

Member of council of *The Socio-Economic Science with Heterogeneous Interacting Agents Society.*

Bios Fellow.

Tsingua University, Center for Intelligent Networked Systems, Beijing, October 2005. Visiting professor. Taught an intensive graduate course on "Advances in Complex Systems".

Max Planck Institute for Mathematics in the Physical Sciences, Leipzig, June 2006. Visiting scholar.

Member on several NSF panels.

US Patent 5,535,301 on Stacked Generalization. US patent pending no. 09/160,828 (1998) for Surfaid Predictor. US patent pending (1999) for Masked Proportional Routing.

Thesis reviewer for students at Stanford University, UC-Irvine, University of Waterloo, University of Pretoria.

Thesis advisor for several students at Stanford University

Organized the 1992 SFI/CNLS workshop on the theory of supervised learning.

Co-organized:
> Spring 1996 AAAI Symposium on Computational Issues in Learning Models of Dynamical Systems.
> The AAAI-96 Workshop on Integrating Multiple Learning Methods. Co-edited the associated special issue of *Machine Learning Journal*.
> NIPS-98 Workshop on Turnkey Algorithms for Improving Generalizers.
> 2002 WCCI Special Track on Distributed Learning for Optimization.
> 2001 SFI/NASA workshop on Collective Intelligence.
> 2002 NASA workshop on Collective Intelligence.
> 2003 Stanford/NASA workshop on Collective Intelligence.
> 2004 Special Session on Product Distribution Theory at The 2004 International Conference on Complex Systems (*invited organizer*).
> 2005 CNLS workshop on Collectives.
> 2005 NIPS workshop on Game Theory, Machine Learning and Reasoning under Uncertainty

Refereed for and/or on Program Committee for:
> American Control Conference
> The American Statistician
> American Association for Artificial Intelligence Conference
> American Association for Artificial Intelligence Symposia
> Annals of Mathematics and Artificial Intelligence
> Annals of Operations Research
> Annals of Physics
> Annals of Statistics
> Arabian Journal for Science and Engineering
> Artificial Intelligence

Artificial Intelligence and Mathematics
Asia-Pacific Conference on Intelligent Agent Technology 2001
Autonomous Agents and Multi-agent systems '03
Autonomous Agents and Multi-agent systems '04
Autonomous Agents and Multi-agent systems '05
Chaos
Complexity
Complexus
Complex Systems
Computers and Operations Research
Connection Science
Conference on Decision and Control 2001
Congress on Evolutionary Computation 2004
Engineering self-organizing applications 2003
Engineering and Physical Sciences Research Council
EURASIP Journal on Applied Signal Processing
European Conference on Complex Systems 2006
Europhysics Letters
Foundations of Physics
Foundations of Evolutionary Algorithms 2000
Frontiers in Evolutionary Algorithms 2000
Games and Economic Behavior
Information Processing Letters
Intelligent Agent Technology 2001
IEEE Communications Letters
2001 IEEE International Symposium on Cluster Computing and the Grid
IEEE Intelligent Systems
IEEE Transactions on Evolutionary Computation
IEEE Transactions on Knowledge and Data Engineering
IEEE Transactions on Neural Networks
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Systems, Man and Cybernetics, A and B
INFORMS Journal on Computing
Information Fusion
Institute for Mathematics and its Applications
International Joint Conference on Artificial Intelligence
International Conference on Complex Systems 2004
International Conference on Machine Learning and Applications
International Joint Conference on Neural Networks
International Workshop on Multiple Classifier Systems
Joint Conference on Intelligent Systems
Journal of Artificial Intelligence Research
Journal of Autonomous Agents and Multi-Agent Systems
Journal of Computational and Graphical Statistics
Journal of Machine Learning Research
Journal of Neural Networks

Journal of the Royal Statistical Society, B
Knowledge Discovery and Data Mining Conference
Machine Learning
The Marsden Fund of The Royal Society of NZ
Mathematical Reviews
Maximum Entropy and Bayesian Methods Conference
MCS 2000
Nature
National Science Foundation (more than half a dozen divisions)
Netherlands Organization for Scientific Research
Neural Computation
Neural Networks
Neural Information Processing Systems Conference
Journal of the Royal Statistical Society B
Physica A
Physica D
Physics Letters A
Proceedings of the National Academy of Sciences
1999 Workshop on Economics with Heterogeneous Interacting Agents
SIAM Review
Society for Economics and Heterogeneous Interacting agents
1st International workshop on Theory and practice of open computational systems

Invited presentations and discussion panels within the past five years:
Agents '00 "Infrastructure for Scalable Multi-Agent Systems" workshop.
American Association for Advancement of Science 1995 Panel on Artificial Life
American Mathematical Society Mt. Holyoke 1996 Workshop on Statistics
Arris Corporation
Cal Tech Center for Neuromorphic Systems Engineering
Cal Tech Control and Dynamical Systems
Cambridge University, Newton Institute of Mathematics
Center for Nonlinear Studies
Conferences on Computational Learning Theory and Natural Learning Systems
Conference on Control and Decision Theory 2004
Control Mechanisms for Complex Systems 1996 International Workshop
Conference on Evolutionary Computation 2000 (**banquet speech**)
Conference on Evolutionary Computation 2005 (**keynote speech**)
Workshop on High Performance Object Databases, Cardiff '00
HP Research Labs (Palo Alto)
IBM Yorktown Heights Research Center
ICML 2000 workshop on What Works Well Where
ICML 2000 workshop on multi-agent systems
Workshop on Intelligent Agent Support for Imagery & Geospatial Analysis 2000
The International Computer Science Institute
Jet Propulsion Laboratory
Maximum entropy and Bayesian Analysis conference

Microsoft Corporation
Modeling Complex Systems '02
Monitoring, security, and rescue tasks in multi-agent systems (*keynote speaker*)
MIT Artificial Intelligence Lab
MIT Lincoln Laboratories
2002 Brookings Inst. Workshop on Multi-Agent Comp. in Economies
NASA Center for Computational Astrobiology kickoff panel discussion
NEC Corporate Research Lab
New England Complex Systems Institute
Neural Information Processing Systems workshop on combining generalizers
Neural Information Processing Systems workshop on Occam's Razor
Oxford University, Applied Mathematics Dept.
Rocky Mountain Conference on Artificial Intelligence
2002 World Conference on Soft Computing (**plenary speaker**)
Snowbird conference on neural computing
Siemens Corporate Research
Stanford Aeoronautics and Aerospace Dept.
Stanford Computer Science Dept.
Stanford Psychology Dept.
Stanford Statistics Dept.
Stanford Aeronautics and Astronautics Dept.
"Strategies for Implementing Large Scale Emergent Systems" Workshop.
Symposium on Understanding Complex Systems 2005 (**keynote speech**)
Theory and practice of open computational systems 2003
UC Berkeley Statistics Dept.
UCLA Aerospace Dept.
UCLA Statistics Dept.
UC Santa Cruz Computer Science Dept.
UC Santa Cruz Applied Math Dept.
University of New Mexico Physics Dept.
University of New Mexico Computer Science Dept.
2002 World Congress on Computational Intelligence (**plenary speaker**)
2004 Workshop on Econ. and Heterog. Interactive Agents (**plenary speaker**)

Peer-Reviewed Awards:
Best Paper Award for IEEE Trans. Evolutionary Computation, Vol. 1
Best Paper Award for IEEE Trans. Evolutionary Computation, Vol. 2
Superior Accomplishment Award for NASA Code IC for 1999
TXN fellow
NIH Postdoctoral Fellowship
LANL Director's Postdoctoral Fellowship
UC DuPont Fellowship
UC Regent's Fellowship
Princeton University Physics Department Kusaka Prize