

J. Doyne Farmer

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- EDUCATION** Ph.D., Physics, **University of California, Santa Cruz**, 1981
B.S., Physics, **Stanford University**, 1973
University of Idaho, 1969-1970
- PROFESSIONAL EXPERIENCE** Professor, **Santa Fe Institute**, 1999–Present
LUISS Guido Carli University, Extraordinary Professor, Spring 2008–2012.
Prediction Company, 1991–1999
Co-President, 1995–1999
Chief Scientist (head of research group), 1991–1999
Los Alamos National Laboratory, 1981–1991
Leader of Complex Systems Group, Theoretical Division, 1988–1991
Staff Member, Theoretical Division, 1986–1988
Oppenheimer Fellow, Center for Nonlinear Studies, 1983–1986
Post-doctoral appointment, Center for Nonlinear Studies, 1981–1983
- PROFESSIONAL ASSOCIATIONS** Editorial Board, *Quantitative Finance* (2003–Present)
Editorial Board, *Artificial Life* (2002–Present)
Editor-in-Chief, *Quantitative Finance* (1999–2003)
Editorial Board, *Nonlinearity* (1988–1991)
- PROFESSIONAL INTERESTS** Complex systems, particularly social evolution of financial markets and technological innovation
- FELLOWSHIPS** **J. Robert Oppenheimer Fellowship**
March 1983–February 1986
Hertz Fellowship
September 1978–June 1981
UC Regents Fellowship
September 1973–June 1974
- RESEARCH GRANTS** **National Science Foundation**
Financial Markets as an Empirical Laboratory to Study an Evolving Ecology of Human Decision Making (HSD-0624351)
\$749,661
09/15/2006 – 08/31/2009

National Science Foundation

Modeling the Dynamics of Technological Evolution (SBE-0738187)
\$380,655
01/01/2008 – 12/31/2010

Barclay's Bank

Financial Markets Modeling
\$300,000
01/01/2006 – 12/31/2008

AWARDS

Los Alamos National Laboratory Fellows Prize, 1989 (for best research paper that year at Los Alamos)

POPULAR PRESS

Bass, Thomas A. *The Eudaemonic Pie*. Boston, MA: Houghton Mifflin Co., 1985.
Gleick, James. *Chaos: Making a New Science*. Toronto: Penguin, 1987.
Waldrup, Mitchell. *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York: Simon & Schuster, 1992.
Bass, Thomas. *The Predictors: How a Band of Maverick Physicists Used Chaos Theory to Trade Their Way to a Fortune on Wall Street*. London: Penguin, 2001.

**CITATION
RECORD (ISI)**

59 publications; 6,461 citations; average citations 110; h-index = 23;
top 5 papers: (1387, 1007, 720, 717, 448)

PUBLICATIONS

Farmer, J. D., and N. Zamani. "Mechanical vs. Informational Components of Price Impact." *European Physical Journal B* 55(2) (2007): 189-200.
Gillemot, Laszlo, J. Doynne Farmer, and Fabrizio Lillo. "There's More to Volatility than Volume." *Quant. Fin.* 6(5) (2007): 371-384.
Farmer, J. D., A. Gerig, F. Lillo, and S. Mike. "Market Efficiency and the Long-Memory of Supply and Demand: Is Price Impact Variable and Permanent or Fixed and Temporary?" *Quant. Fin.* 6(2) (2006): 107-112.
White, D. R., N. Kejzar, C. Tsallis, J. D. Farmer, and S. White. "Generative Model for Feedback Networks." *Phys. Rev. E* 73(1) (2006): Art. No. 016119 Part 2.
Farmer, J. D., D. E. Smith, and M. Shubik. "Is Economics the Next Physical Science?" *Physics Today* 58(9) (2005): 37-42.
Lillo, F., and J. D. Farmer. "The Key Role of Liquidity Fluctuations in Determining Large Price Fluctuations." *Fluctuations and Noise Lett.* 5 (2005): L209-L216.
Lillo, F., S. Mike, and J. D. Farmer. "Theory for Long Memory in Supply and Demand." *Phys. Rev. E* 7106(6 pt 2) (2005): 287-297.
Farmer, J. D., P. Patelli, and I. Zovko. "The Predictive Power of Zero Intelligence in Financial Markets." *PNAS USA* 102(6) (2005):

2254-2259.

- Farmer, J. D., L. Gillemot, F. Lillo, S. Mike, and A. Sen. "What Really Causes Large Price Changes?" *Quant. Fin.* 4(4) (2004): 383-397.
- Lillo, F., and J. D. Farmer. "The Long Memory of the Efficient Market." *Studies in Nonlinear Dynamics & Econometrics* 8(3) (2004): 1226.
- Farmer, J. D., and F. Lillo. "On the Origin of Power-Law Tails in Price Fluctuations." *Quant. Fin.* 314 (2004): 7-10.
- Iori, G., M. G. Daniels, J. D. Farmer, L. Gillemot, S. Krishnamurthy, and E. Smith. "An Analysis of Price Impact Function in Order-Driven Markets." *Physica A* 324(1-2) (2003): 146-151.
- Smith, E., J. D. Farmer, L. Gillemot, and S. Krishnamurthy. "Statistical Theory of the Continuous Double Auction." *Quant. Fin.* 3(6) (2003): 481-514.
- Lillo, F., J. D. Farmer, and R. N. Mantegna. "Master Curve for Price-Impact Function." *Nature* 42 (2003): 129-130.
- Daniels, M. G., J. D. Farmer, L. Gillemot, G. Iori, and D. E. Smith. "Quantitative Model of Price Diffusion and Market Friction Based on Trading as a Mechanistic Random Process." *Phys. Rev. Lett.* 90(10) (2003): 108102-108104.
- Zovko, I., and J. D. Farmer. "The Power of Patience: A Behavioral Regularity in Limit Order Placement." *Quant. Fin.* 2(5) (2002): 387-392.
- Sato, Y., E. Akiyama, and J. D. Farmer. "Chaos in Learning a Simple Two-Person Game." *PNAS USA* 99(7) (2002): 4748-4751.
- Farmer, J. D., and S. Joshi. "The Price Dynamics of Common Trading Strategies." *J. Econ. Behav. & Org.* 49(2) (2002): 149-171.
- Farmer, J. D. "Market Force, Ecology, and Evolution." *Ind. & Corp. Change* 11(5) (2002): 895-953.
- Newman, M., M. Girvan, and J. D. Farmer. "Optimal Design, Robustness, and Risk Aversion." *Phys. Rev. Lett.* 89(2) (2002): 028301.
- Farmer, J. D. "Physicists Attempt to Scale the Ivory Towers of Finance." *Comp. Sci. & Eng. (IEEE)* 1(6) (1999): 26-39.
- Farmer, J. D., and A. W. Lo. "Frontiers of Finance: Evolution and Efficient Markets." *PNAS USA* 96(181) (1999): 9991-9992.
- Theiler, J., B. Galdrikian, A. Longtin, S. Eubank, and J. D. Farmer. "Detecting Nonlinear Structure in Time Series." *Physica D* 58 (1992): 77-94.
- Gibson, J., J. D. Farmer, M. Casdagli, and S. Eubank. "An Analytic Approach to Practical State Space Reconstruction." *Physica D* 57 (1992): 1-30.
- Dressler, U., and J. D. Farmer. "Lyapunov Exponents for Higher Order Derivatives." *Physica D* 59 (1992): 365-377.
- Deissler, R. J., and J. D. Farmer. "Deterministic Noise Amplifiers." *Physica D* 55 (1992): 155-165.
- Casdagli, M., S. Eubank, J. D. Farmer, and J. Gibson. "State Space

- Reconstruction in the Presence of Noise.” *Physica D* 51 (1991): 52-98.
- Farmer, J. D., and J. J. Sidorowich. “Optimal Shadowing and Noise Reduction.” *Physica D* 47 (1991): 373-392.
- Farmer, J. D. “A Rosetta Stone For Connectionism.” *Physica D* 42 (1990): 153-187.
- Bagley, R. J., J. D. Farmer, S. A. Kauffman, N. H. Packard, A. S. Perelson, and I. M. Stadnyk. “Modeling Adaptive Biological Systems.” *Biosystems* 23 (1989): 113-138.
- Ecke, R. E., J. D. Farmer, and D. K. Umberger, “Scaling of the Arnold Tongues.” *Nonlinearity* 2 (1989): 175-196.
- Farmer, J. D., and J. J. Sidorowich. “Predicting Chaotic Time Series.” *Phys. Rev. Lett.* 59(8) (1987): 845-848.
- Keeler, J. D., and J. D. Farmer. “Robust Space-Time Intermittency and 1/f Noise.” *Physica D* 23(1-3) (1986): 413-435.
- Crutchfield, J. P., J. D. Farmer, N. H. Packard, and R. S. Shaw. “Chaos.” *Sci. Am.* 254(12) (1986): 46-57.
- Bagley, R. J., J. D. Farmer, and G. Mayer-Kress. “Mode Locking, the Belousov-Zhabotinsky Reaction, and One-Dimensional Mappings.” *Phys. Lett.* 114A(8) (1986): 419-423.
- Farmer, J. D., S. Kauffman, and N. H. Packard. “Autocatalytic Replication of Polymers.” *Physica D* 22(1-3) (1986): 50-67.
- Farmer, J. D., N. H. Packard, and A. Perelson. “The Immune System, Adaptation, and Machine Learning.” *Physica D* 22(1-3) (1986): 187-204.
- Farmer, J. D., A. S. Lapedes, N. Packard, and B. Wendroff, eds. *Evolution, Games, and Learning: Models for Adaption in Machines and Nature*. Amsterdam: North Holland Physics Publishing, 1986.
- Farmer, J. D., I. I. Satija, and D. K. Umberger. “A Universal Strange Attractor Underlying the Quasiperiodic Transition to Chaos.” *Phys. Lett. A* 114(7) (1986): 341-345.
- Umberger, D. K., and J. D. Farmer. “Fat Fractals on the Energy Surface.” *Phys. Rev. Lett.* 55(7) (1985): 661-664.
- Farmer, J. D. “Sensitive Dependence on Parameters in Nonlinear Dynamics.” *Phys. Rev. Lett.* 55(4) (1985): 351-355.
- Farmer, J. D., and I. I. Satija. “Renormalization of the Quasiperiodic Transition to Chaos for Arbitrary Winding Numbers.” *Phys. Rev. A* 31(5) (1985): 3520-3522.
- Campbell, D., J. Crutchfield, J. D. Farmer, and E. Jen. “Experimental Mathematics: The Role of Computation in Nonlinear Studies.” *Comm. ACM* 28(4) (1985): 374-384.
- Burks, C., and J. D. Farmer. “Towards Modeling DNA Sequences as Automata.” *Physica D* 10(1-2) (1984): 157-167.
- Brandstater, A., J. Swift, H. L. Swinney, A. Wolf, J. D. Farmer, E. Jen, and J. P. Crutchfield. “Low-Dimensional Chaos in a

- Hydrodynamic System.” *Phys. Rev. Lett.* 51(16) (1983): 1442-1445.
- Farmer, J. D., E. Ott, and J. A. Yorke. “The Dimension of Chaotic Attractors.” *Physica D* 7(1-3) (1983): 153-180.
- Crutchfield, J., J. D. Farmer, and B. Huberman. “Fluctuations and Chaotic Dynamics.” *Phys. Reports* 92(2) (1982): 47-82.
- Farmer, J. D. “Information Dimension and the Probabilistic Structure of Chaos.” *Z. Naturforsch* 37A (1982): 1304-1325.
- Farmer, J. D., J. Hart, and P. Weidman. “A Phase Space Analysis of Baroclinic Flow.” *Phys. Lett. A* 91(1) (1982): 22-24.
- Farmer, J. D. “Chaotic Attractors of an Infinite-Dimensional Dynamical System.” *Physica D* 4(3) (1982): 366-393.
- Froehling, H., J. P. Crutchfield, J. D. Farmer, N. H. Packard, and R. Shaw. “On Determining the Dimension of Chaotic Flows.” *Physica D* 3(3) (1981): 605-617.
- Farmer, J. D. “Spectral Broadening of Period-Doubling Bifurcation Sequences.” *Phys. Rev. Lett.* 47(3) (1980): 179-182.
- Farmer, J. D., J. Crutchfield, H. Froehling, N. Packard, and R. Shaw. “Power Spectra and Mixing Properties of Strange Attractors.” *Ann NY Acad. Sci.* 375 (1980): 453-472.
- Packard, N. H., J. P. Crutchfield, J. D. Farmer, and R. S. Shaw. “Geometry from a Time Series.” *Phys. Rev. Lett.* 45(9) (1980): 712-716.
- Crutchfield, J., J. D. Farmer, N. Packard, R. Shaw, G. Jones, and R. Donnelly. “Power Spectral Analysis of a Dynamical System.” *Phys. Lett. A* 76(1) (1980): 1-4.

BOOK CHAPTERS

- Farmer, J. D., L. Gillemot, G. Iori, S. Krishnamurthy, D. E. Smith, and M. G. Daniels. “A Random Order Placement Model of Price Formation in the Continuous Double Auction.” In *The Economy as an Evolving Complex System, III*, eds. L. Blume and S. Durlauf, 133-173. New York: Oxford University Press, 2005.
- Farmer, J. D. “Toward Agent-Based Models for Investment.” In *Developments in Quantitative Investment Models*. AIMR Conference Proceedings, ed. R. Max Darnell. Boston, MA: AIMR, 2001.
- Bagley, R. J., J. D. Farmer, and W. Fontana. “Evolution of a Metabolism.” In *Artificial Life II*, eds. C. Langton, C. Taylor, J. D. Farmer, and S. Rasmussen, 141-158. Santa Fe Institute Studies in the Sciences of Complexity. Redwood City, CA: Addison Wesley, 1991.
- Bagley, R. J., and J. D. Farmer. “Spontaneous Emergence of a Metabolism.” In *Artificial Life II*, eds. C. Langton, C. Taylor, J. D. Farmer, and S. Rasmussen, proc. 93-140. Santa Fe Institute Studies in the Sciences of Complexity. Redwood City, CA: Addison Wesley, 1991.

- Casdagli, M., D. DesJardins, S. Eubank, J. D. Farmer, J. Gibson, N. Hunter, and J. Theiler. "Nonlinear Modeling of Chaotic Time Series: Theory and Applications." In *Applied Chaos*, ed. J. H. Kim and J. Stringer, 335-359. Proceedings from the International Workshop on Applications of Chaos, December 4-7, 1990, San Francisco, CA. Wiley & Sons, 1991.
- Casdagli, M., S. Eubank, J. D. Farmer, and J. Gibson. "State Space Reconstruction in the in Presence of Noise." In *Information Dynamics*, eds. H. Atmanspacher and H. Scheingraber, NATO ASI Series B 256 (1991): 61-96.
- Farmer, J. D., and A. d'A. Belin. "Artificial Life: The Coming Evolution." In *Artificial Life II*, eds. C. Langton, C. Taylor, J. D. Farmer, and S. Rasmussen, 815-840. Santa Fe Institute Studies in the Sciences of Complexity. Redwood City, CA: Addison-Wesley, 1991.
- Eubank, S., M. Casdagli, J. D. Farmer, and J. Gibson. "State Space Forecasting and Noise Reduction." In *Proceedings of the 29th IEEE Conference on Decision and Control*, 641. 1990.
- Eubank, S., and J. D. Farmer. "An Introduction to Chaos and Prediction." In 1989 *Lectures in the Sciences of Complexity*, ed. E. Jen. Santa Fe Institute Studies in the Sciences of Complexity, Lect. Vol. II. Redwood City, CA: Addison-Wesley, 1990.
- Farmer, J. D., and J. J. Sidorowich. "Exploiting Chaos to Predict the Future and Reduce Noise." In *Evolution, Learning and Cognition*, ed. Y. C. Lee, 277-330. Singapore: World Scientific, 1988.
- Farmer, J. D., and J. J. Sidorowich. "Predicting Chaotic Dynamics." In *Dynamic Patterns in Complex Systems*, eds. J. A. S. Kelso, A. J. Mandrell, and M. F. Shlesinger. Singapore: World Scientific, 1988.
- Farmer, J. D., S. Kauffman, N. Packard, and A. Perelson. "Adaptive Dynamic Networks as Models for the Immune System and Autocatalytic Sets." *Perspectives in Biological Dynamics and Theoretical Medicine Ann. NY Acad. Sci.* 504 (1987): 118-131.
- Farmer, J. D. "Scaling Fat Fractals." In *Dimensions and Entropies in Chaotic Systems*, ed. G. Mayer-Kress. Berlin: Springer-Verlag, 1986.
- Farmer, J. D., and N. Packard. "Evolution, Games and Learning: Models for Adaptation in Machines and Nature—Proceedings of the 5th Annual International Conference." *Physica D* 22(1-3) (1986): R7-R12.
- Farmer, J. D. "Sensitive Dependence on Parameters, Fat Fractals, and Universal Strange Attractors." In *Fluctuations and Sensitivity in Non-Equilibrium Systems*, eds. W. Hostemke and D. Kondipudi, 172-180. New York: Springer-Verlag, 1984.
- Farmer, J. D., T. Toffoli, and S. Wolfram, eds. *Cellular Automata, Proceedings of an Interdisciplinary Workshop, Los Alamos, New Mexico 87545, USA, March 7-11, 1983*. Amsterdam: North

Holland Physics Publishing, 1984.

Farmer, J. D., J. L. Hudson, and O. E. Rossler. "Noodle-Map Chaos: A Simple Example." In *Stochastic Phenomena and Chaotic Behavior in Complex Systems*, 30-37. New York: Springer-Verlag, 1983.

Farmer, J. D. "Sensitive Dependence to Noise without Sensitive Dependence to Initial Conditions. Technical Report LA-UR-83-1450, Los Alamos National Laboratory, Los Alamos, NM, 1983.

Campbell, D., J. D. Farmer, and H. Rose. "Order in Chaos: Review of the CNLS Conference on Chaos in Deterministic Systems." *Los Alamos Science* 3 (1982): 66.

Farmer, J. D. "Dimension, Fractal Measures, and Chaotic Dynamics." In *Evolution of Order and Chaos in Physics, Chemistry and Biology*, ed. H. Haken, 228-249. Berlin: Springer-Verlag, 1982.

COMMENTARY AND REVIEWS

Farmer, J. D. Comment on "Large Stock Price Changes: Volume or Liquidity?" by P. Weber and B. Rosenow. <http://arxiv.org/abs/cond-mat/0401132>.

Farmer, J. D., M. Shubik, and E. Smith. "On the Merits of Mathematical Models" – Farmer, Shubik, and Smith reply. *Physics Today* 59(6) (2006): 11-11.

Farmer, J. D. "Cool is Not Enough: There's More to Life than the Second Law of Thermodynamics." Review of *Into the Cool: Energy Flow, Thermodynamics, and Life*, by Eric D. Schneider and Dorion Sagan. *Nature* 436 (2005): 627-628.

Farmer, J. D. "Avoiding Getting Lost in the Wilderness of Bounded Rationality: The Path from Zero Intelligence to No Arbitrage." *Quant. Fin.* 3(4) (2003): C64-C65.

Farmer, J. D. "Looking Forward to the Future." *Quant. Fin.* 3(3) (2003): C30-C30.

Farmer, J. D., and S. Kauffman. "Biological Modeling – Whats Evolving in Artificial Life." *Nature* 331(6155) (1988): 390-391.

Kauffman, S. A., J. D. Farmer, and N. H. Packard. "Autocatalytic Sets of Proteins." *Origins of Life and Evolution of the Biosphere* 16(3-4) (1986): 446-447.

Farmer, J. D. "The Deterministic Random-Walk." *Bull. Amer. Phys. Soc.* 26(3) (1981): 242-242.

WORKING PAPERS

La Spada, Gabriele, J. Dooyne Farmer, and Fabrizio Lillo. "The Non-Trivial Random Walk of Stock Prices. Working Paper #07-12-047, Santa Fe Institute, Santa Fe, NM, 2007. <http://arxiv.org/abs/0711.4596>

Farmer, J. Dooyne and Jessika Trancik. "Dynamics of Technological Development in the Energy Sector. Working Paper #7-12-046, Santa Fe Institute, Santa Fe, NM, 2007.

Zovko, Ilija I., and J. Dooyne Farmer. "Correlations and Clustering in the Trading of Members of the London Stock Exchange." Working

Paper #07-10-039. Santa Fe Institute, Santa Fe, NM, 2007.
<http://arxiv.org/abs/0709.3261>

Cherkashin, Dmitriy, J. Dooyne Farmer, and Seth Lloyd. “A Simple Evolutionary Game with Feedback between Perception and Reality.” Working Paper #07-08-032, Santa Fe Institute, Santa Fe, NM, 2007. <http://arxiv.org/abs/0708.3834>

Bais, F. Alexander, and J. Dooyne Farmer. “The Physics of Information.” Working Paper #07-08-029, Santa Fe Institute, Santa Fe, NM, 2007. <http://arxiv.org/abs/0708.2837>

Farmer, J. D. “Slippage 1996.” Technical Report, Prediction Company, Santa Fe, NM, 1996.
<http://www.santafe.edu/~jdf/papers/slippage.pdf>

CURRENT Ph.D. STUDENTS

Gabriele Laspada, Economics, LUISS Guido Carli University, expected 2010
Javier Vicente-Gonzalez, Physics, University Carlos II, expected 2009
Neda Zamani, Computer Science, University of Sydney, expected 2008
Adlar Kim, Computer Science, MIT, expected 2008
Ilya Zovko, Economics, University of Amsterdam, expected 2008

COMPLETED Ph.D. STUDENTS

Austin Gerig, Physics, University of Illinois (2007)
Laszlo Gillemot, Physics, Budapest University of Technology and Economics (2007)
Dmitri Cherkashin, Mathematics, University of Chicago (2007)
Paolo Patelli, Economics, Sant’Anna School of Advanced Studies, Pisa (2005; one of three advisors)
Richard Bagley, Chemistry, U. C. San Diego (1992)
John Sidorowich, Physics, U. C. Santa Cruz (1991)
David Umberger, Physics, University of Arkansas (1989)

RECENT INVITED LECTURES

(Oct. 2006–Aug.2007)

October 4, 2006, London, meeting at British Petroleum, “A complex systems approach to finance”

October 5, 2006, Budapest, Physics Dept. colloquium at Technical University of Budapest, “Economics and complex systems”.

October 6, 2006, Collegium Budapest colloquium, “Behavioral statistical mechanics: A case study in financial markets”.

October 10, 2006, Milan, “La frontiera tra l’accademia e la pratica in finanza” (meeting of Italian econophysicists and practitioners)

November 8, 2006, New York, invited lecture at NYAS symposium on finance, “Behavioral statistical mechanics of financial markets”

March 5, invited lecture at APS meeting, Denver, “Using statistical methods to understand supply and demand”

March 9, 2007, Albuquerque, University of New Mexico Economics Dept. colloquium, “The statistical mechanics of markets: supply and demand”.

March 21, Miami, Florida, motivational lecture for global retreat for managing directors of Barclays, “Making it happen”.

March 28-29, Chicago, invited lecture at annual conference of Northwestern Institute on Complex Systems, “Explaining supply and demand: Structure vs. strategy”.

April 1-3, Niskayuna, NY, invited lecture at G.E. Whitney Symposium on Sustainability, “Discounting the future”

April 5, Tucson, University of Arizona Applied math colloquium, “The statistical mechanics of markets: supply and demand”

May 4, Santa Fe, SFI Science Board meeting, “Discounting the future”

May 16, London, special event for Barclays clients, “How markets digest fluctuations in supply and demand”

May 21, Florence, invited lecture at SPIE conference, “How markets digest fluctuations in supply and demand”

May 22, Paris, keynote lecture at Global Derivatives (leading quantitative financial practitioner conference), “Behavioral Physics of Financial Markets”

May 23-25, Dublin, conference “Fat tails from finance to fluids”, invited lecture “The central role of fat tails in determining supply and demand”

June 21 – 22, two lectures at SFI complex systems summer school.

July 1-5, Cantania (Sicily), Conference on Complexity, Metastability, and Nonextensivity, invited lecture “The central role of fat tails in determining supply and demand”

July 4-7, Lisbon, Applications of Physics in Finance, invited lecture, “The central role of fat tails in determining supply and demand”

July 5-9, Trento, Italy, Summer School on Agent Based Modeling in Finance, two lectures, “Foundations of the future theory of economics”, parts I and II.

July 11, Genova, public lecture for STATPHYS23 Conference, “Complessita’ e strategie socio-economiche”.

July 12, Genova, invited lecture at STATPHYS23 Conference (the leading international statistical mechanics conference), “Explaining supply and demand: Structure vs. strategy”.

FILMS (16mm)

Crutchfield, J., J. D. Farmer, H. Froehling, N. Packard, and R. Shaw. “A Friendly Introduction to Strange Attractors.” 10min.

Farmer, J. D., J. Crutchfield, N. Packard, and R. Shaw. “Mixing Properties of Chaotic Attractors.” 10min.

VIDEO

“The Sounds of Chaos.” Color, 30-min.

SCREENPLAY

“The Eudaemonic Pie.” With P. Golding (Warner Bros.).

COMMUNITY SERVICE

Forest Guardians, Board of Directors, 1998–2007.
 Board President, 2003–2007.
Monte del Sol High School, Mentor on Global Sustainability, 2004–

2005.
Eli Farmer Fund, New Mexico Community Foundation.