Multiscale Analysis of Complex Time Series: Integration of Chaos and Random Fractal Theory, and Beyond by Jianbo Gao, Yinhe Cao, Wen-wen Tung and Jing Hu Copyright © 2007 John Wiley & Sons. Inc.

## REFERENCES

- 1. Abarbanel, H.D.I. (1996) Analysis of Observed Chaotic Data. Springer.
- 2. Abásolo, D., Hornero, R., Gómez, C., García, M., and López, M. (2005) Analysis of EEG background activity in Alzheimer's disease patients with Lempel-Ziv complexity and central tendency measure. *Med. Eng. Phys.* 28, 315–322.
- 3. Abry, P. and Sellan, F. (1996) The wavelet-based synthesis for fractional Brownian motion Proposed by Sellan, F. and Meyer, Y.: Remarks and fast implementation. *Applied and Comput. Harmonic Analysis* 3, 377–383.
- 4. Abry, P. and Veitch, D. (1998) Wavelet analysis of long-range-dependent traffic. *IEEE Trans. on Info. Theory* **44**, 2–15.
- Addie, R.G., Zukerman, M., and Neame, T. (1995) Fractal traffic: Measurements, modeling and performance evaluation. In *Proc. IEEE InfoCom*, Boston, MA, pp. 985– 992.
- Akselrod, S., Gordon, D., Ubel, F.A., Shannon, D.C., Barger, M.A., and Cohen, R.J. (1981) Power spectrum analysis of heart rate fluctuation: A quantitative probe of beat-to-beat cardiovascular control. *Science* 213, 220–222.
- 7. Albert, R. and Barabasi, A.L. (2002) Statistical mechanics of complex networks. *Rev. Modern Phys.* **74**, 47–97.
- 8. Aleksic, Z. (1991) Estimating the embedding dimension. *Physica D* **52**, 362–368.
- 9. Alizadeh, A.A. et al. (2000) Distinct types of diffuse large B-cell lymphoma identified by gene expression profiling. *Nature* **403**, 503–511.

- 10. Amigó, J.M., Szczepaski, J., Wajnryb, E., and Sanchez-Vives, M.V. (2004) Estimating the entropy rate of spike trains via Lempel-Ziv complexity. *Neural Comput.* **16**, 717–736.
- Andrzejak, R.G., Lehnertz, K., Mormann, F., Rieke, C., David, P., and Elger, C.E. (2001) Indications of nonlinear deterministic and finite-dimensional structures in time series of brain electrical activity: Dependence on recording region and brain state. *Phys. Rev. E* 64, 061907.
- 12. Antoni, M. and Ruffo, S. (1995) Clustering and relaxation in Hamiltonian long-range dynamics. *Phys. Rev. E* **52**, 2361–2374.
- 13. Arimitsu, T. and Arimitsu, N. (2000) Tsallis statistics and fully developed turbulence. *J. Phys. A* 33, L235–L241.
- 14. Aschenbrenner-Scheibe, R., Maiwald, T., Winterhalder, M., Voss, H.U., Timmer, J., and Schulze-Bonhage, A. (2003) How well can epileptic seizures be predicted? An evaluation of a nonlinear method. *Brain* **126**, 2616–2626.
- 15. Ashkenazy, Y., Ivanov, P.C., Havlin, S., Peng, C.K., Goldberger, A.L., and Stanley, H.E. (2001) Magnitude and sign correlations in heartbeat fluctuations. *Phys. Rev. Lett.* **86**, 1900–1903.
- 16. Aurell, E., Boffetta, G., Crisanti, A., Paladin, G., and Vulpiani, A. (1997) Predictability in the large: An extension of the concept of Lyapunov exponent. *J. Physics A* **30**, 1–26.
- 17. Babyloyantz, A. and Destexhe, A. (1988) Is the normal heart a periodic oscillator? *Biol. Cybern.* **58**, 203–211.
- 18. Bachas, C.P. and Huberman, B.A. (1986) Complexity and the relaxation of hierarchical structures. *Phys. Rev. Lett.* **57**, 1965–1969.
- 19. Badii, R. and Politi, A. (1997) Complexity: Hierarchical Structures and Scaling in Physics. Cambridge University Press.
- 20. Badii, R. and Politi, A. (1997) Thermodynamics and complexity of cellular automata. *Phys. Rev. Lett.* **78**, 444–447.
- 21. Bailey, B.A. (1996) Local Lyapunov exponents: Predictability depends on where you are. In *Nonlinear Dynamics and Economics*, edited by Barnett, W.A., Kirman, A.P., and Salmon, M., Cambridge University Press, pp. 345–359.
- Bak, P. (1996) How Nature Works: The Science of Self-Organized Criticality. Copernicus.
- 23. Bak, P., Tang, C., and Wiesenfeld, K. (1987) Self-organized criticality An explanation of 1/f noise. *Phys. Rev. Lett.* **59**, 381–384.
- 24. Bak, P., Tang, C., and Wiesenfeld, K. (1988) Self-organized criticality. *Phys. Rev. B* **38**, 364–374.
- Baker, G.L. and Gollub, J.P. (1996) Chaotic Dynamics: An Introduction. Cambridge University Press.
- 26. Bandt, C. and Pompe, B. (2002) Permutation entropy: A natural complexity measure for time series. *Phys. Rev. Lett.* **88**, 174102.
- 27. Bar-Yam, Y. (1997) Dynamics of Complex Systems. Addison-Wesley.

- 28. Barahona, M. and Poon, C.S. (1996) Detection of nonlinear dynamics in short, noisy time series. *Nature* **381**, 215–217.
- 29. Barbieri, R. and Brown, E.N. (2006) Analysis of heartbeat dynamics by point process adaptive filtering. *IEEE Trans. Biomed. Eng.* **53**, 4–12.
- 30. Barcelo, F. and Jordan, J. (1999) Channel holding time distribution in public cellular telephony. In *Teletraffic Engineering in a Competitive World. Proceedings of the International Teletraffic Congress*, ITC-16, Vol. 3a, edited by Key, P. and Smith, D., Elsevier Science, pp. 107–116.
- 31. Barenblatt, G.I. (2003) Scaling. Cambridge University Press.
- 32. Barenblatt, G.I. and Chorin, A.J. (1998) New perspectives in turbulence: Scaling laws, asymptotics and intermittency. *SIAM Rev.* **40**, 265–291.
- 33. Barnsley, M. (1993) Fractals Everywhere, 2nd ed. Morgan Kaufmann.
- 34. Barnett, W.A. and Serletis, A. (2000) Martingales, nonlinearity and chaos. *J. Econ. Dyn. Control* **24**, 703–724.
- 35. Bartumeus, F., Peters, F., Pueyo, S., Marrase, C., and Catalan, J. (2003) Helical Levy walks: Adjusting searching statistics to resource availability in microzooplankton. *Proc. Natl. Acad. Sci. USA* **100**, 12771–12775.
- 36. Bassingthwaighte, J.B., Liebovitch, L.S., and West, B.J. (1994) *Fractal Physiology*. Oxford University Press.
- 37. Beck, C. (2000) Application of generalized thermostatistics to fully developed turbulence. *Physica A* **277**, 115–123.
- 38. Beck, C., Lewis, G.S., and Swinney, H.L. (2001) Measuring nonextensitivity parameters in a turbulent Couette-Taylor flow. *Phys. Rev. E* **63**, 035303.
- 39. Bennett, C.H. (1986) On the nature and origin of complexity in discrete, homogeneous, locally-interacting systems. *Found. Phys.* **16**, 585–592.
- 40. Bennett, C.H. (1990) How to define complexity in physics, and why? In *Complexity, Entropy and the Physics of Information*, edited by Zurek, W.H. Addison-Wesley, pp. 137–148.
- 41. Bennett, J.C.R., Partridge, C., and Shectman, N. (1999) Packet reordering is not pathological network behavior. *IEEE-ACM Trans. on Networking* **7**, 789–798.
- 42. Benzi, R., Ciliberto, S., Baudet, C., and Chavarria, G.R. (1995) On the scaling of 3-dimensional homogeneous and isotropic turbulence. *Physica D* **80**, 385–398.
- 43. Benzi, R., Ciliberto, S., Tripiccione, R., Baudet, C., Massaioli, F., and Succi, S. (1993) Extended self-similarity in turbulent flows. *Phys. Rev. E* **48**, R29–R32.
- 44. Beran, J., Sherman, R., Taqqu, M.S., and Willinger, W. (1995) Long-range dependence in variable-bit-rate video traffic. *IEEE Trans. on Commun.* **43**, 1566–1579.
- 45. Berge, P., Pomeau, Y., and Vidal, C. (1984) Order within Chaos: Towards a Deterministic Approach to Turbulence. Hermann.
- 46. Bernamont, J. (1937) Fluctuations de potentiel aux bornes d'un conducteur metallique de faible volume parcouru par un courant. *Ann. Phys.* (Leipzig) 7, 71–140.
- 47. Berry, E.X. (1967) Cloud droplet growth by collection. J. Atmos. Sci. 24, 688–701.

- 48. Berry, M.V. and Lewis, Z.V. (1980) On the Weierstrass-Mandelbrot fractal function. *Proc. R. Soc. Lond. A* **370**, 459–484.
- Bigger, J.T., Jr., Steinman, R.C., Rolnitzky, L.M., Fleiss, J.L., Albrecht, P., and Cohen, R,J. (1996) Power law behavior of RR-interval variability in healthy middle-aged persons, patients with recent acute myocardial infarction, and patients with heart transplants. *Circulation* 93, 2142–2151.
- 50. Billock, V.A. (2000) Neural acclimation to 1/f spatial frequency spectra in natural images transduced by the human visual system. *Physica D* **137**, 379–391.
- 51. Billock, V.A., de Guzman, G.C., and Kelso, J.A.S. (2001) Fractal time and 1/f spectra in dynamic images and human vision. *Physica D* **148**, 136–146.
- 52. Bloomfield, P. (1976) Fourier analysis of time series: An introduction. In *Fourier Analysis of Time Series: An Introduction*. Wiley Series in Probability and Mathematical Statistics, edited by Bradley, A.B., Hunter, J.S., Kendall, D.G., and Watson, S.G. Wiley, pp. 1–258.
- 53. Boffetta, G., Cencini, M., Falcioni, M., and Vulpiani, A. (2002) Predictability: A way to characterize complexity. *Phys. Rep.* **356**, 367–474.
- 54. Bolotin, V.A., Levy, Y., and Liu, D. (1999) Characterizing data connection and messages by mixtures of distributions on logarithmic scale. In *Teletraffic Engineering in a Competitive World. Proceedings of the International Teletraffic Congress*, ITC-16, Vol. 3a, edited by Key, P. and Smith, D., Elsevier Science, pp. 887–894.
- 55. Borgas, M.S. (1992) A comparison of intermittency models in turbulence. *Phys. of Fluids* **4**, 2055–2061.
- 56. Borges, E.P., Tsallis, C., Ananos, G.F.J., and de Oliveira, P.M.C. (2002) Nonequilibrium probabilistic dynamics of the Logistic map at the edge of chaos. *Phys. Rev. Lett.* **89**, 254103.
- 57. Brock, W.A., Dechert, W.D., Scheinkman, J.A., and LeBaron, B. (1996) A test for independence based on the correlation dimension. *Econ. Rev.* **15**, 197–235.
- 58. Brock, W.A. and Hommes, C.H. (1998) Heterogeneous beliefs and routes to chaos in a simple asset pricing model. *J. Econ. Dyn. Control* **22**, 1235–1274.
- 59. Brock, W.A. and Sayers, C.L. (1988) Is the business cycle characterized by deterministic chaos? *J. Monetary Econ.* 22, 71–90.
- 60. Butz, A.R. (1972) A theory of 1/f noise. J. Stat. Phys. 4, 199-216.
- 61. Cao, Y.H., Tung, W.W., Gao, J.B., Protopopescu, V.A., and Hively, L.M. (2004) Detecting dynamical changes in time series using the permutation entropy. *Phys. Rev. E* **70**, 046217.
- 62. Carlson, J.M. and Doyle, J. (1999) Highly optimized tolerance: A mechanism for power laws in designed systems. *Phys. Rev. E* **60**, 1412–1427.
- 63. Casilari, E., Reyes, A., Diaz-Estrella, A., and Sandoval, F. (1999) Classification and comparison of modelling strategies for VBR video traffic. In *Teletraffic Engineering in a Competitive World. Proceedings of the International Teletraffic Congress*, ITC-16, Vol. 3b, edited by Key, P. and Smith, D., Elsevier Science, pp. 817–826.

- Cencini, M., Falcioni, M., Olbrich, E., Kantz, H., and Vulpiani, A. (2000) Chaos or noise: Difficulties of a distinction. *Phys. Rev. E* 62, 427–437.
- 65. Cenys, A. and Pyragas, K. (1988) Estimation of the number of degrees of freedom from chaotic time-series. *Phys. Lett. A* **129**, 227–230.
- 66. Chaitin, G.J. (1966) On length of programs for computing finite binary sequences. *J. Assoc. Comp. Mach.* **13**, 547–569.
- 67. Chaitin, G.J. (1987) Information, Randomness and Incompleteness, World Scientific.
- 68. Chambers, J.M., Mallows, C.L., and Stuck, B.W. (1976) Method for simulating stable random variables. *J. Am. Statistical Assn.* **71**, 340–344.
- 69. Chan, H.C. (1990) Radar sea-clutter at low grazing angles. *Proc. Inst. Elect. Eng.* F137, 102–112.
- 70. Chapin, J.K., Moxon, K.A., Markowitz, R.S., and Nicolelis, M.A.L. (1999) Real-time control of a robot arm using simultaneously recorded neurons in the motor cortex. *Nature Neurosci.* **2**, 664–670.
- 71. Chen, Y., Ding, M., and Kelso, J.A.S. (1997) Long memory processes (1/f alpha type) in human coordination. *Phys. Rev. Lett.* **79**, 4501–4504.
- 72. Chen, Z., Hu, K., Carpena, P., Bernaola-Galvan, P., Stanley, H.E., and Ivanov, P.C. (2005) Effect of nonlinear filters on detrended fluctuation analysis. *Phys. Rev. E* 71, 011104.
- 73. Chen, Z., Ivanov, P.C., Hu, K., and Stanley, H.E. (2002) Effect of nonstationarities on detrended fluctuation analysis. *Phys. Rev. E* **65**, 041107.
- 74. Chern, J.L., Ko, J.Y., Lih, J.S., Su, H.T., and Hsu, R.R. (1998) Recognizing hidden frequencies in a chaotic time series. *Phys. Lett. A* **238**, 134–140.
- 75. Chorin, A.J. (1993) Vorticity and Turbulence, Springer-Verlag.
- 76. Chorin, A.J. and Hald, O.H. (2006) *Stochastic Tools in Mathematics and Science*, Springer-Verlag.
- 77. Chorin, A.J., Hald, O.H., and Kupferman, R. (2002) Optimal prediction with memory. *Physica D* **166**, 239–257.
- 78. Chu, S., DeRisi, J., Eisen, M., Mulholland, J., Botstein, D., Brown, P.O., and Herskowitz, I. (1998) The transcriptional program of sporulation in budding yeast. *Science* **282**, 699–705.
- 79. Chung, F., Lu, L.Y., and Vu, V. (2003) The spectra of random graphs with given expected degrees. *Proc. Natl. Acad. Sci. USA* **100**, 6313–6318.
- 80. Cohen, A. and Procaccia, I. (1985) Computing the Kolmogorov entropy from time series of dissipative and conservative dynamical systems, *Phys. Rev. A* 31, 1872–1882.
- 81. Collins, J.J. and DeLuca, C.J. (1994) Random walking during quiet standing. *Phys. Rev. Lett.* **73**, 764–767.
- 82. Collins, P.G., Fuhrer, M.S., and Zettl, A. (2000) 1/f noise in carbon nanotubes. *Appl. Phys. Lett.* **76**, 894–896.
- 83. Costa, M., Goldberger, A.L., and Peng, C.K. (2002) Multiscale entropy analysis of complex physiologic time series. *Phys. Rev. Lett.* **89**, 068102.

- 84. Costa, M., Goldberger, A.L., and Peng, C.K. (2005) Multiscale entropy analysis of biological signals. *Phys. Rev. E* 71, 021906.
- 85. Costa, U.M.S., Lyra, M.L., Plastino, A.R., and Tsallis, C. (1997) Power-law sensitivity to initial conditions within a logisticlike family of maps: Fractality and nonextensivity. *Phys. Rev. E* **56**, 245–250.
- 86. Cover, T.M. and Thomas, J.A. (1991) Elements of Information Theory. Wiley.
- 87. Cox, D.R. (1984) Long-range dependence: A review. In *Statistics: An Appraisal*, edited by David, H.A. and Davis, H.T. The Iowa State University Press, pp. 55–74.
- 88. Crick, F. and Koch, C. (2003) A framework for consciousness. *Nature Neurosci.* 6, 119–126.
- 89. Crovella, M.E. and Bestavros, A. (1997) Self-similarity in World Wide Web traffic: Evidence and possible causes. *IEEE/ACM Trans. on Networking* 5, 835–846.
- 90. Crutchfield, J.P. (1994) The Calcuci of emergence computation, dynamics and induction. *Physica D* **75**, 11–54.
- 91. Crutchfield, J.P. and McNamara, B.S. (1987) Equations of motion from a data series. *Complex Systems*, 1, 417–452.
- 92. Crutchfield, J.P. and Packard, N.H. (1982) Symbolic dynamics of one-dimensional maps entropies, finite precision, and noise. *J. Theo. Phys.* **21**, 433–466.
- 93. Crutchfield, J.P. and Packard, N.H. (1983) Symbolic dynamics of noisy chaos. *Physica* D 7, 201–223.
- 94. Crutchfield, J.P. and Shalizi, C.R. (1999) Thermodynamic depth of causal states: Objective complexity via minimal representations. *Phys. Rev. E* **59**, 275–283.
- 95. Crutchfield, J.P. and Young, K. (1989) Inferring statistical complexity. *Phys. Rev. Lett.* **63**, 105–108.
- 96. Csordas, A. and Szepfalusy, P. (1989) Singularities in Renyi information as phase transitions in chaotic states. *Phys. Rev. A* **39**, 4767–4777.
- 97. Dacorogna, M.M., Gencay, R., Muller, U., Olsen, R.B., and Pictet, O.V. (2001) *An Introduction to High-Frequency Finance*. Academic Press.
- 98. Dalton, F. and Corcoran, D. (2001) Self-organized criticality in a sheared granular stick-slip system. *Phys. Rev. E* **63**, 061312.
- 99. daSilva, F.H.L., Pijn, J.P., Velis, D., and Nijssen, P.C.G. (1997) Alpha rhythms: Noise, dynamics and models. *Int. J. Psychophysiol.* **26**, 237–249.
- 100. Davis, A., Marshak, A., Wiscombe, W., and Cahalan, R. (1994) Multifractal characterizations of nonstationarity and intermittency in geophysical fields observed, retrieved, or simulated. *J. Geophys. Res.* **99**, 8055–8072.
- 101. Davis, A., Marshak, A., Wiscombe, W., and Cahalan, R. (1996) Multifractal characterizations of intermittency in nonstationary geophysical signals and fields. In *Current Trends in Nonstationary Analysis*, edited by Trevilo, G., Hardin, J., Douglas, B., and Andreas, E. World Scientific, pp. 97–158.
- 102. Delgado, J. and Sole, R.V. (1997) Collective-induced computation. *Phys. Rev. E* 55, 2338–2344.

- 103. DeLong, M.R. (1971) Activity of pallidal neurons during movement. *J. Neurophysiol.* **34**, 414–427.
- 104. Dettmann, C.P. and Cohen, E.G.D. (2000) Microscopic chaos and diffusion. *J. Stat. Phys.* **101**, 775–817.
- 105. Dettmann, C.P. and Cohen, E.G.D. (2001) Note on chaos and diffusion. *J. Stat. Phys.* **103**, 589–599.
- 106. Devaney, R. (2003) Introduction to Chaotic Dynamical Systems, 2nd ed. Westview.
- 107. Ding, M.Z., Grebogi, C., Ott, E., Sauer, T., and Yorke, J.A. (1993) Estimating correlation dimension from a chaotic time series: When does plateau onset occur? *Physica D* **69**, 404–424.
- 108. Ding, M.Z., Grebogi, C., Ott, E., Sauer, T., and Yorke, J.A. (1993) Plateau onset for correlation dimension: when does it occur? *Phys. Rev. Lett.* **70**, 3872–3875.
- 109. Ding, M.Z. and Yang, W.M. (1995) Distribution of the first return time in fractional brownian motion and its application to the study of on-off intermittency. *Phys. Rev.* E **52**, 207–213.
- 110. Dorogovtsev, S.N., Goltsev, A.V., Mendes, J.F.F., et al. (2003) Spectra of complex networks. *Phys. Rev. E* **68**, 046109.
- 111. Doyle, J. and Carlson, J.M. (2000) Power laws, highly optimized tolerance, and generalized source coding. *Phys. Rev. Lett.* **84**, 5656–5659.
- 112. Drozdz, S., Kwapien, J., Grummer, F., Ruf, F., and Speth, J. (2003) Are the contemporary financial fluctuations sooner converging to normal? *Acta Phys. Pol. B* **34**, 4293–4306.
- 113. Dubrulle, B. (1994) Intermittency in fully-developed turbulence log-poisson statistics and generalized scale covariance. *Phys. Rev. Lett.* **73**, 959–962.
- 114. Duda, R.O., Hart, P.E., and Stork, D.G. (2001) Pattern Classification, 2nd ed. Wiley.
- 115. Eckmann, J.P., Kamphorst, S.O., and Ruelle, D. (1987) Recurrence plots of dynamic systems. *Europhys. Lett.* **4**, 973–977.
- 116. Eckmann, J.P. and Ruelle, D. (1985) Ergodic theory of chaos and strange attractors. *Rev. Modern Phys.* **57**, 617–656.
- 117. Edelman, G.M. and Tononi, G. (2000) A Universe of Consciousness. Basic Books.
- 118. Elliott, F.W., Jr., Majda, A.J., Horntrop, D.J., and McLaughlin, R.M. (1995) Hierarchical Monte Carlo methods for fractal random fields. *J. Stat. Phys.* **81**, 717–736.
- 119. Erramilli, A., Narayan, O., and Willinger, W. (1996) Experimental queueing analysis with long-range dependent packet traffic. *IEEE/ACM Trans. on Networking* **4**, 209–223.
- 120. Erramilli, A., Singh, P.R., and Pruthi, P. (1995) An application of deterministic chaotic maps to model packet traffic. *Queueing Systems* **20**, 171–206.
- 121. Evans, W. and Pippenger, N. (1998) On the maximum tolerable noise for reliable computation by formulas. *IEEE Tran. Inform. Theory* **44**, 1299–1305.
- 122. Evans, W. and Schulman, L.J. (1999) Signal propagation and noisy circuits. *IEEE Tran. Inform. Theory* **45**, 2367–2373.

- 123. Ewing, D.J. (1984) Cardiac autonomic neuropathy. In *Diabetes and Heart Disease*, edited by Jarrett, R.J. Elsevier, pp. 122–132.
- 124. Falconer, K.J. (1990) Fractal Geometry: Mathematical Foundations and Applications. Wiley.
- 125. Faloutsos, M., Faloutsos, P., and Faloutsos, C (1999) On power-law relationships of the Internet topology. *SIGCOMM'99*, 251–262.
- 126. Farkas, I.J., Derenyi, I., Barabasi, A.L., et al. (2001) Spectra of "real-world" graphs: Beyond the semicircle law. *Phys. Rev. E* **64**, 026704.
- 127. Farrell, T.G., Bashir, Y., Cripps, T., Malik, M., Poloniecki, J., Bennett, E.D., Ward, D.E., and Camm, A.J. (1991) Risk stratification for arrhythmic events in postinfarction patients based on heart rate variability, ambulatory electrocardiographic variables and the signal-averaged electrocardiogram. *J. Am. Coll. Cardiol.* 18, 687–697.
- 128. Fay, F.A., Clarke, J., and Peters, R.S. (1977) Weibull distribution applied to sea clutter. *Proc. IEE Conf. Radar*'77, London, pp. 101–103.
- 129. Feder, H.J.S. and Feder, J. (1991) Self-organized criticality in a stick-slip process. *Phys. Rev. Lett.* **66**, 2669–2672; erratum in *Phys. Rev. Lett.* **67**, 283.
- 130. Feder, J. (1988) Fractals. Plenum Press.
- 131. Feigenbaum, M.J. (1983) Universal behavior in nonlinear systems. *Physica D* 7, 16–39.
- 132. Feldman, D.P. and Crutchfield, J.P. (1998) Measures of statistical complexity: Why? *Phys. Lett. A* **238**, 244–252.
- 133. Feldman, D.P. and Crutchfield, J.P. (2003) Structural information in two-dimensional patterns: Entropy convergence and excess entropy. *Phys. Rev. E* **67**, 051104.
- 134. Feldmann, A., Gilbert, A.C., and Willinger, W. (1998) Data networks as cascades: Investigating the multifractal nature of Internet WAN traffic. *ACM SIGCOMM'98 Conference*, Vancouver, Canada.
- 135. Fell, J., Roschke, J., and Schaffner, C. (1996) Surrogate data analysis of sleep electroencephalograms reveals evidence for nonlinearity. *Biol. Cybern.* **75**, 85–92.
- 136. Feller, W. (1971) Probability Theory and Its Applications, 2nd ed. Vols I and II. Wiley.
- 137. Fleisher, L.A., Pincus, S.M., and Rosenbaum, S.H. (1993) Approximate entropy of heart rate as a correlate of postoperative ventricular dysfunction. *Anesthesiology* **78**, 683–692.
- 138. Fortrat, J.O., Yamamoto, Y., and Hughson, R.L. (1997) Respiratory influences on non-linear dynamics of heart rate variability in humans. *Biol. Cybern.* 77, 1–10.
- 139. Franceschetti, G., Iodice, A., Migliaccio, M., and Riccio, D. (1999) Scattering from natural rough surfaces modeled by fractional Brownian motion two-dimensional processes. *IEEE Trans Antennas Propagation* 47, 1405–1415.
- 140. Fraser, A.M. and Swinney, H.L. (1986) Independent coordinates for strange attractors from mutual information. *Phys. Rev. A* 33, 1134–1140.
- 141. Frederiksen, R.D., Dahm, W.J.A., and Dowling, D.R. (1997) Experimental assessment of fractal scale similarity in turbulent flows Multifractal scaling. *J. Fluid Mech.* 338, 127–155.

- 142. Freund, J., Ebeling, W., and Rateitschak, K. (1996) Self-similar sequences and universal scaling of dynamical entropies. *Phys. Rev. E* **54**, 5561–5566.
- 143. Frisch, U. (1995) *Turbulence—The Legacy of A.N. Kolmogorov*. Cambridge University Press.
- 144. Fritz, H., Said, S., and Weimerskirch, H. (2003) Scale-dependent hierarchical adjustments of movement patterns in a long-range foraging seabird. *Proc. R. Soc. Lond. Ser. B Biol. Sci.* **270**, 1143–1148.
- 145. Gao, J.B. (1997) Recognizing randomness in a time series. *Physica D* **106**, 49–56.
- 146. Gao, J.B. (1999) Recurrence time statistics for chaotic systems and their applications. *Phys. Rev. Lett.* **83**, 3178–3181.
- 147. Gao, J.B. (2000) On the structures and quantification of recurrence plots. *Phys. Lett.* A 270, 75–87.
- 148. Gao, J.B. (2000) Multiplicative multifractal modeling of long-range-dependent (LRD) traffic in computer communications networks. Ph.D dissertation, EE Dept, UCLA.
- 149. Gao, J.B. (2001) Detecting nonstationarity and state transitions in a time series. *Phys. Rev. E* **63**, 066202.
- 150. Gao, J.B. (2004) Analysis of amplitude and frequency variations of essential and parkinsonian tremors. *Med. Biol. Eng. Comput.* **52**, 345–349.
- 151. Gao, J.B., Billock, V.A., Merk, I., Tung, W.W., White, K.D., Harris, J.G., and Roychowdhury, V.P. (2006) Inertia and memory in ambiguous visual perception. *Cogn. Process* 7, 105–112.
- 152. Gao, J.B., Cao, Y.H., Gu, L.Y., Harris, J.G., and Principe, J.C. (2003) Detection of weak transitions in signal dynamics using recurrence time statistics. *Phys. Lett. A* **317**, 64–72.
- 153. Gao, J.B., Cao, Y.H., and Lee, J.M. (2003) Principal component analysis of 1/f noise. *Phys. Lett. A* **314**, 392–400.
- 154. Gao, J.B., Cao, Y.H., Qi, Y., and Hu, J. (2005) Building innovative representations of DNA sequences to facilitate gene finding. *IEEE Intelligent Systems Nov/Dec*, special issue on Data Mining for Bioinformatics, 34–39.
- 155. Gao, J.B., Chen, C.C., Hwang, S.K, and Liu, J.M. (1999) Noise-induced chaos. *Int. J. Mod. Phys. B* **13**, 3283–3305.
- 156. Gao, J.B., Hu, J., Tung, W.W., and Cao, Y.H. (2006) Distinguishing chaos from noise by scale-dependent Lyapunov exponent. *Phys. Rev. E* **74**, 066204.
- 157. Gao, J.B., Hu, J., Tung, W.W., Cao, Y.H., Sarshar, N., and Roychowdhury, V.P. (2006) Assessment of long range correlation in time series: How to avoid pitfalls. *Phys. Rev. E* **73**, 016117.
- 158. Gao, J.B., Hwang, S.K, and Liu, J.M. (1999) When can noise induce chaos? *Phys. Rev. Lett.* **82**, 1132–1135.
- 159. Gao, J.B., Qi, Y., Cao, Y.H., and Tung, W.W. (2005) Protein coding sequence identification by simultaneously characterizing the periodic and random features of DNA sequences. *J. Biomed. Biotechnol.* **2**, 139–146.

- 160. Gao, J.B., Qi, Y., Cao, Y.H., Tung, W.W., and Roychowdhury, V.P. Deriving a novel codon index by combining period-3 and fractal features of DNA sequences, *Proc. Natl. Acad. Sci. USA*. In press.
- 161. Gao, J.B., Qi, Y., and Fortes, J.A.B. (2005) Bifurcations and fundamental error bounds for fault-tolerant computations. *IEEE Tran. Nanotech.* **4**, 395–402.
- 162. Gao, J.B. and Royshowdhury, V.P. (2000) Multifractal gene finder. Technical report, Electrical Engineering Department, UCLA.
- 163. Gao, J.B. and Rao, N.S.V. (2005) Complicated dynamics of Internet transport protocols. *IEEE Commun. Lett.* **9**, 4–6.
- 164. Gao, J.B., Rao, N.S.V., Hu, J., and Ai, J. (2005) Quasi-periodic route to chaos in the dynamics of Internet transport protocols. *Phys. Rev. Lett.* **94**, 198702.
- 165. Gao, J.B. and Rubin, I. (1999) Multiplicative multifractal modeling of long-range-dependent traffic. *Proceedings ICC'99*, Vancouver, Canada.
- 166. Gao, J.B. and Rubin, I. (1999) Multifractal modeling of counting processes of long-range-dependent network traffic. *Proceedings SCS Advanced Simulation Technologies Conference*, San Diego, CA.
- 167. Gao, J.B. and Rubin, I. (2000) Superposition of multiplicative multifractal traffic streams. *Proceedings ICC* '2000, New Orleans.
- 168. Gao, J.B. and Rubin, I. (2000) Statistical properties of multiplicative multifractal processes in modeling telecommunications traffic streams. *Electronics Lett.* **36**, 101–102.
- 169. Gao, J.B. and Rubin, I. (2000) Multifractal analysis and modeling of VBR video traffic. *Electronics Lett.* **36**, 278–279.
- 170. Gao, J.B. and Rubin, I. (2000) Superposition of multiplicative multifractal traffic processes. *Electronics Lett.* **36**, 761–762.
- 171. Gao, J.B. and Rubin, I. (2000) Multiplicative multifractal modeling of long-range-dependent (LRD) traffic in computer communications networks. World Congress of Nonlinear Analysts, July, Catonia, Sicily, Italy. Also J. Nonlinear Analysis 47, 5765–5774 (2001).
- 172. Gao, J.B. and Rubin, I. (2001) Multifractal modeling of counting processes of long-range-dependent network traffic. *Comput. Commun.* **24**, 1400–1410.
- 173. Gao, J.B. and Rubin, I. (2001) Multiplicative multifractal modeling of long-range-dependent network traffic. *Int. J. Commun. Systems* **14**, 783–801.
- 174. Gao, J.B. and Rubin, I. (2001) Long-range-dependence properties and multifractal modeling of vBNS traffic. *Applied Telecommunications Symposium (ATS'01)*, Seattle, Washington, April.
- 175. Gao, J.B. and Tung, W.W. (2002) Pathological tremors as diffusional processes. *Biol. Cybern.* **86**, 263–270.
- 176. Gao, J.B., Tung, W.W., Cao, Y.H., Hu, J., and Qi, Y. (2005) Power-law sensitivity to initial conditions in a time series with applications to epileptic seizure detection. *Physica A* **353**, 613–624.

- 177. Gao, J.B., Tung, W.W., and Rao, N.S.V. (2002) Noise-induced Hopf-bifurcation-type sequence and transition to chaos in the Lorenz equations. *Phys. Rev. Lett.* **89**, 254101.
- 178. Gao, J.B. and Zheng, Z.M. (1993) Local exponential divergence plot and optimal embedding of a chaotic time series. *Phys. Lett. A* **181**, 153–158.
- 179. Gao, J.B. and Zheng, Z.M. (1994) Direct dynamical test for deterministic chaos and optimal embedding of a chaotic time series. *Phys. Rev. E* **49**, 3807–3814.
- 180. Gao, J.B. and Zheng, Z.M. (1994) Direct dynamical test for deterministic chaos. *Europhys. Lett.* **25**, 485–490.
- 181. Garfinkel, A., Spano, M.L., Ditto, W.L., and Weiss, J.N. (1992) Controlling cardiac chaos. *Science* 257, 1230–1235.
- 182. Gaspard, P., Briggs, M.E., Francis, M.K., Sengers, J.V., Gammons, R.W., Dorfman, J.R., and Calabrese, R.V. (1998) Experimental evidence for microscopic chaos. *Nature* **394**, 865–868.
- 183. Gaspard, P. and Wang, X.J. (1993) Noise, chaos, and  $(\epsilon, \tau)$ -entropy per unit time. *Phys. Rep.* **235**, 291–343.
- 184. Geisel, T., Nierwetberg, J., and Zacherl, A. (1985) Accelerated diffusion in Josephson junctions and related chaotic systems. *Phys. Rev. Lett.* **54**, 616–620.
- 185. Gell-Mann, M. and Lloyd, S. (1996) Information measures, effective complexity, and total information. *Complexity* **2**, 44–52.
- 186. Georgopoulos, A.P., Schwartz, A.B., and Kettner, R.E. (1986) Neuronal population coding of movement direction. *Science* **233**, 1416–1419.
- 187. Gilbert, A.C., Willinger, W., and Feldmann, A. (1999) Scaling analysis of conservative cascades, with applications to network traffic. *IEEE Tran. Info. Theory* **45**, 971–991.
- 188. Gilden, D.L., Thornton, T., and Mallon, M.W. (1995) 1/f noise in human cognition. *Science* **267**, 1837–1839.
- 189. Gini, F. (2000) Performance analysis of two structured covariance matrix estimators in compound-Gaussian clutter. *Signal Processing* **80**, 365–371.
- 190. Gini, F., Montanari, M., and Verrazzani, L. (2000) Maximum likelihood, ESPRIT, and periodogram frequency estimation of radar signals in K-distributed clutter. *Signal Processing* **80**, 1115–1126.
- 191. Gkantsidis, C., Mihail, M., and Zegura, E. (2003) Spectral analysis of Internet topologies. *INFOCOM'03*.
- 192. Gleick, J. (1987) Chaos. Penguin Books.
- 193. Goh, K.I., Kahng, B., and Kim, D. (2001) Spectra and eigenvectors of scale-free networks. *Phys. Rev. E* **64**, 051903.
- 194. Goldberger, A.L., Rigney, D.R., Mietus, J., Antman, E.M., and Greenwald, S. (1988) Nonlinear dynamics in sudden cardiac death syndrome: Heart rate oscillations and bifurcations. *Experientia* **44**, 983–987.
- 195. Goldberger, A.L. and West, B.J. (1987) Applications of nonlinear dynamics to clinical cardiology. *Ann. NY Acad. Sci.* **504**, 155–212.

- 196. Golub, T.R., Slonim, D.K., Tamayo, P., Huard, C., Gaasenbeek, M., Mesirov, J.P., Coller, H., Loh, M.L., Downing, J.R., Caligiuri, M.A., Bloomfield, C.D., and Lander, E.S. (1999) Molecular classification of cancer: Class discovery and class prediction by gene expression monitoring. *Science* 286, 531–537.
- 197. Gottwald, G.A. and Melbourne, I. (2004) A new test for chaos in deterministic systems. *Proc. R. Soc. Lond. Ser. A* **46**, 603–611.
- 198. Gouyet, J.F. (1995) Physics and Fractal Structures. Springer.
- 199. Granger, C.W.J. (1980) Long memory relationships and the aggregation of dynamic models. *J. Econ.* **14.** 227–238.
- 200. Granger, C.W.J. (1991) Developments in the nonlinear analysis of economic series. *Scand. J. Econ.* **93**, 263–276.
- 201. Granger, C.W.J. (1994) Is chaotic economic theory relevant for economics? A review article of Jess Benhabib: Cycles and chaos in economic equilibrium. *J. Int. Comp. Econ.* **3**, 139–145.
- Grassberger, P. (1986) Toward a quantitative theory of self-generated complexity. *Int. J. Theo. Phys.* 25, 907–938.
- 203. Grassberger, P. and Procaccia, I. (1983) Characterization of strange attractors. *Phys. Rev. Lett.* **50**, 346–349.
- 204. Grassberger, P. and Procaccia, I. (1983) Estimation of the Kolmogorov entropy from a chaotic signal. *Phys. Rev. A* **28**, 2591–2593.
- 205. Grimmett, G. and Stirzaker, D. (2001) *Probability and Random Processes*, 3rd ed. Oxford University Press.
- 206. Guckenheimer, J. and Holmes, P. (1990) Nonlinear Oscillations, Dynamical Systems, and Bifurcations of Vector Fields. Springer-Verlag.
- 207. Guerin, C.A. and Saillard, M. (2001) Electromagnetic scattering on fractional Brownian surfaces and estimation of the Hurst exponent. *Inverse Problems* 17, 365–386.
- 208. Gusev, V.D., Nemytikova, L.A., and Chuzhanova, N.A. (1999) On the complexity measures of genetic sequences. *Bioinformatics* **15**, 994–999.
- 209. Haken, H. (1983) At least one Lyapunov exponent vanishes if the trajectory of an attractor does not contain a fixed point. *Phys. Lett. A* **94**, 71–72.
- 210. Hammer, P.W., Platt, N., Hammel, S.M., Heagy, J.F., et al. (1994) Experimental observation of on-off intermittency. *Phys. Rev. Lett.* **73**, 1095–1098.
- 211. Han, J., Gao, J.B., Qi, Y., Jonker, P., and Fortes, J.A.S. (2005) Towards hardware-redundant fault-tolerant logic for nanoelectronics. *IEEE Design and Test of Computers* (special issue), 328–339.
- 212. Hanson, J.E. and Crutchfield, J.P. (1997) Computational mechanics of cellular automata: An example. *Physica D* **103**, 169–189.
- 213. Haykin, S. (2001) Adaptive Filter Theory, 4th ed. Prentice Hall.
- 214. Haykin, S., Bakker, R., and Currie, B.W. (2002) Uncovering nonlinear dynamics—the case study of sea clutter. *Proc. IEEE* **90**, 860–881.

- 215. Heagy, J.F., Platt, N., and Hammel, S.M. (1994) Characterization of on-off intermittency. *Phys. Rev. E* 49, 1140–1150.
- 216. Heath, D, Resnick, S., and Samorodnitsky, G. (1998) Heavy tails and long range dependence in ON/OFF processes and associated fluid models. *Math. Operations Res.* 23, 145–165.
- 217. Helander P., Chapman S.C., Dendy R.O., Rowlands, G., and Watkins, N.W. (1999) Exactly solvable sandpile with fractal avalanching. *Phys. Rev. E* **59**, 6356–6360.
- 218. Henon, M. (1976) Two-dimensional mapping with a strange attractor. *Commun. Math. Phys.* **50**, 69–77.
- 219. Hentschel, H.G.E. and Procaccia, I. (1983) The infinite number of generalized diensions of fractals and strange attractors. *Physica D* **8**, 435–444.
- 220. Hively, L.M., Gailey, P.C., and Protopopescu, V.A. (1999) Detecting dynamical change in nonlinear time series. *Phys. Lett. A* **258**, 103–114.
- 221. Ho, K.K.L., Moody, G.B., Peng, C.K., Mietus, J.E., Larson, M.G., Levy, D., and Goldberger, A.L. (1997) Predicting survival in heart failure cases and controls using fully automated methods for deriving nonlinear and conventional indices of heart rate dynamics. *Circulation* **96**, 842–848.
- 222. Hommes, C.H. and Manzan, S. (2006) Testing for nonlinear structure and chaos in economic time series: A comment. *J. Macroecon.* **28**, 169–174.
- 223. Hon, E.H. and Lee, S.T. (1965) Electronic evaluations of the fetal heart rate patterns preceding fetal death: Further observations. *Am. J. Obstet. Gynecol.* **87**, 814–826.
- 224. Houghton, H.G. (1985) Physical Meteorology. MIT Press, pp. 272.
- 225. Hu, J., Gao, J.B., Cao, Y.H., Bottinger, E., and Zhang, W.J. (2007) Exploiting noise in array CGH data to improve detection of gene copy number change. *Nucl. Acids Res.* 35, e35.
- 226. Hu, J., Gao, J.B., and Principe, J.C. (2006) Analysis of biomedical signals by the Lempel-Ziv complexity: The effect of finite data size. *IEEE Trans. Biomed. Eng.* **53**, 2606–2609.
- 227. Hu, K., Ivanov, P.C., Chen, Z., Carpena, P., and Stanley, H.E. (2001) Effect of trends on detrended fluctuation analysis. *Phys. Rev. E* 64, 011114.
- 228. Hu, J., Tung, W.W., and Gao, J.B. (2006) Detection of low observable targets within sea clutter by structure function based multifractal analysis. *IEEE Trans. Antennas Prop.* **54**, 135–143.
- 229. Hu, J., Tung, W.W., Gao, J.B., and Cao, Y.H. (2005) Reliability of the 0-1 test for chaos. *Phys. Rev. E* **72**, 056207.
- 230. Huang, N.E., Shen, Z., and Long, S.R. (1999) A new view of nonlinear water waves: The Hilbert spectrum. *Annu. Rev. Fluid Mech.* **31**, 417–457.
- 231. Huberman, B.A. and Hogg, T. (1986) Complexity and adaptation. *Physica D* 22, 376–384.
- 232. Huikuri, H.V., Seppanen, T., Koistinen, M.J., Airaksinen, K.E.J., Ikaheimo, M.J., Castellanos, A., and Myerburg, R.J. (1996) Abnormalities in beat-to-beat dynamics

- of heart rate before the spontaneous onset of life-threatening ventricular tachyarrhythmias in patients with prior myocardial infarction. *Circulation* **93**, 1836–1844.
- 233. Hwa, R.C. and Ferree, T.C. (2002) Scaling properties of fluctuations in the human electroencephalogram. *Phys. Rev. E* **66**, 021901.
- 234. Hwang, S.K., Gao, J.B., and Liu, J.M. (2000) Noise-induced chaos in an optically injected semiconductor laser. *Phys. Rev. E* **61**, 5162–5170.
- 235. Ivanov, P.C., Amaral, L.A.N., Goldberger, A.L., Havlin, S., Rosenblum, M.G., Struzik, Z.R., and Stanley, H.E. (1999) Multifractality in human heartbeat dynamics. *Nature* **399**, 461–465.
- 236. Iyengar, N., Peng, C.K., Morin, R., Goldberger, A.L., and Lipsitz, L.A. (1996) Agerelated alterations in the fractal scaling of cardiac interbeat interval dynamics. *Am. J. Physiol.* **271**, R1078–R1084.
- 237. Jaeger, H.M., Liu, C.H., and Nagel, S.R. (1989) Relaxation at the angle of repose. *Phys. Rev. Lett.* **62**, 40–43.
- 238. Jakeman, E. and Pusey, P.N. (1976) A model for non-Rayleigh sea echo. *IEEE Trans. Antennas Prop.* **24**, 806–814.
- 239. Janicki, A. and Weron, A. (1994) Can one see  $\alpha$ -stable variables and processes? *Stat. Sci.* **9**, 109–126.
- 240. Jensen, H., Christensen, K., and Fogedby, H. (1989) 1/f noise, distribution of lifetimes, and a pile of sand. *Phys. Rev. B* **40**, 7425–7427.
- 241. Jeong, J., Kim, M.S., and Kim S.Y. (1999) Test for low-dimensional determinism in electroencephalograms. *Phys. Rev. E* **60**, 831–837.
- 242. Jerger, K.K., Netoff, T.I., Francis, J.T., Sauer, T., Pecora, L., Weinstein, S.L., and Schiff, S.J. (2001) Early seizure detection. *J. Clin. Neurophysiol.* **18**, 259–268.
- 243. Johnson, J.B. (1925) The Schottky effect in low frequency circuits. *Phys. Rev.* 26, 71–85.
- 244. Kaneko, K. and Tsuda, I. (2000) *Complex Systems: Chaos and Beyond*. Springer, pp. 219–236.
- 245. Kantelhardt, J.W., Koscielny-Bunde, E., Rego, H.H.A., Havlin, S., and Bunde A. (2001) Detecting long-range correlations with detrended fluctuation analysis. *Physica A* **295**, 441–454.
- 246. Kantelhardt, J.W., Zschiegner, S.A., Bunde, E., Havlin, S., Bunde, A., and Stanley, H.E. (2002) Multifractal detrended fluctuation analysis of nonstationary time series. *Physica A* **316**, 87–114.
- 247. Kanter, M. (1975) Stable densities under change of scale and total variation inequalities. *Ann. Probability* **3**, 697–707.
- 248. Kantz, H. (1994) A robust method to estimate the maximal Lyapunov exponent of a time series. *Phys. Lett. A* **185**, 77–87.
- 249. Kantz, H. and Schreiber, T. (1997) *Nonlinear Time Series Analysis*. Cambridge University Press.
- 250. Kaplan, D. (1995) Understanding Nonlinear Dynamics. Springer-Verlag.

- 251. Kaplan, D.T. and Glass, L. (1992) Direct test for determinism in a time-series. *Phys. Rev. Lett.* **68**, 427–430.
- 252. Kaplan, D.T. and Goldberger, A.L. (1991) Chaos in cardiology. *J. Cardiovasc. Electrophysiol.* **2**, 342–354.
- Kaulakys, B. and Meskauskas, T. (1998) Modeling 1/f noise. Phys. Rev. E 58, 7013–7019.
- 254. Kennel, M.B. (1997) Statistical test for dynamical nonstationarity in observed timeseries data. *Phys. Rev. E* **56**, 316–321.
- 255. Kennel, M.B., Brown, R., and Abarbanel, H.D.I. (1992) Determining embedding dimension for phase-space reconstruction using a geometrical construction. *Phys. Rev. A* **45**, 3403–3411.
- 256. Kennel, M.B. and Isabelle, S. (1992) Method to distinguish possible chaos from colored noise and to determine embedding parameters. *Phys. Rev. A* 46, 3111–3118.
- 257. Khinchin, A.I. and Gnedenko, B.V. (1962) An Elementary Introduction to the Theory of Probability. Dover.
- 258. Kida, S. (1991) Log-stable distribution and intermittency of turbulence. *J Phys. Soc. Jpn.* **60**, 5–8.
- 259. Kim, S.P., Sanchez, J.C., Erdogmus, D., Rao, Y.N., Wessberg, J., Principe, J.C., and Nicolelis, M. (2003) Divide-and-conquer approach for brain-machine interfaces: Nonlinear mixture of competitive linear models. *Neural Networks* 16, 865–871.
- 260. Klafter, J., Shlesinger, M.F., and Zumofen, G. (1996) Beyond Brownian motion. *Physics Today* **49**, 33–39.
- 261. Kleiger, R.E., Miller, J.P., Bigger, J.T., Moss, A.J., and the Multicenter Post-infarction Research Group (1987) Decreased heart rate variability and its association with increased mortality after myocardial infarction. *Am. J. Cardiol.* **59**, 256–262.
- 262. Kleinfelter, N., Moroni, M., and Cushman, J.H. (2005) Application of a finite-size Lyapunov exponent to particle tracking velocimetry in fluid mechanics experiments. *Phy. Rev. E* **72**, 056306.
- 263. Kleinrock, L. (1975) Queueing Systems. Wiley.
- 264. Kobayashi, M. and Musha, T. (1982) 1/f fluctuation of heartbeat period. *IEEE Trans. Biomed. Eng.* **29**, 456–457.
- 265. Kolmogorov, A.N. (1941) The local structure of turbulence in incompressible viscous fluid for very large Reynolds number. *Dokl. Akad. Nauk SSSR* **30**, 299–303.
- 266. Kolmogorov, A.N. (1962) A refinement of previous hypotheses concerning the local structure of turbulence in a viscous incompressible fluid at high reynolds number. *J. Fluid Mech.* **13**, 82–85.
- 267. Kolmogorov, A.N. (1965) Three approaches to the quantitative definition of "information." *Probl. Info. Transm.* **1**, 1–7.
- 268. Kolmogorov, A.N. (1968) Logical basis for information theory and probability theory. *IEEE Trans. Inform. Theory* **IT-14**, 662–664.
- 269. Kolmogorov, A.N. (1983) Combinatorial foundations of information theory and the calculus of probabilities. *Russ. Math. Surveys* **38**, 29–40.

- Koppel, M. (1987) Complexity, depth and sophistication. Complex Systems 1, 1087– 1091.
- 271. Kore, L. and Bosman, G. (1999) Random telegraph signal of a multiple quantum well infrared photodetector. *J. Appl. Phys.* **86**, 6586–6589.
- 272. Kuusela, T.A., Jartti, T.T., Tahvanainen, K.U.O., and Kaila, T.J. (2002) Nonlinear methods of biosignal analysis in assessing terbutaline-induced heart rate and blood pressure changes. *Am. J. Physiol.*—*Heart and Circulatory Physiol.* **282**, H773–H783.
- Kyrtsou, C. and Serletis, A. (2006) Univariate tests for nonlinear structure. J. Macroecon. 28, 154–168.
- 274. Labovitz, C., Malan, G.R., and Jahanian, F. (1998) Internet routing instability. *IEEE-ACM Trans. Networking* **6**, 515–528.
- 275. Lai, Y.C., Harrison, M.A.F., Frei, M.G., and Osorio, I. (2003) Inability of Lyapunov exponents to predict epileptic seizures. *Phys. Rev. Lett.* **91**, 068102.
- 276. Latora, V., Baranger, M., Rapisarda, A., and Tsallis, C. (2000) The rate of entropy increase at the edge of chaos. *Phys. Lett. A* **273**, 97–103.
- 277. Latora, V., Rapisarda, A., and Tsallis, C. (2001) Non-Gaussian equilibrium in a long-range Hamiltonian system. *Phys. Rev. E* **64**, 056134.
- 278. Lavagno, A., Kaniadakis, G., Rego-Monteiro, M., Quarati, P., and Tsallis. C. (1998) Non-extensive thermostatistical approach of the peculiar velocity function of galaxy clusters. *Astrophys. Lett. Commun.* **35**, 449–455.
- 279. Lee, H.N. (2001) Impact of flow control windows in TCP on fractal scaling of traffic exiting from a server pool. *Proc. GlobeCom*, San Antonio, Texas, November.
- 280. Lee, J.M., Kim, D.J., Kim, I.Y., Park, K.S., and Kim, S.I. (2002) Detrended fluctuation analysis of EEG in sleep apnea using MIT/BIH polysomnography data. *Computers Biol. Med.* 32, 37–47.
- 281. Leland, W.E., Taqqu, M.S., Willinger, W., and Wilson, D.V. (1994) On the self-similar nature of Ethernet traffic (extended version). *IEEE/ACM Trans. Networking* 2, 1–15.
- 282. Lempel, A. Lempel and Ziv, J. (1976) On the complexity of finite sequences. *IEEE Trans. Info. Theory* **22**, 75–81.
- 283. Li, W. (1991) On the relationship between complexity and entropy for Markov chains and regular languages. *Complex Systems* **5**, 381–399.
- 284. Li, W. and Kaneko, K. (1992) Long-range correlation and partial 1/f-alpha spectrum in a noncoding DNA-sequence. *Europhys. Lett.* **17**, 655–660.
- 285. Liebert, W., Pawelzik, K., and Schuster, H.G. (1991) Optimal embedding of chaotic attractors from topological considerations. *Europhys. Lett.* **14**, 521–526.
- 286. Lindgren, K. and Nordahl, M.G. (1988) Complexity measures and cellular automata. *Complex Systems* **2**, 409–440.
- 287. Lloyd, S. and Pagels, H. (1988) Complexity as thermodynamic depth. *Ann. Phys.* **188**, 186–213.
- 288. Lorenz, E.N. (1963) Deterministic nonperiodic flow. J. Atmos. Sci. 20, 130-141.

- 289. Lyra, M.L. and Tsallis, C. (1998) Nonextensivity and multifractality in low-dimensional dissipative systems. *Phys. Rev. Lett.* **80**, 53–56.
- Mackey, M.C. and Glass, L. (1977) Oscillation and chaos in physiological control systems. Science 197, 287–288.
- 291. Majda, A.J. and Kramer, P.R. (1999) Simplified models for turbulent diffusion: Theory, numerical modeling, and physical phenomena. *Phys. Rep.* **314**, 238–574.
- 292. Malik, M., Farrell, T., Cripps, T.R., and Camm, A,J. (1989) Heart rate variability in relation to prognosis after myocardial infarction: Selection of optimal processing techniques. *Eur. Heart J* 10, 1060–1074.
- 293. Mandelbrot, B.B. (1974) Intermittent turbulence in self-similar cascades: Divergence of high moments and dimension of carrier. *J. Fluid Mech.* **62**, 331–358.
- 294. Mandelbrot, B.B. (1982) The Fractal Geometry of Nature. San Francisco: Freeman.
- 295. Mandelbrot, B.B. (1982) Comment on computer rendering of fractal stochastic models. *Commun. ACM* **25**, 581–583.
- 296. Mandelbrot, B.B. (1997) Fractals and Scaling in Finance. New York: Springer.
- 297. Mandelbrot, B.B. and Ness, V. (1968) Fractional Brownian motions, fractional noises and applications. *SIAM Rev.* **10**, 422–437.
- 298. Mane, R. (1981) On the dimension of the compact invariant sets of certain nonlinear maps. In *Dynamical Systems and Turbulence*, edited by Rand, D.A. and Young, L.S., *Lecture Notes in Mathematics*, Vol. 898. Springer-Verlag, pp. 230–242.
- 299. Manuca, R (1996) Stationarity and nonstationarity in time series analysis. *Phys. D* **99**, 134–161.
- 300. Martinerie, J., Adam, C., Le Van Quyen, M., Baulac, M., Clemenceau, S., Renault, B., and Varela, F.J. (1998) Epileptic seizures can be anticipated by non-linear analysis. *Nat. Med.* **4**, 1173–1176.
- 301. Martin-Lof, P. (1966) The definition of random sequences. *Inform. Contr.* **9**, 602–619.
- 302. Martorella, M., Berizzi, F., and Mese, E.D. (2004) On the fractal dimension of sea surface backscattered signal at low grazing angle. *IEEE Trans. Antennas Prop.* **52**, 1193–1204.
- 303. Mayer-Kress, G., Yates, F.E., Benton, L., Keidel, M., Tirsch, W., Pappl, S.J., and Geist, K. (1988) Dimensional analysis of nonlinear oscillations in brain, heart, and muscle. *Math Biosci.* **90**, 155–182.
- 304. Meneveau, C. and Sreenivasan, K.R. (1987) Simple multifractal cascade model for fully-developed turbulence. *Phys. Rev. Lett.* **59**, 1424–1427.
- 305. Metzler, R. and Klafter, J. (2000) The random walk's guide to anomalous diffusion: A fractional dynamics approach. *Phys. Rep.* **339**, 1–77.
- 306. Metzler, R. and Klafter, J. (2004) The restaurant at the end of the random walk: Recent developments in fractional dynamics of anomalous transport processes. *J. Phys. A* 37, R161–R208.
- 307. Meyer, Y., Sellan, F., and Taqqu, M.S. (1999) Wavelets, generalized white noise and fractional integration: The synthesis of fractional Brownian motion. *J. Fourier Anal. Appl.* **5**, 465–494.

- 308. Micolich, A.P., Taylor, R.P., Davies, A.G., Bird, J.P., Newbury, R., Fromhold, T.M., Ehlert, A., Linke, H., Macks, L.D., Tribe, W.R., Linfield, E.H., Ritchie, D.A., Cooper, J., Aoyagi, Y., and Wilkinson, P.B. (2001) The evolution of fractal patterns during a classical-quantum transition. *Phys. Rev. Lett.* 87, 036802.
- 309. Mihail, M. and Papadimitriou, C. (2002) On the Eigenvalue power-law. *RANDOM* 02. Harvard, MA.
- 310. Milotti, E. (2002) 1/f noise: A pedagogical review (downloadable at http://arxiv.org/abs/physics/0204033).
- 311. Molina, M., Castelli, P., and Foddis, G. (2000) Web traffic modeling exploiting TCP connections' temporal clustering through HTML-REDUCE. *IEEE Network* **14**, 46–55.
- 312. Mondragon, R.J. (1999) A model of packet traffic using a random wall model. *Int. J. Bif. Chaos* **9**, 1381–1392.
- 313. Mondragon, R.J., Arrowsmith, D.K., and Pitts, J.M. (2001) Chaotic maps for traffic modelling and queueing performance analysis. *Performance Evaluation* **43**, 223–240.
- 314. Mondragon, R.J., Pitts, J.M., and Arrowsmith, D.K. (2000) Chaotic intermittency-sawtooth map model of aggregate self-similar traffic streams. *Electronics Lett.* **36**, 184–186.
- 315. Montroll, E.W. and Shlesinger, M.K. (1982) On 1/f noise and other distributions with long tails (log-normal distribution, Levy distribution, Pareto distribution, scale-invariant process). *Proc. Natl. Acad. Sci. USA* **79**, 3380–3383.
- 316. Montroll, E.W. and Shlesinger, M.K. (1983) Maximum entropy formalism, fractals, scaling phenomena, and 1/f noise: A tale of tails. J. Stat. Phys. 32, 209–230.
- 317. Nagarajan, R. (2002) Quantifying physiological data with Lempel-Ziv complexity: Certain issues. *IEEE Trans. Biomed. Eng.* **49**, 1371–1373.
- 318. Nathanson, F.E. (1969) Radar Design Principles, McGraw Hill, pp. 254–256.
- 319. Nicolelis, M.A.L., Ghazanfar, A.A., Faggin, B.M., Votaw, S., and Oliveira, L.M.O. (1997) Reconstructing the engram: Simultaneous, multisite, many single neuron recordings. *Neuron* **18**, 529–537.
- 320. Nohara, T. and Haykin, S. (1991) Canadian east coast radar trials and the *K*-distribution. *Proc. Inst. Elect. Eng.* **F138**, 80–88.
- 321. Norros, I. (1994) A storage model with self-similar input. *Queueing Systems* 16, 387–396.
- 322. Norros, I. (1995) On the use of fractional Brownian motions in the theory of connectionless networks. *IEEE JSAC* **13**, 953–962.
- 323. Obukhov, A.M. (1962) Some specific features of atmospheric turbulence. *J. Fluid Mech.* 13, 77–81.
- 324. Oppenheim, A.V., Schafer, R.W., and Buck, J.R. (1999) Discrete-Time Signal Processing, 2nd ed. Prentice Hall.
- 325. Orlov, Y.L. and Potapov, V.N. (2004) Complexity: An internet resource for analysis of DNA sequence complexity. *Nucl. Acids Res.* **32**, W628–W633.

- 326. Ortega, G.J. (1995) A new method to detect hidden frequencies in chaotic time series. *Phys. Lett. A* **209**, 351–355.
- 327. Ortega, G.J. (1996) Invariant measures as Lagrangian variables: Their application to time series analysis. *Phys. Rev. Lett.* **77**, 259–262.
- 328. Osborne, A.R. and Provenzale, A. (1989) Finite correlation dimension for stochastic systems with power-law spectra. *Physica D* **35**, 357–381.
- 329. Oswiecimka, P., Kwapien, J., and Drozdz, S. (2005) Multifractality in the stock market: Price increments versus waiting times. *Physica A* **347**, 626–638.
- 330. Ott, E. (2002) Chaos in Dynamical Systems. Cambridge University Press.
- 331. Ott, E., Sauer, T., and Yorke, J.A. (1994) Coping with Chaos: Analysis of Chaotic Data and the Exploitation of Chaotic Systems. Wiley.
- 332. Otu, H.H. and Sayood, K. (2003) A new sequence distance measure for phylogenetic tree construction. *Bioinformatics* **19**, 2122–2130.
- 333. Over, T.M. and Gupta, V.K. (1996) A space-time theory of mesoscale rainfall using random cascades. *J. Geophys. Res.* **101**, 26319–26331.
- 334. Packard, N.H., Crutchfield, J.P., Farmer, J.D., and Shaw, R.S. (1980) Geometry from a time series. *Phys. Rev. Lett.* **45**, 712–716.
- 335. Papoulis, A. and Unnikrishna Pillai, S. (2001) *Probability, Random Variables and Stochastic Processes with Errata Sheet*, 4th ed. McGraw-Hill.
- 336. Parisi, G. and Frisch, U. (1985) On the singularity structure of fully developed turbulence. In *Turbulence and Predictability in Geophysical Fluid Dynamics and Climate Dynamics*, edited by Ghil, M., Benzi, R., and Parisi, G. North-Holland, pp. 71–84.
- 337. Paxson, V. and Floyd, S. (1995) Wide area traffic the failure of Poisson modeling. *IEEE/ACM Trans. Networking* 3, 226–244.
- 338. Pecora, L.M. and Caroll, L.M. (1990) Synchronization in chaotic systems. *Phys. Rev. Lett.* **64**, 821–824.
- 339. Pei, X. and Moss, F. (1996) Characterization of low-dimensional dynamics in the crayfish caudal photoreceptor. *Nature* **379**, 618–621.
- 340. Peng, C.K., Buldyrev, S.V., Goldberger, A.L., Havlin, S., Sciortino, F., Simons, M., and Stanley, H.E. (1992) Long-range correlations in nucleotide sequences. *Nature* **356**, 168–170.
- 341. Peng, C.K., Buldyrev, S.V., Havlin, S., Simons, M., Stanley, H.E., and Goldberger, A.L. (1994) Mosaic organization of DNA nucleotides. *Phys. Rev. E* **49**, 1685–1689.
- 342. Peng, C.K., Havlin, S., Stanley, H.E., and Goldberger, A.L. (1995) Quantification of scaling exponents and crossover phenomena in nonstationary heartbeat time series. *Chaos* 5, 82–87.
- 343. Peng, C.K., Mietus, J., Hausdorff, J.M., Havlin, S., Stanley, H.E., and Goldberger, A.L. (1993) Long-range anticorrelations and non-Gaussian behavior of the heartbeat. *Phys. Rev. Lett.* **70**, 1343–1346.
- 344. Pesin, Y.B. (1977) Characteristic Lyapunov exponents and smooth ergodic theory. *Russian Math. Survey* **32**, 55–114.

- 345. Pincus, S.M. (1991) Approximate entropy as a measure of system complexity. *Proc. Natl. Acad. Sci. USA* **88**, 2297–2301.
- 346. Pincus, S.M. and Viscarello, R.R. (1992) Approximate entropy: A regularity statistic for fetal heart rate analysis. *Obstet. Gynecol.* **79**, 249–255.
- 347. Pipiras, V. (2005) Wavelet-based simulation of fractional Brownian motion revisited. *Appl. Comput. Harmonic Anal.* **19**, 49–60.
- 348. Pippenger, N. (1988) Reliable computation by formulas in the presence of noise. *IEEE Tran. Inform. Theory* **34**, 194–197.
- 349. Plastino, A.R. and Plastino, A. (1993) Stellar polytropes and tsallis entropy. *Phys. Lett. A* 174, 384–386.
- 350. Platt, N., Hammel, S.M., and Heagy, J.F. (1994) Effects of additive noise on on-off intermittency. *Phys. Rev. Lett.* **72**, 3498–3501.
- 351. Pomeau, Y. and Manneville, P. (1980) Intermittent transition to turbulence in dissipative dynamical systems. *Commun. Math. Phys.* **74**, 189–197.
- 352. Poon, C.S. and Barahona, M. (2001) Titration of chaos with added noise. *Proc. Natl. Acad. Sci. USA* 98, 7107–7112.
- 353. Press, W.H. (1978) Flicker noises in astronomy and elsewhere. *Comments on Astro- physics* **7**, 103–119.
- 354. Pritchard, W.S., Duke, D.W., and Krieble, K.K. (1995) Dimentional analysis of resting human EEC .2. Surrogate-data testing indicates nonlinear but not low-dimensional chaos. *Psychophysiology* **32**, 486–491.
- 355. Proakis, J.G. and Manolakis, D.K. (2006) *Digital Signal Processing*, 4th ed. Prentice Hall.
- 356. Protopopescu, V.A., Hively, L.M., and Gailey, P.C. (2001) Epileptic event forewarning from scalp EEG. *J. Clin. Neurophysiol.* **18**, 223–245.
- 357. Provenzale, A., Osborne, A.R., and Soj, R. (1991) Convergence of the K2 entropy for random noises with power law spectra. *Physica D* **47**, 361–372.
- 358. Provenzale, A., Smith, L.A., Vio, R., and Murante, G. (1992) Distinguishing between low-dimensional dynamics and randomness in measured time-series. *Physica D* **58**, 31–49.
- 359. Qi, Y., Gao, J.B., and Fortes, J.A.B. (2005) Markov chain and probabilistic computation: A general framework for fault-tolerant system architectures for nanoelectronics. *IEEE Trans. Nanotech.* **4**, 194–205.
- 360. Radhakrishnan, N. and Gangadhar, B. (1998) Estimating regularity in epileptic seizure time-series data. *Eng. Med. Biol. Magazine, IEEE* 17, 89–94.
- 361. Rambaldi, S. and Pinazza, O. (1994) An accurate fractional Brownian motion generator. *Physica A* **208**, 21–30.
- 362. Ramos-Fernandez, G., Mateos, J.L., Miramontes, O., Cocho, G., Larralde, H., and Ayala-Orozco, B. (2004) Levy walk patterns in the foraging movements of spider monkeys (*Ateles geoffroyi*). *Behav. Ecol. Sociobiol.* **55**, 223–230.

- 363. Rao, N.S.V., Gao, J.B., and Chua. L. O. (2004) On dynamics of transport protocols in wide-area Internet connections. In *Complex Dynamics in Communication Networks*, edited by Kocarevi, L. and Vattay, G. Springer-Verlag, pp. 69–101.
- 364. Rapp, P.E., Cellucci, C.J., Korslund, K.E., Watanabe, T.A.A., and Jiménez-Montaño, M.A. (2001) Effective normalization of complexity measurements for epoch length and sampling frequency. *Phys. Rev. E* 64, 016209.
- 365. Rapp, P.E., Cellucci, C.J., Watanabe, T.A.A., and Albano, A.M. (2005) Quantitative characterization of tide complexity of multichannel human EEGs. *Int. J. Bifurcation Chaos* **15**, 1737–1744.
- 366. Resnick, S. and Samorodnitsky, G. (2000) Fluid queues, on/off processes, and teletraffic modeling with highly variable and correlated inputs. In *Self-Similar Traffic and Performance Evaluation*, edited by Park, K. and Willinger, W. Wiley, pp. 171–192.
- 367. Richman, J.S. and Moorman, J.R. (2000) Physiological time-series analysis using approximate entropy and sample entropy. *Am. J. Physiol. Heart Circ. Physiol.* **278**, H2039–H2049.
- 368. Riedi, R.H., Crouse, M.S., Ribeiro, V.J., and Baraniuk, R.G. (1999) A multifractal wavelet model with application to network traffic. *IEEE Trans. Info. Theory* **45**, 992–1018.
- 369. Rissanen, J. (1989) Stochastic Complexity in Statistical Inquiry. World Scientific.
- 370. Robinson, P.A. (2003) Interpretation of scaling properties of electroencephalographic fluctuations via spectral analysis and underlying physiology. *Phys. Rev. E* **67**, 032902.
- 371. Rombouts, S.A.R.B., Keunen, R.W.M., and Stam, C.J. (1995) Investigation of non-linear structure in multichannel EEG. *Phys. Lett. A* **202**, 352–358.
- 372. Rosenstein, M.T., Collins, J.J., and De Luca, C.J. (1993) A practical method for calculating largest Lyapunov exponents from small data sets. *Physica D* **65**, 117–134.
- 373. Rosenstein, M.T., Collins, J.J., and De Luca, C.J. (1994) Reconstruction expansion as a geometry-based framework for choosing proper delay times. *Physica D* **73**, 82–98.
- 374. Ross, D.L. et al. (2000) Systematic variation in gene expression patterns in human cancer cell lines. *Nat. Genet.* **24**, 227–235.
- 375. Ross, S. (2002) Introduction to Probability Models. Harcourt Academic Press.
- 376. Rossler, O.E. (1979) Equation for hyperchaos. Phys. Lett. A 71, 155–157.
- 377. Rothstein, J. (1979) Generalized entropy, boundary conditions, and biology. In *The Maximum Entropy Formalism*, edited by Levine, R.D. and Tribus, M. MIT Press, pp. 423–468.
- 378. Ruelle, D. (1978) Thermodynamic Formalism. Addison Wesley Longman.
- 379. Ruelle, D. and Takens, F. (1971) On the nature of turbulence. *Commun. Math. Phys.* **20**, 167.
- 380. Salvino, L.M.W. and Cawley, R. (1994) Smoothness implies determinism a method to detect it in time series. *Phys. Rev. Lett.* **73**, 1091–1094.
- 381. Samorodnitsky, G. and Taqqu, M.S. (1994) *Stable Non-Gaussian Random Processes*. Chapman & Hall.

- 382. Sanchez, J.C., Carmena, J.M., Lebedev, M.A., Nicolelis, M.A.L., Harris, J.G., and Principe, J.C. (2004) Ascertaining the importance of neurons to develop better brain-machine interfaces. *IEEE Trans. Biomed. Eng.* **51**, 943–953.
- 383. Sanchez, J.C., Erdogmus, D., Nicolelis, M.A.L., Wessberg, J., and Principe, J.C. (2005) Interpreting spatial and temporal neural activity through a recurrent neural network brain-machine interface, *IEEE Trans. Neur. Sys. Reh.* 13, 213–219.
- 384. Sano, M. and Sawada, Y. (1985) Measurement of the Lyapunov spectrum from a chaotic time series. *Phys. Rev. E* **55**, 1082–1085.
- 385. Sauer, T., Yorke, J.A., and Casdagli, M. (1991) Embedology. J. Stat. Phys. 65, 579–616
- 386. Saul, J.P., Albrecht, P., Berger, R.D., and Cohen, R,J. (1988) Analysis of long-term heart rate variability: Methods, 1/f scaling and implications. *Comput. Cardiol.* 14, 419–422.
- 387. Saupe, D. (1988) Algorithms for random fractals. In *The Science of Fractal Images*, edited by Peitgen, H. and Saupe, D. Springer-Verlag, pp. 71–113.
- 388. Scafetta, N. and West, B.J. (2004) Multiscaling comparative analysis of time series and a discussion on "earthquake conversations" in California. *Phys. Rev. Lett.* **9213**, 8501–8504.
- 389. Scheinkman, J. and LeBaron, B. (1989) Nonlinear dynamics and stock returns. *J. Business* **62**, 311–337.
- 390. Schiff, S.J., Dunagan, B.K., and Worth, R.M. (2002) Failure of single-unit neuronal activity to differentiate globus pallidus internus and externus in Parkinson disease. *J. Neurosurg.* **97**, 119–128.
- 391. Schottky, W. (1926) Small-shot effect and flicker effect. Phys. Rev. 28, 74-103.
- 392. Schreiber, T. (1997) Detecting and analysing nonstationarity in a time series using nonlinear cross predictions. *Phys. Rev. Lett.* **78**, 843–846.
- 393. Schwartz, A.B., Taylor, D.M., and Tillery, S.I.H. (2001) Extraction algorithms for cortical control of arm prosthetics. *Curr. Opin. Neurobiol.* 11, 701–707.
- 394. Sellan, F. (1995) Wavelet transform based fractional brownian-motion synthesis. *Compt. Rend. Acad. Sci. Ser. I-Math.* **321**, 351–358.
- 395. Serletis, A. and Shintani, M. (2006) Chaotic monetary dynamics with confidence. *J. Macroecon.* **28**, 228–252.
- 396. Serruya, M.D., Hatsopoulos, N.G., Paninski, L., Fellows, M.R., and Donoghue, J.P. (2002) Instant neural control of a movement signal. *Nature* **416**, 141–142.
- 397. Shaw, R. (1984) The Dripping Faucet as a Model Chaotic System. Aerial Press.
- 398. She, Z.S., Jackson, E., and Orszag, S.A. (1991) Structure and dynamics of homogeneous turbulence: Models and simulations. *Proc. R. Soc. Lond. A* **434**, 101–124.
- 399. She, Z.S. and Leveque, E. (1994) Universal scaling laws in fully-developed turbulence. *Phys. Rev. Lett.* **72**, 336–339.
- 400. She, Z.S. and Waymire, E.C. (1995) Quantized energy cascade and log-Poisson statistics in fully-developed turbulence. *Phys. Rev. Lett.* **74**, 262–265.

- 401. Shintani, M. and Linton, O. (2003) Is there chaos in the world economy? A nonparametric test using consistent standard errors. *Int. Econ. Rev.* **44**, 331–358.
- 402. Shintani, M. and Linton, O. (2004) Nonparametric neural network estimation of Lyapunov exponents and a direct test for chaos. *J. Econometr.* **120**, 1–33.
- 403. Shlesinger, M.F., Zaslavsky, G.M., and Klafter, J. (1993) Strange kinetics. *Nature* **363**, 31–37.
- 404. Shuster, H.G. (1988) Deterministic Chaos. VCH.
- 405. Smith, L.A., Ziehmann, C., and Fraedrich, K. (1999) Uncertainty dynamics and predictability in chaotic systems. *Q. J. Roy. Meteorol. Soc.* **125**, 2855–2886.
- 406. Snow, E.S., Novak, J.P., Lay, M.D., and Perkins, F.K. (2004) 1/f noise in single-walled carbon nanotube devices. *Appl. Phys. Lett.* **85**, 4172–4174.
- Solomon, T., Weeks, E., and Swinney, H. (1993) Observation of anomalous diffusion and Levy flights in a two dimensional rotating flow. *Phys. Rev. Lett.* 71, 3975–3979.
- 408. Solomonoff, R.J. (1964) Formal theory of inductive inference (part I). *Inform. Contr.* 7, 1–22.
- 409. Sprott, J.C. (2003) Chaos and Time-Series Analysis. Oxford University Press.
- 410. Stam, C.J., Pijn, J.P.M., Suffczynski, P., and daSilva, F.H.L. (1999) Dynamics of the human alpha rhythm: Evidence for non-linearity? *Clin. Neurophysiol.* **110**, 1801–1813.
- 411. Stapf, S., Kimmich, R., and Seitter, R. (1993) Proton and deuteron field-cycling NMR relaxometry of liquids in porous glasses: Evidence of Levy-walk statistics. *Phys. Rev. Lett.* **75**, 2855–2859.
- 412. Stern, L., Allison, L., Coppel, R.L., and Dix, T.I. (2001) Discovering patterns in *Plasmodium falciparum* genomic DNA. *Mol. Biochem. Parasitol.* **118**, 175–186.
- 413. Stoica, P. and Moses, R.L. (1997) Spectral Analysis of Signals. Prentice Hall.
- 414. Strang, G. and Nguyen, T. (1997) Wavelet and Filter Banks. Wellesley-Cambridge Press.
- 415. Strogatz, S.H. (2001) Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry and Engineering. Westview Press.
- 416. Sugihara, G. and May, R.M. (1990) Nonlinear forecasting as a way of distinguishing chaos from measurement error in time series. *Nature* **344**, 734–741.
- 417. Swinney, H.L. (1983) Observations of order and chaos in non-linear systems. *Physica D* **7**, 3–15.
- 418. Swinney, H.L. and Gollub, J.P. (1986) Characterization of hydrodynamic strange attractors. *Physica D* **18**, 448–454.
- 419. Szczepaski, J., Amigó, J.M., Wajnryb, E., and Sanchez-Vives, M.V. (2003) Application of Lempel-Ziv complexity to the analysis of neural discharges. *Network* 14, 335–350.
- 420. Szepfalusy, P. and Gyorgyi, G. (1986) Entropy decay as a measure of stochasticity in chaotic systems. *Phys. Rev. A* 33, 2852–2855.

- 421. Takens, F. (1981) Detecting strange attractors in turbulence. In *Dynamical Systems and Turbulence, Lecture Notes in Mathematics*, vol. 898, edited by Rand, D.A. and Young, L.S. Springer-Verlag, pp. 366.
- 422. Talkner, P. and Weber, R.O. (2000) Power spectrum and detrended fluctuation analysis: Application to daily temperatures. *Phys. Rev. E* **62**, 150–160.
- 423. Tang, Y. and Chen, S.G. (2005) Defending against Internet worms: A signature-based approach. *Proc. of IEEE INFOCOM'05*, Miami, Florida.
- 424. Taqqu, M.S., Teverovsky, V., and Willinger, W. (1995) Estimators for long-range dependence: An empirical study. *Fractals* 3, 785–798.
- 425. Taqqu, M.S., Teverovsky, V., and Willinger, W. (1997) Is network traffic self-similar or multifractal? *Fractals* **5**, 63–73.
- 426. Taqqu, M.S., Willinger, W., and Sherman, R. (1997) Proof of a fundamental result in self-similar traffic modeling. *Comput. Commun. Rev.* **27**, 5–23.
- 427. Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology (1996) Heart rate variability: Standards of measurement, physiological interpretation, and clinical use. *Circulation* **93**, 1043–1065.
- 428. Taylor, D.M., Tillery, S.I.H., and Schwartz, A.B. (2002) Direct cortical control of 3D neuroprosthetic devices. *Science* **296**, 1829–1832.
- 429. Taylor, R.P., Micolich, A.P., and Jonas, D. (1999) Fractal analysis of Pollock's drip paintings. *Nature* **399**, 422.
- 430. Theiler, J. (1986) Spurious dimension from correlation algorithms applied to limited time-series data. *Phys. Rev. A* **34**, 2427–2432.
- 431. Theiler, J. (1991) Some comments on the correlation dimension of 1/f-alpha noise. *Phys. Lett. A* **155**, 480–493.
- 432. Theiler, J., Eubank, S., Longtin, A., Galdrikian, B., and Farmer. J.D. (1992) Testing for nonlinearity in time-series — the method of surrogate data. *Physica D* 58, 77–94.
- 433. Theiler, J. and Rapp, P. (1996) Re-examination of the evidence for low-dimensional, nonlinear structure in the human electroencephalogram. *Electroencephalogr. Clin. Neurophysiol.* **98**, 213–222.
- 434. Thompson, D. (1961) On Growth and Form. Cambridge University Press.
- 435. Timmer, J., Haussler, S., Lauk, M., and Lucking, C.H. (2000) Pathological tremors: Deterministic chaos or nonlinear stochastic oscillators? *Chaos* 10, 278–288.
- 436. Tirnakli, U. (2000) Asymmetric unimodal maps: Some results from *q*-generalized bit cumulants. *Phys. Rev. E* **62**, 7857–7860.
- 437. Tirnakli, U. (2002) Dissipative maps at the chaos threshold: Numerical results for the single-site map. *Physica A* **305**, 119–123.
- 438. Tirnakli, U. (2002) Two-dimensional maps at the edge of chaos: Numerical results for the Henon map. *Phys. Rev. E* **66**, 066212.
- 439. Tirnakli, U., Ananos, G.F.J., and Tsallis, C. (2001) Generalization of the Kolmogorov-Sinai entropy: Logistic-like and generalized cosine maps at the chaos threshold. *Phys. Lett. A* **289**, 51–58.

- 440. Tirnakli, U., Tsallis, C., and Lyra, M.L. (1999) Circular-like maps: Sensitivity to the initial conditions, multifractality and nonextensivity. *Eur. Phys. J. B* 11, 309–315.
- 441. Tirnakli, U., Tsallis, C., and Lyra, M.L. (2002) Asymmetric unimodal maps at the edge of chaos. *Phys. Rev. E* **65**, 036207.
- 442. Tononi, G. and Edelman, G.M. (1998) Neuroscience consciousness and complexity. *Science* **282**, 1846–1851.
- 443. Tononi, G., Edelman, G.M., and Sporns, O. (1998) Complexity and coherency: Integrating information in the brain. *Trends Cogni. Sci.* **2**, 474–484.
- 444. Tononi, G., McIntosh, A.R., Russell, D.P., and Edelman, G.M. (1998) Functional clustering: Identifying strongly interactive brain regions in neuroimaging data. *NeuroImage* 7, 133–149.
- 445. Tononi, G., Sporns, O., and Edelman, G.M. (1994) A measure for brain complexity relating functional segregation and integration in the nervous-system. *Proc. Natl. Acad. Sci. USA* **91**, 5033–5037.
- 446. Trulla, L.L., Giuliani, A., Zbilut, J.P., and Webber, C.L. (1996) Recurrence quantification analysis of the logistic equation with transients. *Phys. Lett. A* **223**, 255–260.
- 447. Trunk, G.V. and George, S.F. (1970) Detection of targets in non-Gaussian sea clutter. *IEEE Tran. Aero. Elec. Sys.* **6**, 620–628.
- 448. Tsallis, C. (1988) Possible generalization of Boltzmann-Gibbs statistics. *J. Stat. Phys.* **52**, 479–487.
- 449. Tsallis, C., Levy, S.V.F., Souza, A.M.C., and Maynard, R. (1995) Statistical-mechanical foundation of the ubiquity of Levy distributions in nature. *Phys. Rev. Lett.* **75**, 3589–3593.
- 450. Tsallis, C., Plastino, A.R., and Zheng, W.M. (1997) Power-law sensitivity to initial conditions New entropic representation. *Chaos Solitons Fractals* **8**, 885–891.
- 451. Tsonis, A.A. and Elsner, J.B. (1992) Nonlinear prediction as a way of distinguishing chaos from random fractal sequences. *Nature* **358**, 217–220.
- 452. Tsybakov, B. and Georganas, N.D. (1997) On self-similar traffic in ATM queues: Definitions, overflow probability bound, and cell delay distribution. *IEEE/ACM Trans. Networking* **5**, 397–409.
- 453. Tulppo, M.P., Makikallio, T.H., Takala, T.E.S., Seppanen, T., and Huikuri, H.V. (1996) Quantitative beat-to-beat analysis of heart rate dynamics during exercise. *Am. J. Physiol.* **271**, H244–H252.
- 454. Tung, W.W., Moncrief, M.W., and Gao, J.B. (2004) A systemic view of the multiscale tropical deep convective variability over the tropical western Pacific warm pool. *J. Climate* 17, 2736–2751.
- 455. Uchaikin, V.V. and Zolotarev, V.M. (1999) Chance and Stability: Stable Distributions and Their Applications. VSP BV.
- 456. van der Ziel, A. (1979) Flicker noise in electronic devices. *Adv. Electron. Phys.* 49, 225–297.
- 457. Veres, A. and Boda, M. (2000) The chaotic nature of TCP congestion control. *Proc. IEEE INFOCOM 2000*, Piscataway, NJ, pp. 1715–1723.

- 458. Viswanathan, G.M., Afanasyev, V., Buldyrev, S.V., Murphy, E.J., Prince, P.A., and Stanley, H.E. (1996) Levy flight search patterns of wandering albatrosses. *Nature* **381**, 413–415.
- 459. Viswanathan, G.M., Buldyrev, S.V., Havlin, S., da Luz, M.G.E., Raposo, E.P., and Stanley, H.E. (1999) Optimizing the success of random searches. *Nature* **401**, 911–914.
- 460. Von Neumann J. (1956) Probabilistic logics and the synthesis of reliable organisms from unreliable components. In *Automata Studies*, edited by Shannon, C.E. and McCarthy, J. Princeton University Press, pp. 43–98.
- 461. Voss, R.F. (1985) Random fractal forgeries. In *Fundamental algorithms in Computer Graphics*, edited by Earnshaw, R.A. Springer-Verlag, pp. 805–835.
- 462. Voss, R.F. (1988) Fractals in nature: From characterization to simulation. In *The Science of Fractal Images*, edited by Peitgen, H. and Saupe, D. Springer-Verlag, pp. 21–70.
- 463. Voss, R.F. (1992) Evolution of long-range fractal correlations and 1/f noise in DNA-base sequences. *Phys. Rev. Lett.* **68**, 3805–3808.
- 464. Wackerbauer, R., Witt, A., Altmanspacher, H., Kurths, J., and Scheingraber, H. (1994) A comparative classification of complexity measures. *Chaos, Solitons Fractals* 4, 133–173.
- 465. Wallace, C.S. and Boulton, D.M. (1968) An information measure for classification. *Comput. J.* **11**, 185–194.
- 466. Ward, K.D., Baker, C.J., and Watts, S. (1990) Maritime surveillance radar Part 1: Radar scattering from the ocean surface. *Proc. Inst. Elect. Eng.* **F137**, 51–62.
- 467. Watanabe, S. (1969) Knowing and Guessing: A Quantitative Study of Inference and Information. Wiley.
- 468. Watanabe, T.A.A., Cellucci, C.J., Kohegyi, E., Bashore, T.R., Josiassen, R.C., Greenbaun, N.N., and Rapp, P.E. (2003) The algorithmic complexity of multichannel EEGs is sensitive to changes in behavior. *Psychophysiology* **40**, 77–97.
- 469. Wayland, R., Bromley, D., Pickett, D., and Passamante, A. (1993) Recognizing determinism in a time series. *Phys. Rev. Lett.* **70**, 580–582.
- 470. Webber, C.L. and Zbilut, J.P. (1994) Dynamical assessment of physiological systems and states using recurrence plot strategies. *J. Appl. Physiol.* **76**, 965–973.
- 471. Wessberg, J., Stambaugh, C.R., Kralik, J.D., Beck, P.D., Laubach, M., Chapin, J.K., Kim, J., Biggs, J., Srinivasan, M.A., and Nicolelis, M.A.L. (2000) Real-time prediction of hand trajectory by ensembles of cortical neurons in primates. *Nature* 408, 361–365.
- 472. West, B.J. (1996) Levy statistics of water wave forces. Physica A 230, 359–363.
- 473. West, B.J. (1996) Extrema of fractal random water waves. *Int. J. Mod. Phys. B* 10, 67–132.
- 474. West, B.J. (2006) Thoughts on modeling complexity. *Complexity* 11, 33–43.
- 475. Wiggins, S. (2003) Introduction to Applied Nonlinear Dynamical Systems and Chaos. Springer.

- 476. Willinger, W., Taqqu, M.S., Sherman, M.S., and Wilson, D.V. (1997) Self-similarity through high-variability: Statistical analysis of ethernet LAN traffic at the source level. *IEEE/ACM Trans. Networking* **5**, 71–86.
- 477. Witt, A., Neiman, A., and Kurths, J. (1997) Characterizing the dynamics of stochastic bistable systems by measures of complexity. *Phys. Rev. E* **55**, 5050–5059.
- 478. Wolf, A., Swift, J.B., Swinney, H.L., and Vastano, J.A. (1985) Determining Lyapunov exponents from a time series. *Physica D* 16, 285–317.
- 479. Wolf, M. (1997) 1/f noise in the distribution of prime numbers. *Physica A* **241**, 493–499.
- 480. Wolfram, S. (1984) Cellular automata as models of complexity. *Nature* 311, 419–424.
- 481. Wolfram, S. (1984) Computation theory of cellular automata. *Commun. in Math. Phys.* **96**, 15–57.
- 482. Wolfram, S. (1984) Universality and complexity in cellular automata. *Physica D* **10**, 1–35.
- 483. Wornell, G.M. (1996) Signal Processing with Fractals: A Wavelet-Based Approach. Prentice Hall.
- 484. Wu, X. and Xu, J. (1991) Complexity and brain function. *Acta Biophys. Sinica* 7, 103–106.
- 485. Xu, J., Liu, Z., Liu, R., and Yang, Q.F. (1997) Information transformation in human cerebral cortex. *Physica D* **106**, 363–374.
- 486. Yamamoto, Y. and Hughson, R.L. (1991) Coarse-graining spectral analysis: New method for studying heart rate variability. *J. Appl. Physiol.* **71**, 1143–1150.
- 487. Yano, J.-I., Fraedrich, K., and Blender, R. (2001) Tropical convective variability as 1/*f* noise. *J. Climate* **14**, 3608–3616.
- 488. Yin, Z.M. (1996) New methods for simulation of fractional brownian motion. *J. Comput. Phys.* **127**, 66–72.
- 489. Zhang, X.S. and Roy, R.J. (1999) Predicting movement during anaesthesia by complexity analysis of electroencephalograms. *Med. Biol. Eng. Comput.* **37**, 327–334.
- 490. Zhang, X.S. and Roy, R.J. (2001) Derived fuzzy knowledge model for estimating the depth of anesthesia. *IEEE Trans. Biomed. Eng.* **48**, 312–323.
- 491. Zhang, X.S., Roy, R.J., and Jensen, E.W. (2001) EEG complexity as a measure of depth of anesthesia for patients. *IEEE Trans. Biomed. Eng.* **48**, 1424–1433.
- 492. Zhang, X.S., Zhu, Y.S., Thakor, N.V., and Wang, Z.Z. (1999) Detecting ventricular tachycardia and fibrillation by complexity measure. *IEEE Trans. Biomed. Eng.* **46**, 548–555.
- 493. Zhang, X.S., Zhu, Y.S., and Wang, Z.M. (2000) Complexity measure and complexity rate information based detection of ventricular tachycardia and fibrillation. *Med. Biol. Eng. Comput.* **38**, 553–557.
- 494. Zhang, X.S., Zhu, Y.S., and Zhang, X.J. (1997) New approach to studies on ECG dynamics: Extraction and analyses of QRS complex irregularity time series. *Med. Biol. Eng. Comput.* **35**, 467–473.

- 495. Zheng, Y., Gao, J.B., Sanchez, J.C., Principe, J.C., and Okun, M.S. (2005) Multiplicative multifractal modeling and discrimination of human neuronal activity. *Phys. Lett. A* **344**, 253–264.
- 496. Zhou, Y.H., Gao, J.B., White, K.D., Merk, I., and Yao, K. (2004) Perceptual dominance time distributions in multistable visual perception. *Biol. Cybern.* **90**, 256–263.
- 497. Ziv, J. and Lempel, A. (1978) Compression of individual sequences via variable-rate coding. *IEEE Trans. Info. Theory* **24**, 530–536.
- 498. Zumbach, G. (2004) Volatility processes and volatility forecast with long memory. *Quant. Financ.* **4**, 70–86.