

TERRORIST ATTACKS: AN OPEN LETTER

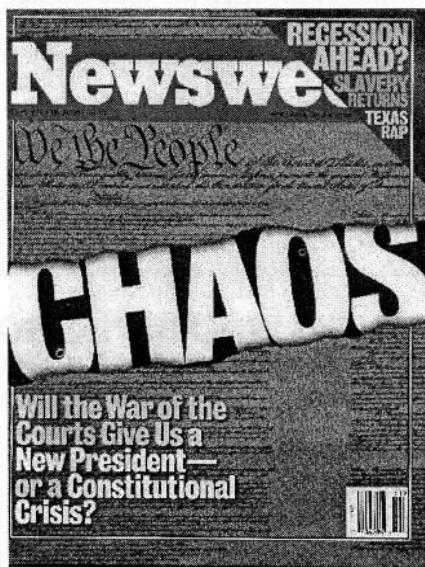
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**Summer, 2002, Annual Conference in Portland Announced,
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Vote for SCTPLS President for 2002-2003**

AN OPEN LETTER FROM THE SCTPLS OFFICERS

The events of September 11, 2001, prompted an intense discussion on the CHAOPSYC listserver. Participants debated possible historical precursors of the event that transpired 5, 50, or 500 years ago. They considered the present state of international relations and debated the merits of possible military options and humanitarian aid. The role of nonlinear dynamics was, as might be expected, also a focus of discussion; it was noted that most of the work on these issues was first published in the 1980s and early 1990s. We note that this was the first discussion on CHAOPSYC in over five years that reached 100 contributions without a mention from anyone that there was "too much e-mail."

We would like to thank members and other colleagues, worldwide, for their e-mail inquiring into our well being and conveying their condolences and shock. We have received no report



that any SCTPLS member was lost in the disasters. We know, however, with the grand connections among all things nonlinear, that we will all will be touched by the events, in ways we cannot yet imagine.

We checked our files for comparisons to current events and were reminded of last year's CHAOPSYC discussions concerning the USA presidential elections. At that time, some CHAOPSYC discussants posted editorials from various sources wherein the authors mused whether some kind of "chaos" was occurring. The cover of *Newsweek* (Dec. 18, 2000) [see Figure] was typical of the thinking at that time. After thoughtful discussion it was concluded that in spite of what might be localized chaotic events, nothing resembling persistent chaos, as we know it, was occurring or was going to occur as a result of the presidential election turmoil. There appear to be many self-correcting, social and political nonlinear processes in place that prevent the political system from permanently destabilizing.

Similarly, we observe, now, that although there was tragedy, horror, and personal chaos, in New York, Washington, DC, and Pennsylvania, there was little chaos in public events. Evacuations were prompt and orderly. Firefighters, police, and rescue teams responded immediately and in practiced yet flexible ways. Volunteers self-organized and coordinated with official responses. The Mayor of New York conveyed an aura of both competence and empathy. The State Department of the US Government issued a statement within hours of the airliner strikes that there would be US response, and that it would be unheated, thoughtfully planned, and executed in a focused fashion. Calls for extreme responses of a wide variety were processed through the system, and appear to have informed but not dominated the government's response. Interestingly, and as importantly, the complexity of modern international connectivity also seems also to have organized itself in ways

more likely to lead to careful readjustment than to chaotic maladjustment.

Given the potential for disruption of the United States' vital systems, we can conclude that the flexible nonlinearity that characterizes American society enables the rapid and positive readjustments we see occurring. We only hope that the necessary additional security precautions that the government must implement in the near term will not, in the long term, compromise the freedoms necessary to the flexible nonlinearity that has long been the nation's salvation.

We make no pretense of knowing what the families of six thousand dead and many thousands of other injured are experiencing and will continue to experience. Those of us who were no closer to Ground Zero than a TV set have, nonetheless, stopped whining about whether our airplanes will be late, whether our stock dividends went up or down a couple pennies, or about other similar issues that tended to get disproportionate attention before September 11. We have found that just as the world events allow us to see how our science might be applied to the terrorist attacks and their sociopolitical aftermath, our personal experiences allow us to appreciate the importance of the nonlinear, interpersonal relationships that nurture and sustain each one of us. We celebrate and cherish these connections as we move, in our professional lives, to use our science to further the emergence of positive flows from negative forces.

Kevin Dooley, President

Steve Guastello, Treasurer and Journal Editor

Mary Ann Metzger, Secretary

& Bob Porter, Newsletter Editor and Past President

SOCIETY IS PORTLAND BOUND

According to Steve Guastello and Kevin Dooley, the formal arrangements for the Summer Conference are well underway in Portland, OR, and more information is becoming available every day. The Call for Papers will be published on the Society website (www.societyforchaostheory.org), on CHAOPSYC, and in the next newsletter. The Call for Papers is mailed to all members. Stay tuned. To CHAOPSYC for more details.

MINUTES OF THE BUSINESS MEETING MADISON, AUGUST 6, 2001

President Kevin Dooley called the meeting to order with brief remarks.

Motion. Minutes for the 2000 meeting approved as published in the Newsletter. Approved.

President Dooley asked for feedback on the current conference. Regarding facilities, comments included: "Madison location is fine." "Hotel upgrade is fabulous." "Bothers me to spend over \$80, but reasonable compared to other conferences." Some speakers would prefer dorm-style option. Grainger Hall conference Center was generally fine, but parking was an outrage. [NOTE: Conferees who used the hotel had free parking there, but others were ticketed]

Regarding the conference itself, opinions included: a first timer feeling welcome, pleasures at sharing data, enjoyment of interactions wonderful workshops, and comments that the conference was a nice size.

Additional discussion revolved around concern that papers are much too short, the suggestions to extend the conference to another day, and concerns that tighter regulation on timing occur. **Motion. Extend by half a day, if we can. Approved.**

Location of the conference 2002 was discussed. Previous locations were reviewed: Berkeley 1999, Philadelphia 2000, Madison 2001. **Nominated were Portland, Eugene, San Diego, Tempe. Portland Approved.** [Editors Note: *Portland arrangements are nearly complet, see related story.*]

Committee report, European meeting. A motion approved at the business meeting 2000 appointed Bob Porter and Karl Toifl to investigate feasibility of a European meeting in 2002. They found the European situation to be very favorable for a meeting. According to their analysis, February would be best. Both Vienna and Palermo were considered. **Committee motion. President will name a committee to arrange a meeting in addition to the regular US conference, the additional meeting to be held in Europe at affordable rates in February 2002. Approved.** [Editors Note: Progress is being made on meeting. Committee consists of Karl Toifl, Dick Bird, and Bob Porter.]

Journal report. Steve Guastello reported that we have been accepted in major indexes (JEL/Econlit and Medline), and that three special issues are in process or to begin soon.

Newsletter. President Dooley solicited creative, short pieces for the newsletter.

Other business:

Nominated for president for 2002-2003: Dick Bird, Holly Arrow, and Tim Haslett. [Editors Note: Holly Arrow has declined the nomination due to other commitments.]

Motion. Fred Abraham will be retained by the Society to make a plaque to honor Stephen Guastello. Approved.

Motion. Conference 2003 shall include an event in honor of the scientific contributions of Walter Freeman. Approved.

Submitted by Mary Ann Metzger, Secretary

Review the programs from previous annual conferences at: <http://www.societyforchaostheory.org>

WHO'S WHO IN THE SOCIETY

President 2000-2001: Kevin Dooley, kevin.dooley@asu.edu
Immediate Past-President and Newsletter Editor: Bob Porter, rjporter@mindspring.com
Treasurer and Journal Editor: Stephen Guastello, stephen.guastello@marquette.edu
Secretary: Mary Ann Metzger, metzger@umbc.edu
Web Site Manager: Kevin Dooley, kevin.dooley@asu.edu

ANNOUNCEMENTS

We are happy to announce a timely chapter by Gus Koehler, Guenther Kress, and Randi Miller, *What Disaster Response Management Can Learn from Chaos Theory*, in Ali Farazmand's, **Handbook of Crisis and Emergency Management**. This handbook is intended to instruct politicians, policy makers, administrators, researchers, and others on the wide range of internal issues and topics in emergency management within the disciplines of political science, public administration and public policy. It reviews approaches to natural disasters around the world; considers resolutions to cultural, religious, and political tensions in the Middle East; discusses terrorism and safeguards against the use of biological, chemical, or nuclear weapons; describes the function of crisis public relations; and addresses other topics. Various contributing authors consider crisis management between and among groups; political, economic, and social crisis management; environmental and health emergency management; conceptual, practical, and empirical aspects of emergency management; and crisis and emergency management in the Americas, Europe, Asia, Africa, and the Near and Middle East.



Waldemar Karwowski and Stephen Guastello were invited speakers at the **World Congress on Safety in Modern Technical Systems**, which was held in Saarbrücken, Germany September 12-14, 2001. Waldemar presented "State of the Art in Ergonomics: Human and Safety Aspects of Advanced Technologies." Stephen presented: "Nonlinear Dynamic Systems Theory (NDS) approach to accident causation and control." Their papers appeared in the congress' proceedings volumes with shortened titles. In a related item: Waldemar Karwowski is Editor in Chief of a new journal, "Theoretical Issues in Ergonomic Systems." Waldemar says Nonlinear dynamics contributions are welcome.



J. Barkley Rosser, Jr. is now Editor in Chief of *Journal of Economic Behavior and Organizations*. Nonlinear dynamics and game theory contributions are welcome, Barkley says.



Carlo Piccardi wrote us to announce: **TOPICS IN NONLINEAR DYNAMICS** Venice International University, Venice (Italy), **January 30 - February 1, 2002** A workshop-like program organized by SICC - Italian Society for Chaos and Complexity in cooperation with VIU - Venice International University. The program is primarily directed to young researchers and PhD students interested in the theory and applications of nonlinear dynamical systems. The lectures cover both introductory and advanced topics, and at least one special session is devoted to applications in specific fields. The topics of general interest are bifurcation theory, numerical bifurcation analysis, chaotic dynamics, and time series analysis, while a special session is devoted to evolutionary dynamics. **LECTURERS** James A. Yorke, University of Maryland, USA; Sergio Rinaldi, Politecnico di Milano, Italy; Carlo Piccardi, Politecnico di Milano, Italy; Yuri A. Kuznetsov, University of Utrecht, The Netherlands; Willy Govaerts, University of Ghent, Belgium; Ulf Dieckmann, International Institute for

Applied Systems Analysis, Austria; Michael Obersteiner, Institute for Advanced Studies, Austria; Fabio Dercole, Politecnico di Milano, Italy; Alfredo Medio, University of Venice "Ca' Foscari", Italy; Sergio Invernizzi, University of Trieste, Italy; Marji Lines, University of Udine, Italy; Eric Kostelich, Arizona State University, USA; Antonello Provenzale, ICGF-CNR, Italy.

For information and application, visit the website <http://www.elet.polimi.it/venice2002>



7th WORKSHOP ON ECONOMICS AND HETEROGENEOUS INTERACTING AGENTS (WEHIA)

Istituto Nazionale per la Fisica della Materia (INFN), Sezione>Trieste-SISSA, V. Beirut 2-4, I-34014 Trieste Italy - **May 30-June 1, 2002** . The economy is more and more frequently regarded as a complex system of interacting agents.

Recent developments of this approach have focused on three main issues: i) THE HETEROGENEITY OF THE AGENTS IN THE ECONOMY. ii) THE WAYS IN WHICH AGENTS INTERACT. iii) THE DYNAMIC PROCESS WHICH GOVERNS THE EVOLUTION OF THE INDIVIDUAL. The 7th Workshop on Economics and Heterogeneous Interacting Agents (WEHIA) offers a forum for presentation and discussion of the latest results on these issues. Workshop topics include: Interacting Agents: General Considerations Aggregation of heterogeneous agents The Analysis of Cooperation Bounded Rationality Interacting Particle Systems and Economics Percolation Theory and Economics Learning in Economics Evolutionary Game Theory Computational Methods in Economics Market Structure and its Emergence Economic Graphs and Network Analysis Non-linear econometrics Keynote speakers: J.-P. Bouchaud (CEA Saclay and Science & Finance, Paris) J. S. Metcalfe (PREST The University of Manchester) J. A. Scheinkman (Princeton University) H. E. Stanley (Boston University) Y.-C. Zhang (Université de Fribourg CH) **CALL FOR PAPERS** The Program Committee invites the submission of contributions for oral or poster presentation. Persons interested are encouraged to send a long abstract along with their registration form no later than **31st January 2002**. An electronic version of the abstract should also be sent (in PDF, PostScript or MS Word format) to smr1409@ictp.trieste.it. For further information please contact us by email to smr1409@ictp.trieste.it Directors: Mauro Gallegati (Univ. Ancona) Alan Kirman (Marseille) Matteo Marsili (INFN-SISSA) Program Committee: Rob Axtell Carl Chiarella Robin Cowan Richard Day Domenico Delli Gatti Massimo Egidi Daniel Friedman Mauro Gallegati Laura Gardini Alan Kirman Michael Kopel Cars Hommes Thomas Lux Rosario Mantegna Fernando Vega-Redondo Registration Deadline: 31st January 2002

Learning in Economics Evolutionary Game Theory Computational Methods in Economics Market Structure and its Emergence Economic Graphs and Network Analysis Non-linear econometrics Keynote speakers: J.-P. Bouchaud (CEA Saclay and Science & Finance, Paris) J. S. Metcalfe (PREST The University of Manchester) J. A. Scheinkman (Princeton University) H. E. Stanley (Boston University) Y.-C. Zhang (Université de Fribourg CH) **CALL FOR PAPERS** The Program Committee invites the submission of contributions for oral or poster presentation. Persons interested are encouraged to send a long abstract along with their registration form no later than **31st January 2002**. An electronic version of the abstract should also be sent (in PDF, PostScript or MS Word format) to smr1409@ictp.trieste.it. For further information please contact us by email to smr1409@ictp.trieste.it Directors: Mauro Gallegati (Univ. Ancona) Alan Kirman (Marseille) Matteo Marsili (INFN-SISSA) Program Committee: Rob Axtell Carl Chiarella Robin Cowan Richard Day Domenico Delli Gatti Massimo Egidi Daniel Friedman Mauro Gallegati Laura Gardini Alan Kirman Michael Kopel Cars Hommes Thomas Lux Rosario Mantegna Fernando Vega-Redondo Registration Deadline: 31st January 2002

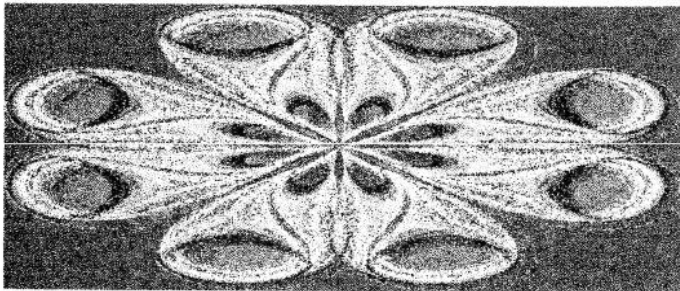


Francesco Mallamace, Sharon Glotzer, Gianpiero Malessio, and Peter Poole write to announce the upcoming conference **HORIZONS IN COMPLEX SYSTEMS** in honor of Gene Stanley's 60th birthday, to be held in Sicily at the University of Messina from Wednesday evening 5 Dec through

Saturday evening 8 Dec, 2001. They solicit contributions in either in poster or in oral format, with abstracts before 25 October be sent to messina@cmrg.apmaths.uwo.ca to facilitate planning the timetable. A conference website describing the conference is now up: <http://cmrg.apmaths.uwo.ca/~messina> It contains: information and photographs of hotel (faces the Straits of Messina.); travel information and suggested air ticket web sites; a tentative list of participants thus far and interesting links about the site and about Sicily. Conference E-Mail: messina@cmrg.apmaths.uwo.ca



Members in the Chicago area may be interested in the CALL FOR PAPERS for a Conference on Human Consciousness Illinois Institute of Technology, December 1, 2001. The Seven Student Members of the Inter-professional Project on Organizing and Conducting a Conference on Human Consciousness and Professor Peter Lykos, write that, following the very successful International Conference on Human Consciousness held in Sweden last month, a group of diverse students from the Illinois Institute of Technology, with a mutual interest in human consciousness, decided to organize a conference on the subject. They hereby issue a Call for Papers from distinguished individuals who share our passion on the topic of human consciousness. If you have an interest in discussing human consciousness with others, we would like to cordially invite you to submit a title (ten words or less) and an abstract (75 words or less) and send it to lykos@iit.edu. A manuscript to be included in electronic proceedings may follow. We would also like to ask you to forward this message on to any of your colleagues who you think might share our interest in this fascinating area. Thank you for your time and we hope to hear from you by 26 October 2001. For those interested in a display of topics addressed by a quite diverse set of individuals, here are the links to the evolving home page of our conference and to the international conference held in Sweden. www.iit.edu/~curtchr1
<<http://www.iit.edu/~human.consciousness/>>
www.ida.his.se/ida/consciousness/
<<http://www.ida.his.se/ida/consciousness/>>



REPORTS FROM THE CUSP

Editor's Note: Short research articles, book reviews, and other items of interest are solicited from all members for consideration for publication in REPORTS FROM THE CUSP. Articles are reviewed by the editor and those selected may be edited for length. Ordinarily, only one item will appear per newsletter.

CONTRIBUTIONS ARE WELCOME

This month's contribution is a Book Review

BOOK REVIEW

Book title: **Self-Organization and the City**

Author: Juval Portugali,

With 120 figures and a Foreword by Hermann Haken.

Includes chapters in collaboration with I. Benenson, I. Omer and N. Alfasi. Two special chapters on 'Synergetic Cities' with Hermann Haken. Publisher: Berlin, Heidelberg, and New York: Springer-Verlag

A review by Wei-Bin Zhang

Traditional urban studies have been split into two, disconnected, parallel currents: one quantitative and positivist, termed regional science, and the other qualitative-hermeneutic, called social theory of the city. It is held that through applying self-organization theories to issues related to spatial urban evolution, the two split urban currents can be united. The book makes an initial step toward this direction, illustrating how the notion of self-organization can provide a common language and a conceptual and methodological framework for the study of cities and urbanism. The book also attempts to find a common language allowing discourse, co-operation and exchange of ideas between disciplines such as geography, architecture, town-planning, engineering, economics, sociology, psychology, anthropology, and archaeology.

In addition to the introduction and conclusion, the book consists of five parts: on cities and urbanism, city games, self-organizing planning, synergetic cities, self-organization and urban revolutions. In the introduction, the author illustrates the background and the purpose of the book project. The motivation for writing the book stemmed from the rise of the self-organization paradigm in domains such as physics, chemistry, biology, and mathematics and the split within human geography into regional sciences and social theory of the city. The book attempts to explore the possibility of integration between the notion of self-organization and socio-cultural theories of cities and urbanism.

Part I, On Cities and Urbanism, examines cities from varied perspectives. The Aristotelian view, for instance, sees cities as geometrical shapes that regardless of their variable quantitative sizes and properties, still share some structural-topological properties which constitute the necessary and sufficient conditions for their definition; Wittgenstein's view experiences cities in terms of networks stretching in time and space. Cities may also be perceived like a language. The author also introduces concepts such as prototypicality of core cities, the ideal-type of Max Weber, and Inter-Representation Networks (IRNs) to describe varied perceptions about cities and their evolution. An interesting classification is the ecocity which studies the city in terms of location theory with its economic principles supported and supplemented by the ecological theory with evolutionary principles. The well-known urban theories by, for instance, von Thünen, Alonso, Burgess, Christaller, Lösch, and Hoyt belong to the ecocity framework. The author also discusses Newton's cities (typically, Wilson's gravity models), metropolis, urban planning, the city of justice, the humanistic city, the Marxist city, de-visualized cities, postmodern city, and the hypermodern self-organizing city. It is argued that cities can be

treated as self-organizing systems and thus urban evolution can be examined with self-organization as a conceptual-theoretical framework. A concise introduction to theories of self-organization by Haken, Prigogine and others is made with a comprehensive review of the literature. Applying self-organization theory, the author defines cities with dissipative structures, synergetic cities, chaotic cities, fractal cities, cellular automata cities, sandpile cities, FACS (free agents on a cellular space) cities, and IRN cities.

Part II, City Games, also covers multiple topics of spatial evolution with multiple perspectives. The author proposes a modeling approach, which incorporates in its structure properties of both self-organization and social theory. The approach builds a family of models, called City, City-1, ..., City-6 and applies these models to varied urban issues, such as processes of socio-cultural segregation, relations between international migration and internal structure of cities, and socio-cultural morphogenesis. The City is considered as an open complex system which exchanges with its environment not only matter and energy but also human population. The City is generally described by:

$$S^H(t+1) = F_t(S^H(t), S^{U(H)}(t), S^A(t), E(t)),$$

where $S^H(t)$ is the current state of city H , $U(H)$ is a neighborhood of city H , $S^A(t)$ represents the dependence of the transformation rule on the City as a whole, $E(t)$ is the external environment, and F is the transformation rule. The City is used to examine phenomena of residential socio-spatial segregation in a city and the existence and the role of local regions of instability within an otherwise stable urban system. As shown in Chapter 5, the City is a typical system in self-organization. It is open because it is part of its environment through a flow of immigrants from the environment inward into the City and from it outward to the environment. The City's global properties are not the sum of its parts and it exhibits phenomena of non-linearity.

City-1 is a direct extension of the City. It is a two-layer model: a population model of human agents describing the migration and interaction activities of individuals, superimposed on a cellular automata (CA) infrastructure describing various domains of the urban landscape. City-1 is applied to examine the impact of international migration on intra-urban migration, the urban space economy, and socio-spatial segregation. City-2 is structurally similar to City-1. It differs from City-1 in that it includes the circumstances where spatial cognitive dissonance in the city may arise and lead to changes in individuals' intentions, cultural affiliation, and identity. In both the City and City-1 the socio-cultural properties of individuals and their socio-spatial intentions/wants were determined externally, while in City-2, these properties are determined internally. City-3 is a refinement of City-2. In City-2, individuals' decisions are made in relation to local information; but in City-3, individuals' decisions are made in relation to both local and global information. City-4 defines the individual agent by means of a cultural code (c-code) or memetic code (m-code). A personal identity is multi-dimensional. Formally, in City-4, one needs multiple dimensions to describe the dynamics of an agent's cultural identity. The form of City-4 expands that of City-2 and City-3. City-5 moves from CA-city to GIS-city, that is, from an infrastructure based on an abstract cell space to one based on the real structure of the city

as encoded by means of GIS (geographical information systems). The author represents a city's infrastructure by a GIS-based vector map consisting of a number of layers of streets, houses, open spaces, etc. and puts on top the layer of free agents as defined in the five City models developed before. City-6 is related to City-4. However, in City-4, there is no a-priori dependencies between any two components of cultural identity, but in City-6, each individual has a hierarchical identity. An agent might thus have more than one cultural identity. The purpose of this model is to specially study the effects of groups' internal complexity on the dynamics of residential distribution in the city space. Applying these general models to varied spatial issues from Chapter 5 to Chapter 10, the author examines various nonlinear phenomena, emergence of slaving variables, co-existence of order variables, stability versus instability, predictability versus unpredictability, bifurcation, chaos, sudden emergence and extinction of the socio-cultural groups, structural change, in spatial evolution.

Part III, Self-Organizing Planning, examines complexity of planning in the light of self-organization. The purpose of this part is to show how to take the whole of the self-organizing city as a metaphor for the development of a new planning theory and methodology. The new approach promises to have the potential to make urban, regional and environmental planning more innovative and productive. The author first shows limitations of the traditional planning visions and then proposes a self-organization approach to spatial planning. This new approach begins with a distinction between two forms of planning: just-in-case planning versus just-in-time planning. The concept of just-in-time planning is a 'copy' of the concept of just-in-time management. The former refers to the traditional mode of planning and the latter to what in a self-organizing system might be. Based on this discussion, the author develops preliminary principles for a self-organizing planning system and elaborates them in light of the current literature on the issues. The preliminary principles include the parallel distributed planning (which is influenced by the concept of parallel distributed processing which is the name for the neo-connectionist approach to the study of brain functioning and cognition) in a self-organizing city, decision making agents as self-organizing systems, self-organization in private and collective planning, planning synergetic cities, plans as patterns of routinized activities, enslavement to and emergence of a city's order-parameter plans, and distinction between fast local plans and slow global plans.

Part IV, Synergetic Cities, applies Haken's theory of self-organization, synergetics, to deal with phenomena of complex spatial systems. There are four approaches in synergetics: the microscopic, the macroscopic, the phenomenological, and the conceptual or hermeneutic. The microscopic approach is a bottom-up approach, starting with an interaction between the individual parts of the system which then enslaves the system. The macroscopic approach is a top-down approach typical of cases where a description of some macroscopic properties of the system can be performed, whereas information on the individual parts of the system is not sufficient or doesn't exist. The phenomenological approach begins with the finding that close to instability points the behavior of the system is governed by a few order parameters, the equations of which can often be written directly. The

hermeneutic approach is a useful framework for the interpretation of soft, non-quantifiable phenomena such as language, nationalism, or planning. As far as urban and regional systems are concerned, two lines of research have been developed. The first approach is the so-called master-equation approach in sociology, economics, and urban dynamics. The formation of a master equation with properly chosen transition probabilities determines the temporary evolution of the probability distribution of socio-economic configuration. The second approach, the pattern recognition approach, starts from state variables for which evolution equations are formulated with chance events as stochastic forces. Part IV mainly applies the self-organization of cities from the perspective of Haken's synergetic approach to pattern formation and pattern recognition. This part is too abstract and too general. It is difficult to see how the general ideas from synergetics can be applied to urban and regional issues in a meaningful way. Part V, Self-Organization and Urban Revolutions, examines urban evolutions over history in the light of self-organization.

The book attempts to integrate the theories of complex self-organizing systems with the rich body of discourse and literature in social theory of cities and urbanism. It is intended for students of self-organization as well as students of cities and urbanism. It is designed to stimulate thinking about spatial evolution and complexity of self-organization. The book is an insightful and interesting but not an easy book. The reader needs knowledge of multiple fields, such as mathematics, philosophy, self-organization, chaos, fractal, sociology, urban planning, and geography, not to mention urban economics, regional science, and economic geography to fully comprehend the meanings of the book. Its arrangements appear to be chaotic but are actually well structured. Although it might not have succeeded in constructing a comprehensive theory in a high sense, the book provides a comprehensive literature on and deep insights into many important issues related to spatial evolution. Conclusively, this book is highly recommended for those who are interested in self-organization as well as evolution of cities and regions. It is highly recommended. *Wei-Bin Zhang, October, 2001*

NEWS FROM MEMBERS

The Center for Evolutionary Economics (CEE), Moscow has pleasure in offering mutual beneficial cooperation in the field of evolutionary economics theory development and promotion of evolutionary economics ideas. CEE, Moscow was established by the Institute of Economics and the Central Economics-Mathematics Institute of the Russian Academy of Science in 1995. The center unites economists of different Russian universities, institutes and holds international symposiums, conferences for the evolutionary economics and the institutional theory, promotes the ideas of the evolutionary economics. The center supports contacts with the European Association for Evolutionary Politics Economics and the American Associations for Evolutionary Economics. Mr. Vladimir Maevsky, the chief of the center and a academician of the Russian Academy of Science, is a member of the editorial board of the Journal of Evolutionary Economics. Institute of Economics, the Center for Evolutionary Economics, Nakhimovskiy prospect, 32, Moscow, 117218, Russia Attn:

Prof., academician Vladimir Maevsky; e-mail: cee@inst-econ.org.ru or Kirill Sadtchenko, NEC Corporation, Moscow Representative office e-mail address: sadtchenko@dionis.iasnet. postal address: Krilatsky holmy str, 1, room 177, Moscow, Russia, 121609



The following new articles have been published with support of the Center for Evolutionary Economics and the International Kondratyev's Fund:

Sadtchenko, K.V.(2001). *Evolution of economic systems at micro and macroeconomic levels.*

In Abalkin, L.I., D.S. Lyvov, Makarov, V.L., Maevsky, V.I., Berezovskaya, M.V.(Eds.), *Evolutionary economics: the unity and contradiction of the theory and practice* (p. 149-166). Moscow: the Institute of Economics Press. The publication is available only in Russian.

Sadtchenko, K.V.(2001). *Evolution of economic systems.* In Y.Yakovets, V. Bondarenko & B.Erasov (Eds.), *Dialog and Communication between Civilizations of East and West: Alternatives for XXI century*, collected papers of Fourth International Kondratyev Conference (472-477). Moscow: MFK. The publication is available only in Russian.



Neil F. Johnson reports that Oxford University, UK, is launching the Oxford Center for Computational Finance on 10th October 2001. There are three Directors, reflecting the three academic departments involved: Dr Jeff Dewynne (dewynne@maths.ox.ac.uk - Mathematics), Prof Mike Giles (giles@comlab.ox.ac.uk - Computing) and Dr Neil Johnson (n.johnson@physics.ox.ac.uk - Physics). Several companies are also actively involved in the Center, providing sophisticated hardware, software and database management resources in addition to live data emerging from the world's financial markets. The companies involved in this partnership are Sun Microsystems, NAG, IBM Informix, Reuters and Market Information Services. Several features combine to make OCCF unique in the world as a finance research center: - Interdisciplinary scientific base. OCCF's composition reflects the highly quantitative, data-driven nature of modern financial markets and the increasingly important role of high-performance computing. - Empirical focus. OCCF's capacity to analyze real-time data enables it to study the complexity of the dynamics emerging from today's markets. The markets represent the ongoing experiment, while OCCF constitutes the laboratory. In this way, OCCF's research remains focussed on key issues of interest to both practitioners and academics. - Partnership companies. OCCF enjoys an active collaboration with these companies who have made donations of hardware, software, database management and live market data. Several joint research projects are currently underway.



Nonlinear Dynamical Bookshelf



ABOVE: The Taming of the Butterfly--1

Alt, W., & Deutsch, A. (Eds.). (2001). **Mathematics and biosciences in interaction**. Basel, Switzerland: Birkhauser. This book is devoted to the publication of advanced textbooks, monographs, and multi-authored volumes on mathematical concepts in the biological sciences. It concentrates on truly interdisciplinary research presenting currently important biological fields and relevant methods of mathematical modeling and analysis. Emphasis will be put on mathematical concepts and methods being developed and refined in close relation to problems and results relevant for experimental bioscientists. The envisaged readership includes researchers and advanced students in applied mathematics — numerical analysis as well as statistics, genetics, cell biology, neurobiology, bioinformatics, biophysics, biomedical engineering, biotechnology, evolution and behavioral sciences, theoretical biology, systems theory. -- Publisher

Alt, W., Deutsch, A., & Dunn, G. (Eds.). (1997). **Dynamics of cell and tissue motion**. Basel, Switzerland: Birkhauser. ISBN 3-7643-5781-9. Forms an essential step in understanding the dynamics of life and biological self-organization. Biological motion is one of the most obvious expressions of self-organization, as it requires autonomous creation and regulated action of forces leading

to shape formation and translocation of cells and tissues. The topics of the book include intracellular motility and cytoplasm dynamics (e.g. cell division), single cell movement in varying extracellular media (e.g. chemotaxis or contact guidance), cell aggregation and cooperative motion (e.g. cellular swarms or slugs) and, finally, cell-cell interactions in developing tissues (e.g. embryogenesis or plant movement).

The dynamics underlying biological motion are explained, on the one hand, by various methods of image processing and correlation analysis, and on the other hand by using physico-chemical theories, developing corresponding mathematical models and performing continuum field or stochastic simulations. Thus, the study is of an interdisciplinary character typically found in theoretical and mathematical biology. Its presentation is intended to reach a broad audience — from theoretically interested bioscientists, physicians and biophysicists to applied mathematicians interested in the application of nonlinear dynamical systems and simulation algorithms.

The most important feature of the book is that it considers possible synergetic mechanisms of interaction and cooperation on different microscopic levels: on the molecular level of cytoskeletal polymers, membrane proteins and extracellular matrix filaments, as well as on the level of cells and cellular tissues. New results concern the aspects of filament or cell alignment, various modes of force transduction and the formation of global stress fields. The latter aspect of mechanical cell-cell communication is emphasized in order to complement the much more well studied phenomena of chemical, genetic or electrophysical communication. — *Publisher*.

Boyarsky, A., & Gora, P. (1997). **Laws of Chaos: Invariant Measures and Dynamical Systems in One Dimension**. Basel, Switzerland: Birkhauser. 416p. ISBN 0-8176-4003-7. "The book provides a personal view on invariant measures and dynamical systems in one dimension. It gives a detailed study of the piecewise linear transformations under another spirit than that of W Doebelin developed in the commemorative volume [Doebelin and modern probability: Proceedings of the Doebelin conference "50 years after Doebelin: Developments in the theory of Markov chains, Markov processes and sums of independent random variables", *Contemporary Mathematics* 149 (1993; articles are reviewed individually in Zbl)]. The book contains 13 chapters. Some titles are as follows: Spectral decomposition of the Frobenius-Perron operator Markov

transformations, Compactness theorem and Approximation of invariant densities, Stability of invariant measures, The inverse problem for the Frobenius-Perron equation and others. The style of the book is clear with good didactic perspectives for those who wish to study dynamical systems in connection with measure theory and ergodic theory. Finally the book is a valuable contribution to the topic of Dynamical Systems.” —ZENTRALBLATT MATH

Judd, K., Mees, A., Ku, T., & Vincent, T. (Eds.). (1997). Control & Chaos. Basel, Switzerland: Birkhauser. 352 p. ISBN 0-81 76-3867-9. The articles in this *Control & Chaos* volume are an outgrowth of a US-Australia workshop held in Hawaii in 1995. Experts in dynamical systems theory and control theory from the US and Australia, as well as England and Japan, focused on the problem of controlling nonlinear and potentially chaotic systems using limited control effort. The formal contributions take into account the discussions and commentaries of the participants and are reflected at the end of each article. Part I contains papers dealing with modeling, behavior, reconstruction, prediction and numerics. Part II deals with controlling complex systems by means of embedding unstable periodic orbits, targeting, filtering, optimization and adaptive methods. Part III contains four applications papers including the control of a bouncing ball, evolutionary stability, chaos in ecosystems, and neural networks.

Kennedy, J., Eberhart, R. C., & Shi, Y. (2001). Swarm Intelligence. Orlando FL: Academic Press/Harcourt Science and Technology. Traditional methods for creating intelligent computational systems have privileged private “internal” cognitive and computational processes. In contrast, Swarm Intelligence argues that human intelligence derives from the interactions of individuals in a social world and further, that this model of intelligence can be effectively applied to artificially intelligent systems. The authors first present the foundations of this new approach through an extensive review of the critical literature in social psychology, cognitive science, and evolutionary computation. They then show in detail how these theories and models apply to a new computational intelligence methodology-- particle swarms--which focuses on adaptation as the key behavior of intelligent systems. Drilling down still further, the authors describe the practical benefits of applying particle swarm optimization to a range of engineering problems. Developed by the authors, this algorithm is an extension of cellular automata and provides a powerful optimization, learning, and problem solving method.

This important book presents valuable new insights by exploring the boundaries shared by cognitive science, social psychology, artificial life, artificial intelligence, and evolutionary computation and by applying these insights to the solving of difficult engineering problems. Researchers and graduate students in any of these disciplines will find the material intriguing, provocative, and revealing as will the curious and savvy computing professional.

Features: Places particle swarms within the larger context of intelligent adaptive behavior and evolutionary

computation; describes recent results of experiments with the particle swarm optimization (P50) algorithm; includes a basic overview of statistics to ensure readers can properly analyze the results of their own experiments using the algorithm. Support software can be downloaded from the publisher’s website, which includes a Java P50 applet, C and Visual Basic source code.

Losa, G.A. Nonnenmacher, T. F., Merlini, D., & Weibel, E.R. (Eds.). (1998). Fractals in biology and medicine, Vol. II. Basel, Switzerland: Birkhauser. ISBN 3-7643-571 5-0. Explores the potential of the fractal geometry in understanding how to analyze natural shapes. The volume devotes special emphasis to the complex field of human tumors by addressing the role of fractals in the design, organization and measurement of cellular and molecular structures and of growth patterns in breast and skin carcinoma, in leukemia and lymphoma cells, and in bone, lung and renal diseases. The chapters are grouped into the following sections: Fractal design of biological structures and functions, chromatin structure, DNA organization and nuclear membranes, and fractal structures in tumors and diseases. The volume focuses on current problems in biomedical research and will be invaluable for cell biologists, biomathematicians and laboratory oncologists -- Publisher

Losa, G.A. Nonnenmacher, T. F., Merlini, D., & Weibel, E.R. (Eds.). (2001). Fractals in biology and medicine, Vol. III. Basel, Switzerland: Birkhauser. ISBN 3-7643-6474-2. In March 2000 leading scientists gathered at the Centro Seminariale Monte Verità, Ascona, Switzerland, for the Third International Symposium on “Fractals 2000 in Biology and Medicine”. This interdisciplinary conference was held over a four-day period and provided stimulating contributions from the very topical field *Fractals in Biology and Medicine*. This *Volume III* in the MBI series highlights the growing power and efficacy of the fractal geometry in understanding how to analyze living phenomena and complex shapes. Many biological objects, previously considered as hopelessly far from any quantitative description, are now being investigated by means of fractal methods. Researchers currently used fractals both as theoretical tools, to shed light on living systems’ self-organization and evolution, and as useful techniques, capable of quantitatively analyzing physiological and pathological cell states, shapes and ultrastructures. The book should be of interest to researchers and students from Molecular and Cell Biology, medicine, Biomathematics, Analytical Morphology, Immunology and Neurology, interested in the combination of mathematics and life sciences. – Publisher

Michaels, M. (2001). The Quest for Fitness: A rational exploration into the new science of organization. Writers Club. ISBN 0-595-18133-3. Documents the future of management thought. From 1988 to 1994, a group of consultants, scientists, managers, and academics from economics, commerce, engineering, psychology and other disciplines, worked to reconcile

developments in science with management theory. Led by the author, the group explored the converging models of complex systems, evolution, genetics, mathematics and chaos, physics, neural networks, computational science and other esoteric subjects to determine their relationship to how organizations work.

Early findings were eclectic. They were frequently dismissed by contemporary management theorists for their contrarian nature. Notions such as continuous change, unpredictability and its implications for vision-based strategic planning, and self-organization, scoffed at then, are now finding their way into the mainstream of management theory. Today, we are seeing the ratification of the work of these early pioneers. Yet, there has been little reference to the source of these ideas. Nor has anyone ever presented a concerted new management philosophy that has not been in conflict, in some way, with the converging scientific model. The Quest for Fitness accomplishes both these tasks. - *Publisher*.

"Michaels interprets current business themes through the lens of complexity theory. Using clear metaphors, references to popular gurus of management and complexity, and commentary on contemporary culture, Michael's explores the inner workings of organizations and why they succeed and fail. He has crafted a good read that is as much a history of late 20th century business as it is a how to book for 21st century business leaders." - *William Fulkerson*.

Midgley, G. (2001). Systemic intervention: Philosophy, methodology and practice. Boston: Kluwer. This book aims to rethink systemic intervention to enhance its relevance for supporting social change in the 21st Century. Section One focuses on the *philosophy* of systemic intervention; Section Two on *methodology*; and Section Three on *practice*. Throughout the book, arguments are provided for why philosophy, methodology and practice *all* have a role to play in our thinking about systemic intervention.

Section One introduces the notion of *systems philosophy*, concentrating on the preoccupation of systems thinkers with undertaking 'holistic' or 'comprehensive' analyses. Of course, there is no such thing as a genuinely comprehensive analysis, so the defining feature of systems thinking is reflection on the *boundaries* of inclusion and exclusion. A new path is mapped out for the development of systems philosophy, which dissolves the supposedly 'fundamental' dualism between subject and object that is commonly found in the philosophy of science.

Section Two of the book then goes on to examine the methodological consequences of taking this new approach. First, the concept of *intervention* is introduced. This is defined as purposeful action by an agent to create change, and is contrasted with observation. It is argued that observation, as undertaken in science, should actually be seen as a 'special case' of intervention, not as distinct from it. Next, the systems philosophy outlined in Section One is related to the methodology of intervention, and it is suggested that 'systemic intervention' is purposeful action by an agent to create change *in relation to reflection on boundaries*. This leads to the exposition of a theory of

'boundary critique', which deepens our understanding of what it means to reflect on boundaries in the context of intervention. Each of the following are discussed as part of this theory: the relationship between boundary and value judgements; the extension of the concept of boundary judgement to encompass concerns about how things *ought* to be (as well as what actually exists); the importance of wide-spread stakeholder participation in systemic intervention; and the need for agents to deal with the marginalisation of particular issues and stakeholders within social contexts. Then the case is made for theoretical pluralism. A review of intervention methods and methodologies is also provided.

Finally, Section Three of this book starts with some background to the author's own intervention practice in Community Operational Research (dealing with problematic issues in community contexts). Four examples of systemic intervention are provided, each of which is used to illustrate a different aspect of the methodology outlined in Section Two. The book then ends with an invitation to the reader to begin to practice systemic intervention and contribute to its further development. - *Publisher*

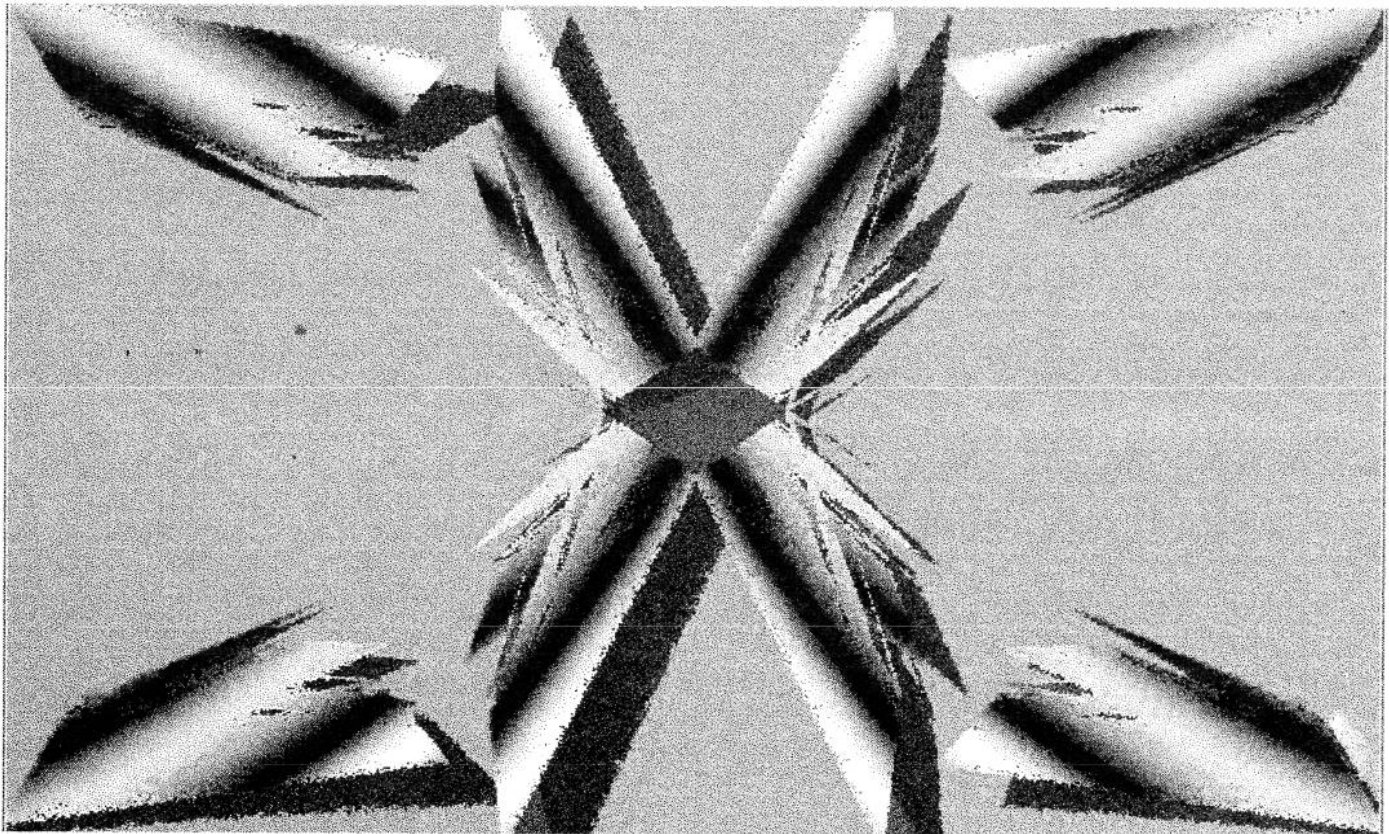
Peters, R. M. (2001). Variability-entropy theory. New Hyde Park, NY: Author. 65p. + vi. ISBN: 0-9713107-0-X. *From the introduction:* The traditional view of health is one of stability... Internal feedback mechanisms are thought to preserve a stable "internal milieu", making immediate internal adjustments to any physiologic stress so as to maintain a constant stable environment... Disease is viewed as a perturbation ... of the normal quiet steady internal environment... Contrary to appearances, good health may actually be characterized by wide fluctuations of physiological variables, by the ability of various organs systems to alter their function immensely in response to physiologic stresses, and by an internal environment that is much more chaotic and dynamic than previously thought. Counter-intuitively, disease processes may actually be characterized by loss of this dynamic variability in physiologic functions... [A] less dynamic internal environment seems to be present in many pathologic states.

Raikhlin, R. (2001). Civil war, terrorism, and gangs: The system of sociology and social dynamics. Web publication by author: http://israel.net/raikhlin/social_dynamics/myengbook. Chapter 1: The system of sociology. 2: The roots of terrorism. 3: Formulation and growth of golems, their classification. 4: The psychology of the golem, how the golem conducts himself. Addenda: The crowd. Quantal sociology. 5: Stereotypes. 6. The ecology of terror. 7: Law and justice. 8. Three whalls of social evolution. The author amplifies: The process of social evolution is described. Three basic elements are distinguished: of psychology, repression and wars. Childish psychology leads to breakdown of society into equal parts and the formation of an unstable structure. Stability is restored by mere repression. Thus a cycle is formed of a "rigid" and stable absolute dictatorship and a "flexible" and unstable democracy. During the "flexible" stage, mutations occur in society, the nature of which defined in the course of military conflicts. The victors are those whose mutations were "good." 9: Leaders and society. 10: Fighting against

terrorism and gangs. 11: Thermodynamics of social systems. Addendum: Resonance of economic systems.

Sulis, W., & Trofimova, I. (Eds.). (2001). Nonlinear dynamics in the life and social sciences. Amsterdam: IOS Press. 417pp + xii. This is a compilation of papers that was selected from the program of the NATO Advanced Study Institute on Nonlinear Dynamics in the Life and Social Science held at the Lomonosov Moscow State University from 25 April to 6 May, 2000. Chapter 1. Chaos Theory. Applications of Chaos, *D. Ruelle*; Entropy, Information and Ordering Criteria in Open Systems, *Y.L. Klimontovich*; Stabilization of Unstable Periodic Orbits of Chaotic Dynamical Systems, *N.A. Magnitskii & S. V. Sidorov*; Chaotic Oscillations and the Genesis of Meaning in Cerebral Cortex, *W. Freeman & J.M. Barrie*. 2. System Effects. Quantitative Languages for Complex Systems Applied to Biological Structure, *M.A. Smith, Y Bar-Yam & W. Gelbart*; Bridge from Classical to Quantum Theory of Open Systems, *Y.L. Klimontovich*; The Neural Basis of Mental Representations: Nonlinear Perspectives, *W Sulis*; Emergence, Radical Novelty, and the Philosophy of Mathematics, *I. Goldstein*; Asymptotic Analysis of Traveling Fronts for Reaction-Transport Systems via Hamilton—Jacobi Formalism, *S. Fedotov*. 3. Time Series. Dynamical Data Analysis at the Turn of the Century, *T Sauer*. Wavelet Analysis and its Applications to Time Series, *L. Levkovich-Maslyuk*. Nonlinear Analysis of 30-Second Sleep Stage Epochs, *ID. R&, L.E. Kapuniai, D.H. Crowell & I. Pearce*. Investigation of Variability of Indexes of Myocardial Contractility by Complexity Measures in

Patients with Hypertension, *T Matcharashvili & M. Janiashvili*. 4. Modeling in Life Sciences. Principles, Concepts and Phenomena of Ensembles with Variable Structure (EVS), *I. Trofimova*; Numerical Study of Bifurcation Phenomena in Nerve Cells, *W Govaerts*; Realistic Modeling of Cardiac Arrhythmia, *C. Zemlin, H. Herzel & A. Panfilov*; Analysis of Rotating DLA-Clusters: Theory and Computer Simulation, *A. Loskutov, D. Andrievsky, V. Ivanov & A. Ryabov*; Online Estimation of the State and Parameters in Compartmental Models Using Extended Kalman Filter, *L. Ozbek & M. Efe*. 5. Nonlinear Dynamics in Psychology and Social Sciences. Three Centuries of Category Errors in Studies of the Neural Basis of Consciousness and Intentionality, *WI. Freeman*; Universals and Specifics in Psychology, *IN. Trofimova*; Nonlinear Dynamics and Psychiatry, *W. Sulis & A. Gupta*. Construction of System Dynamics from Multivariate Data, *FD. Abraham, O. Mitina & V. Petrenko*; Head-tracking Fractal Dynamics in Visually Pursuing a Virtual Target, *P. Renaud, G.E. Singer & R. Proulx*. 6. Nonlinear Dynamics in Biology and Ecology. The Complexity of Evolution, *I. Cohen*; The Gene Centered View of Evolution and Symmetry Breaking and Pattern Formation in Spatially Distributed Evolutionary Processes, *H. Sayama & Y. Bar-Yam*; Nonlinear DNA Dynamics, *LV. Yakushevich*; Chaos and Order in Spatially Structured Plankton Dynamics. A Theoretical Study, *A.B Medvinsky, LA. Tikhonova, S. V. Petrovskii, H. Malchow & E. Venturino*; Self-Organisation in Fish School, *S.V. Semovski*. On Certain Properties of Dayhoff Matrix Transformation, *S.A. Larionov*. Author Index.



MOMMY, Where did I come from?

Complexity Digest, edited by Gottfried J. Mayer

1. Humans on the Move, Science A handful of ancient sites have convinced most anthropologists that early humans frequented southern Europe beginning perhaps 1.2 million years ago. But many researchers aren't sure just what species name to give to the first Europeans, or how many species they belonged to. There is even less agreement on where the first settlers came from and whether they gave rise to later Europeans. And yet recent discoveries here and at other sites in Spain and Italy indicate that Europe was more than just a neglected backwater during the early days of human evolution.

* **Humans On The Move** <<http://www.sciencemag.org/cgi/content/summary/291/5509/1721>>, Elizabeth Culotta, Andrew Sugden, Brooks Hanson, Science 2001 291: 1721 A handful of ancient sites have convinced most anthropologists that early humans frequented southern Europe beginning perhaps 1.2 million years ago. But many researchers aren't sure just what species name to give to the first Europeans, or how many species they belonged to. There is even less agreement on where the first settlers came from and whether they gave rise to later Europeans. And yet recent discoveries here and at other sites in Spain and Italy indicate that Europe was more than just a neglected backwater during the early days of human evolution.

* **In Search Of The First Europeans**, Michael Balter, Science 2001 291: 1722-1725 A new look at archaeological sites throughout the Mediterranean region shows that Neandertals and modern humans coexisted in Europe for at least several thousand years and took turns occupying the same caves in the Middle East for much longer. Although modern humans had a clear technological and cultural advantage in Europe, they did not rout the Neandertals. There are no signs of war or rapid replacement. So far the evidence suggests that there was plenty of room for both groups for thousands of years, with competition for resources intensifying only as the climate worsened.

* **The Riddle of Coexistence** <<http://www.sciencemag.org/cgi/content/full/291/5509/1725>>, Ann Gibbons, Science 2001 291: 1725-1729 Successful reproduction would imply that Neandertals and humans were part of the same species and shared a recent evolutionary history. Studies of the maternally inherited mitochondrial DNA (mtDNA) from three Neandertals show it to be distinctly different from that of living humans, suggesting that Neandertal genes do not survive today and supporting a replacement view (...) variation between Neandertals and modern humans falls within the range of mtDNA variation between subspecies of chimpanzees.

* **But Did They Mate?** <<http://www.sciencemag.org/cgi/content/full/291/5509/1726>> Ann Gibbons, Science 2001 291: 1726 The timing of the Clovis people's journey is pinned down by the melting of the great glaciers of the last

Ice Age. (...) might have trekked through a gap in the glaciers just east of the ice-covered Pacific coastal mountains and south of the arctic ice, to the Great Plains (see map). But they couldn't have gone very far south before the ice melted to open a path. (...) gap probably did not open earlier than 13,000 years before the present (BP)

* **Clovis First**, <<http://www.sciencemag.org/cgi/content/full/291/5509/1732>> Eliot Marshall, Science 2001 291: 1732 Leaders in the field remain skeptical, noting that the evidence from pre-Clovis sites is patchy and uneven, unlike the powerful stone record of the Clovis people. He and other skeptics have challenged pre-Clovis finds, questioning everything from dates to stratigraphy. A close look at a few of the most important and controversial sites illustrates why it is so difficult to prove very ancient occupation--and why the peopling of the Americas remains an open question.

* **Pre-Clovis Sites Fight for Acceptance** <<http://www.sciencemag.org/cgi/content/full/291/5509/1730>> Eliot Marshall, Science 2001 291: 1730-1732 But molecular anthropologists tracking these ancient travelers by the trails left in their descendants' DNA are finding a surprise: striking differences in how the two sexes traveled about parts of this planet. (...) male explorers or warriors carried their genomes to distant places. But surprisingly, in general females seem to have stirred the genetic melting pot by dispersing their DNA more widely than their brothers dispersed theirs--perhaps as a result of thousands of years of moving to join their husbands' clans.

* **Tracking The Sexes By Their Genes** <<http://www.sciencemag.org/cgi/content/full/291/5509/1733>> Elizabeth Pennisi, Science 2001 291: 1733-1734 Polynesia, with its dramatic volcanic islands rising out of the South Pacific, was the last area of the world to be settled by people. The fossil and archaeological trail shows that humans first set foot in Fiji only 3000 years ago, then sailed on within 500 years to Samoa and Tonga, and later reached Easter Island, Hawaii, and the fringes of remote Oceania, exploring a realm stretching 4500 kilometers. But just who was in those out-rigger canoes has long been a mystery.

* **The Peopling Of the Pacific**, <<http://www.sciencemag.org/cgi/content/full/291/5509/1735>> Ann Gibbons, Science 2001 291: 1735-1737 Population genetics has emerged as a powerful tool for unraveling human history. In addition to the study of mitochondrial and autosomal DNA, attention has recently focused on Y-chromosome variation. Ambiguities and inaccuracies in data analysis, however, pose an important obstacle to further development of the field. Here we review the methods available for genealogical inference using Y-chromosome data. Approaches can be divided into those that do and those

that do not use an explicit population model in genealogical inference.

* **Genealogical And Evolutionary Inference With The Human Y Chromosome**, <<http://www.sciencemag.org/cgi/content/full/291/5509/1738>> Michael P. H. Stumpf, David B. Goldstein, *Science* 2001 291: 1738-1742 Ongoing debate about proper interpretation of DNA sequence polymorphisms and their ability to reconstruct human population history illustrates a important change in perspective that we have achieved in the past 20 years of population genetics. To what extent does the history of a locus represent the history of a population? Tools originally developed for molecular systematics, where genetic lineages have been separated by speciation events, are routinely applied to the analysis of variation within our species, with conflicting results.

* **Genetic Clues To Dispersal In Human Populations: Retracing The Past From The Present** <<http://www.sciencemag.org/cgi/content/full/291/5509/1742>> Rebecca L. Cann *Science* 2001 291: 1742-1748 Human biological and cultural evolution are closely linked to techno-logical innovations. Direct evidence for tool manufacture and use is absent before 2.5 million years ago (Ma), so recon-structions of australopithecine technology are based mainly on the behavior and anatomy of chimpanzees. Stone tool technology, robust australopithecines, and the genus *Homo* appeared almost simultaneously 2.5 Ma. Once this adaptive threshold was crossed, technological evolution was accompanied by increased brain size, population size, and geographical range.

* **Paleolithic Technology And Human Evolution** <<http://www.sciencemag.org/cgi/content/full/291/5509/1748>> Stanley H. Ambrose, *Science* 2001 291: 1748-1753

2. Isotopic Evidence For Microbial Sulphate Reduction In The Early Archaean Era, *Nature* Our results provide the oldest evidence of microbial sulphate reduction in the geological record, pre-dating previous evidence by more than 0.75 Gyr. They also give the earliest indication of a specific microbial metabolism. Sulphate reduction is a complex metabolic process requiring advanced membrane-bound transport enzymes (...). Therefore, by 3.47 Gyr ago (...) microbes had already developed many of the critical cellular systems shared by their modern descendants. (...) This placement (...) represents the oldest evolutionary event thus far dated on the tree of life.

* **Isotopic Evidence For Microbial Sulphate Reduction In The Early Archaean Era** <http://www.nature.com/nlink/v410/n6824/abs/410077a0_fs.html> , Y Shen, R Buick & D E Canfield, *Nature* 410, 77 - 81 (2001)

3. The Origin Of Atmospheric Oxygen On Earth: The Innovation Of Oxygenic Photosynthesis, PNAS Abstract: The evolution of O₂-producing cyanobacteria that use water as terminal reductant transformed Earth's atmosphere to one suitable for the evolution of aerobic metabolism and complex life. The innovation of water oxidation freed photosynthesis to invade new environments and visibly changed the face of the Earth. We offer a new hypothesis for how this process evolved, which identifies two critical roles

for carbon dioxide in the Archean period. First, we present a thermodynamic analysis showing that bicarbonate (formed by dissolution of CO₂) is a more efficient alternative substrate than water for O₂ production by oxygenic phototrophs. This analysis clarifies the origin of the long debated "bicarbonate effect" on photosynthetic O₂ production. We propose that bicarbonate was the thermodynamically preferred reductant before water in the evolution of oxygenic photosynthesis. Second, we have examined the speciation of manganese(II) and bicarbonate in water, and find that they form Mn-bicarbonate clusters as the major species under conditions that model the chemistry of the Archean sea. These clusters have been found to be highly efficient precursors for the assembly of the tetramanganese-oxide core of the water-oxidizing enzyme during biogenesis. We show that these clusters can be oxidized at electrochemical potentials that are accessible to anoxygenic phototrophs and thus the most likely building blocks for assembly of the first O₂ evolving photo-reaction center, most likely originating from green nonsulfur bacteria before the evolution of cyanobacteria.

* **The Origin Of Atmospheric Oxygen On Earth: The Innovation Of Oxygenic Photosynthesis** <<http://www.pnas.org/cgi/content/abstract/98/5/2170>>, G. C. Dismukes, V. V. Klimov, S. V. Baranov, Yu. N. Kozlov, J. Dasgupta, And A. Tyryshkin, PNAS 2001;98 2170-2175

4. Crystals Prove Life on Mars, *Discovery* A crystal found in a meteorite from Mars could only have been formed by a microbe and may be evidence of the oldest life form ever found, researchers say. Scientists at the Johnson Space Center in Houston say that a crystallized magnetic mineral, called magnetite, found in a Martian meteorite is similar to crystals formed on Earth by bacteria. (...) Thomas-Keprta said there is no report of such magnetites being formed by any but biologic means.

* **Crystals Prove Life On Mars** <<http://dsc.discovery.com/news/ap/20010226/marslife.html>> , Associated Press, Copyright 2001, Feb. 26, 2001, *Discovery Abstract*: The presence of magnetite crystal chains, considered missing evidence for the biological origin of magnetite in ALH84001 [Thomas-Keprta, K. L., Bazylinski, D. A., Kirschvink, J. L., Clemett, S. J., McKay, D. S., Wentworth, S. J., Vali, H., Gibson, E. K., Jr., & Romanek, C. S. (2000) *Geochim. Cosmochim. Acta* 64, 4049-4081], is demonstrated by high-power stereo backscattered scanning electron micro-scropy. Five characteristics of such chains (uniform crystal size and shape within chains, gaps between crystals, orientation of elongated crystals along the chain axis, flexibility of chains, and a halo that is a possible remnant of a membrane around chains), observed or inferred to be present in magnetotactic bacteria but incompatible with a nonbiological origin, are shown to be present. Although it is unlikely that magnetotactic bacteria were ever alive in ALH84001, decomposed remains of such organisms could have been deposited in cracks in the rock while it was still on the surface on Mars.

* **Chains Of Magnetite Crystals In The Meteorite ALH84001: Evidence Of Biological Origin** <<http://www.pnas.org/cgi/content/abstract/98/5/2176>>, E.

6. Quantifying Dynamics Of The Financial Correlations, arXiv Abstract: A novel application of the correlation matrix formalism to study dynamics of the financial evolution is presented. This formalism allows us to quantify the memory effects as well as some potential repeatable intraday structures in the financial time-series. The present study is based on the high-frequency Deutsche Aktienindex (DAX) data over the time-period between November 1997 and December 1999 and demonstrates a power of the method. In this way two significant new aspects of the DAX evolution are identified: (i) the memory effects turn out to be sizably shorter than what the standard autocorrelation function analysis seems to indicate and (ii) there exist short term repeatable structures in fluctuations that are governed by a distinct dynamics. The former of these results may provide an argument in favour of the market efficiency while the later one may indicate origin of the difficulty in reaching a Gaussian limit, expected from the central limit theorem, in the distribution of returns on longer time-horizons.

* Quantifying Dynamics Of The Financial Correlations <<http://xxx.lanl.gov/abs/cond-mat/0102402>>, S. Drozd, J. Kwapien, F. Guemmer, F. Ruf, J. Speth, arxiv, Talk Presented By The First Author At The Nato Arw On Econophysics, Prague, February 8-10, 2001; To Be Published In Proceedings (Physica A), cond-mat/0102402, 01/02/22

7. Complex Structures In Generalized Small Worlds, arXiv Abstract: We propose a generalization of small world networks, in which the reconnection of links is governed by a function that depends on the distance between the elements to be linked. An adequate choice of this function lets us control the clusterization of the system. Control of the clusterization, in turn, allows the generation of a wide variety of topologies.

* Complex Structures In Generalized Small Worlds <<http://xxx.lanl.gov/abs/nlin.AO/0102029>>, Marcelo Kuperman, Guillermo Abramson, arXiv, nlin.AO/0102029, 01/02/23

8. Artificial Societies of Intelligent Agents, Thesis in Computing Engineering Summary: We developed artificial societies of adaptive autonomous agents, that we consider intelligent, in order to understand adaptive and social behaviour, creating a system that is able to simulate these behaviours. We developed a model for social action, where sociality emerges from the simple interactions of the members of a society. But first, we present a behaviours production system, capable of reproducing in an emergent way several properties of adaptive animal behaviour in artificial creatures. We test our models in a Behaviours Virtual Laboratory, available via Internet, where the user can perform several experiments to test our models and to understand adaptive and social behaviours.

* Artificial Societies of Intelligent Agents <<http://jlagunez.iquimica.unam.mx/~carlos/asia/asia.html>>, Thesis for majoring in Computing Engineering, Fundación Arturo Rosenblueth, México, 2001

9. A Novel Microbial Habitat In The Mid-Ocean Ridge Subseafloor, PNAS Abstract: The subseafloor at the mid-ocean ridge is predicted to be an excellent microbial habitat, because there is abundant space, fluid flow, and geochemical energy in the porous, hydrothermally influenced oceanic crust. These characteristics also make it a good analog for potential subsurface extraterrestrial habitats. Subseafloor environments created by the mixing of hot hydrothermal fluids and seawater are predicted to be particularly energy-rich, and hyperthermophilic microorganisms that broadly reflect such predictions are ejected from these systems in low-temperature (15°C), basalt-hosted diffuse effluents. Seven hyperthermophilic heterotrophs isolated from low-temperature diffuse fluids exiting the basaltic crust in and near two hydrothermal vent fields on the Endeavour Segment, Juan de Fuca Ridge, were compared phylogenetically and physiologically to six similarly enriched hyperthermophiles from samples associated with seafloor metal sulfide structures. The 13 organisms fell into four distinct groups: one group of two organisms corresponding to the genus *Pyrococcus* and three groups corresponding to the genus *Thermococcus*. Of these three groups, one was composed solely of sulfide-derived organisms, and the other two related groups were composed of subseafloor organisms. There was no evidence of restricted exchange of organisms between sulfide and subseafloor habitats, and therefore this phylogenetic distinction indicates a selective force operating between the two habitats. Hypotheses regarding the habitat differences were generated through comparison of the physiology of the two groups of hyperthermophiles; some potential differences between these habitats include fluid flow stability, metal ion concentrations, and sources of complex organic matter.

* A Novel Microbial Habitat In The Mid-Ocean Ridge Subseafloor <<http://www.pnas.org/cgi/content/abstract/98/5/2158>>, Melanie Summit, John A. Baross, PNAS 2001;98 2158-2163

10. The Evolution Of Social Behavior In Microorganisms, Trends in Ecology & Evolution Abstract: Recent studies of microorganisms have revealed diverse complex social behaviours, including cooperation in foraging, building, reproducing, dispersing and communicating. These microorganisms should provide novel, tractable systems for the analysis of social evolution. The application of evolutionary and ecological theory to understanding their behavior will aid in developing better means to control the many pathogenic bacteria that use social interactions to affect humans.

* The Evolution Of Social Behavior In Microorganisms <<http://reviews.bmn.com/browse/areas/record?tocname=Evolution&pii=S0169534701021152>>, Bernard J. Crespi, Trends in Ecology & Evolution, 2001, 16:4:178-183

11. Structural Colour: Now You See It — Now You Don't, Nature Excerpt: The second, more striking effect arising from the tilted multilayering accounts for the strongly bistable nature of the wing reflectivity in diffuse white light: it is either 'on', when an observer sees one of a broad range of colours, or it is 'off' and produces no reflected

iridescence. (...) This structural arrangement is important in signalling by the butterfly. On or near the edge of the A. meliboeus dark zone, wing movements of no more than a few degrees generate ultra-high-contrast colour flicker in reflectivity.

* Structural Colour: Now You See It --- Now You Don't <http://www.nature.com/nlink/v410/n6824/abs/410036a0_fs.html> , P Vukusic, J R Sambles, C R Lawrence & R J Wootton, Nature 410, 36 (2001)

12. Invariant Scaling Relationships For Interspecific Plant Biomass Production Rates And Body Size, PNAS Abstract: The allometric relationships for plant annualized biomass production ("growth") rates, different measures of body size (dry weight and length), and photosynthetic biomass (or pigment concentration) per plant (or cell) are reported for multicellular and unicellular plants representing three algal phyla; aquatic ferns; aquatic and terrestrial herbaceous dicots;

and arborescent monocots, dicots, and conifers. Annualized rates of growth G scale as the $3/4$ -power of body mass M over 20 orders of magnitude of M (i.e., $G \propto M^{3/4}$); plant body length L (i.e., cell length or plant height) scales, on average, as the $1/4$ -power of M over 22 orders of magnitude of M (i.e., $L \propto M^{1/4}$); and photosynthetic biomass M_p scales as the $3/4$ -power of nonphotosynthetic biomass M_n (i.e., $M_p \propto M_n^{3/4}$). Because these scaling relationships are indifferent to phylogenetic affiliation and habitat, they have far-reaching ecological and evolutionary implications (e.g., net primary productivity is predicted to be largely insensitive to community species composition or geological age).

* **Invariant Scaling Relationships For Interspecific Plant Biomass Production Rates And Body Size** <<http://www.pnas.org/cgi/content/abstract/98/5/2922>> , Karl J. Niklas and Brian J. Enquist, PNAS 2001;98 2922-2927 Excerpt: The relationship of body size to the anatomical, physiological, behavioral, and ecological characteristics of animals has long been a focus of interest in zoology. As one considers animal species of different sizes, regular, predictable changes are seen in the relative proportions of the body's organs and the relative rates of physiological processes such as metabolism and growth. Students of zoology are familiar with these scaling relationships (also called allometries) and many of their ecological and adaptive implications (1-3). For example, the relative scaling of metabolism versus that of the volume of the digestive tract affects the potential diets of herbivorous mammals, which in turn influences their social behavior (4, 5).

***Scaling Of Growth: Plants And Animals Are Not So Different** <<http://www.pnas.org/cgi/content/full/98/5/2113>> John Damuth, PNAS 2001;98 2113-2114

13. Circuit Training, Nature Abstract: Robots that can assemble themselves from components smaller than bacteria are beginning to seem less like science fiction. A team at Pennsylvania State University has used DNA to encourage gold wires millionths of a millimetre across to take up specific positions on a gold surface, bringing self-wiring nano-circuitry within the bounds of possibility.(...) The wires whose DNA strands matched those on the surface were up to

four times more likely to become attached than those with non complementary DNA tags, Mallouk's group found.

* Circuit Training, Philip Ball, Nature Science update, 01/02/28

14. Nanohedra: Using Symmetry To Design Self Assembling Protein Cages, Layers, Crystals, And Filaments, PNA Abstract: A general strategy is described for designing proteins that self assemble into large symmetrical nanomaterials, including molecular cages, filaments, layers, and porous materials. In this strategy, one molecule of protein A, which naturally forms a self-assembling oligomer, A_n , is fused rigidly to one molecule of protein B, which forms another self-assembling oligomer, B_m . The result is a fusion protein, $A-B$, which self assembles with other identical copies of itself into a designed nanohedral particle or material, $(A-B)_p$. The strategy is demonstrated through the design, production, and characterization of two fusion proteins: a 49-kDa protein designed to assemble into a cage approximately 15 nm across, and a 44-kDa protein designed to assemble into long filaments approximately 4 nm wide. The strategy opens a way to create a wide variety of potentially useful protein-based materials, some of which share similar features with natural biological assemblies.

* Nanohedra: Using Symmetry To Design Self Assembling Protein Cages, Layers, Crystals, And Filaments <<http://www.pnas.org/cgi/content/abstract/98/5/2217>> Jennifer E. Padilla, Christos Colovos, and Todd O. Yeates, PNAS 2001;98 2217-2221

15. Recent Improvements In Prediction Of Protein Structure By Global Optimization Of A Potential Energy Function, PNAS Abstract: Recent improvements of a hierarchical ab initio or de novo approach for predicting both a and b structures of proteins are described. The united-residue energy function used in this procedure includes multibody interactions from a cumulant expansion of the free energy of polypeptide chains, with their relative weights determined by Z-score optimization. The critical initial stage of the hierarchical procedure involves a search of conformational space by the conformational space annealing (CSA) method, followed by optimization of an all-atom model. The procedure was assessed in a recent blind test of protein structure prediction (CASP4). The resulting lowest-energy structures of the target proteins (ranging in size from 70 to 244 residues) agreed with the experimental structures in many respects. The entire experimental structure of a cyclic α -helical protein of 70 residues was predicted to within 4.3 Å α -carbon (Ca) rms deviation (rmsd) whereas, for other α -helical proteins, fragments of roughly 60 residues were predicted to within 6.0 Å Ca rmsd. Whereas b structures can now be predicted with the new procedure, the success rate for α - and β -proteins is lower than that for α -proteins at present. For the b portions of α/β structures, the Ca rmsd's are less than 6.0 Å for contiguous fragments of 30-40 residues; for one target, three fragments (of length 10, 23, and 28 residues, respectively) formed a compact part of the tertiary structure with a Ca rmsd less than 6.0 Å. Overall,

CONTINUED on Page. 18

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Dear Colleagues,

The year 2001 marks the 10th anniversary of the founding of the *Society for Chaos Theory in Psychology & Life Sciences* (SCTPLS), and the year of our 11th annual conference. We have come along way in the last decade as evidenced by

- The growing list of books and journal publications by Society authors,
- The first five years of our flagship journal, *Nonlinear Dynamics, Psychology, and Life Sciences (NDPLS)*,
- Great attendance and lively collegial spirit at our annual conferences,
- Worldwide recognition for what we have all accomplished together,
- NDPLS included for indexing in *PsycInfo*, *Medline*, and *JEL/EconLit*.

If your mailing label for this *Newsletter* does not already show the date 2002 next to your name, it is because we have not yet received your renewal in the *Society for Chaos Theory in Psychology & Life Sciences* for the 2001-02 year. We are appealing to the Chaopsycher in you—be a part of our growing, energetic family as we enter our second decade. We want to make sure you do not miss any journal issues, *Newsletters*, or special announcements for the year.

We have an exciting year in store. Next year's conference will be in Portland, Oregon, and we are also planning a "European summit". We are continuing to work on our data project, whereby data sources will be available to members for testing and analysis. *NDPLS* will feature special issues on Evolutionary Economics and the Creative Theory Papers.

Your SCTPLS membership costs about 16 cents per day. Not a bad deal for four issues of *NDPLS*, and four issues of a newsletter that keeps you up to date with conferences, events, books, and other timely news. On top of that, the cost of your membership is essentially equal to the difference in conference fees between members and non-members, so your membership fee literally pays for itself!

As always, please contact any of us if you have questions or suggestions about Society work. Our success rests on the support and participation of all of our members. We are looking forward to hearing from you soon, and seeing you at our next conference next summer in Portland Oregon.

Thanks for your consideration. We wish you all the best in 2001-02.

Sincerely,

Kevin J. Dooley, Ph.D. President (kevin.dooley@asu.edu)

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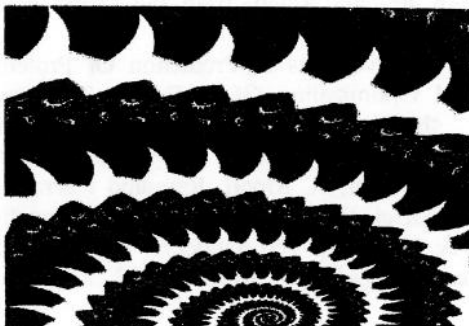
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Meet the President-Elect Candidates – Election of Fall, 2001.

Please use the ballot on page 19.

Dick Bird

In accepting the nomination for the position of President of the Society I have in mind three things. First, dating from around 1989 when I first encountered chaos theory and its applications, my vision of chaos as a transforming force in science and ultimately in society: second dating from about 1992, my vision of the Society as a transforming force within the science of chaos; and third, my determination to work myself and with others to further these aims. I believe that the Society has already achieved great things by providing a community of scholars with linked and extended interests and ideas in the field of chaos in the life sciences; but I also believe it can achieve much more in the future. If elected, I promise to work towards an enlarged role for the society, particularly in terms of European and World participation and membership. Only through the influence of such a force as this Society can the study of chaos have that impact on society and benefit for humankind which it deserves.

Tim Haslett

Tim Haslett is a Senior Lecturer in the Department of Management at Monash University in Australia. His PhD was in the field of Local Rule theory, a subject on which he has presented a number of papers at the Society's conferences. His research interests are in applications of nonlinear theory to the business environment. He combines his academic work with consulting work in the areas of Systems Dynamics Modeling and Complex Adaptive Systems theory.

He has held a wide range of positions with the University sector including membership of the governing council as a staff representative, Head of Department, Director of Post graduate teaching Programs and President of the Staff Union.

He writes, "I was pleased to accept nomination for the position of President of the Society and would be happy to serve in that capacity in the future. At present I would wish to indicate my strong support for Dick Bird as the next President and would look forward to being able to support him in that role in the future."



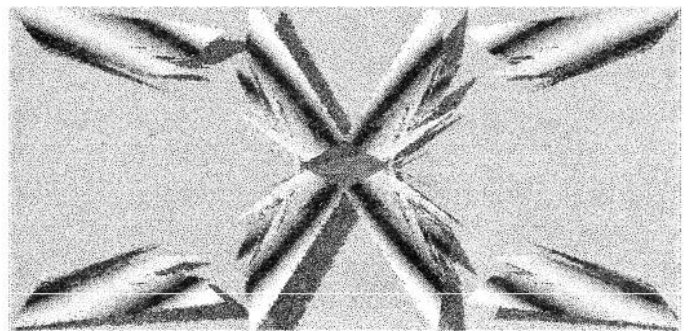
Catechismic Chaos by Anna Tambour

Posted September 28, 2001 issue 111, HMS Beagle
<http://news.bmn.com/hmsbeagle/1112xcursion/poem>

Did nature in creation spurt with math as part of One,
or are numbers a religion making all obey to Sum?

Whatever be the truth of it
I never feel less grave,
Than when Nature to The Numbers,
refuses to behave.

Anna Tambour, a former industrial designer, is now a full-time writer with a particular passion for observing other animals' natural behavior. Poem appears with the permission of the author and Elsevier Science Limited.



Continued from Complexity Digest

these results constitute an important step toward the ab initio prediction of protein structure solely from the amino acid sequence.

* Recent Improvements In Prediction Of Protein Structure By Global Optimization Of A Potential Energy Function <<http://www.pnas.org/cgi/content/abstract/98/5/2329>> , Jaroslaw Pillardy, Cezary Czaplewski, Adam Liwo, Jooyoung Lee, Daniel, R. Ripoll, Rajmund Kazmierkiewicz, Stanislaw Oldziej, William J. Wedemeyer, Kenneth D. Gibson, Yelena A. Arnautova, Jeff Saunders, Yuan-Jie Ye, and Harold A. Scheraga, PNAS 2001;98 2329-2333

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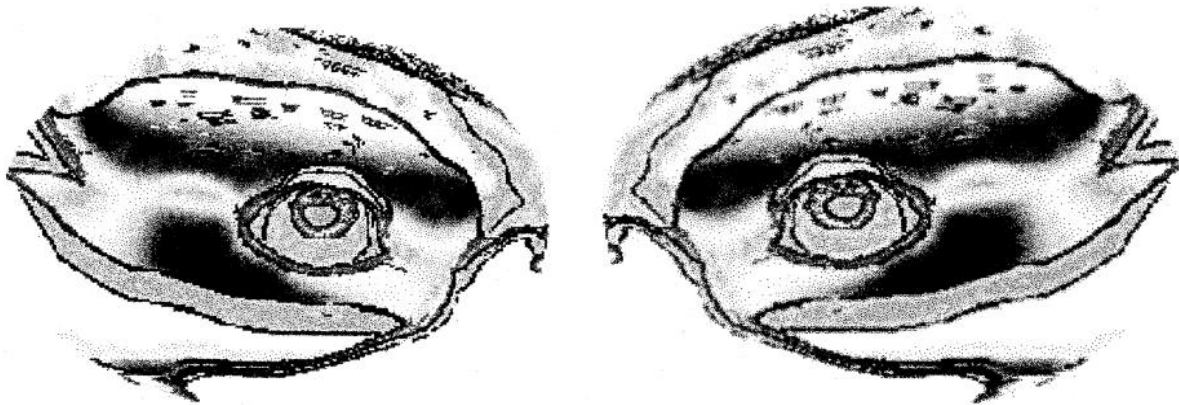
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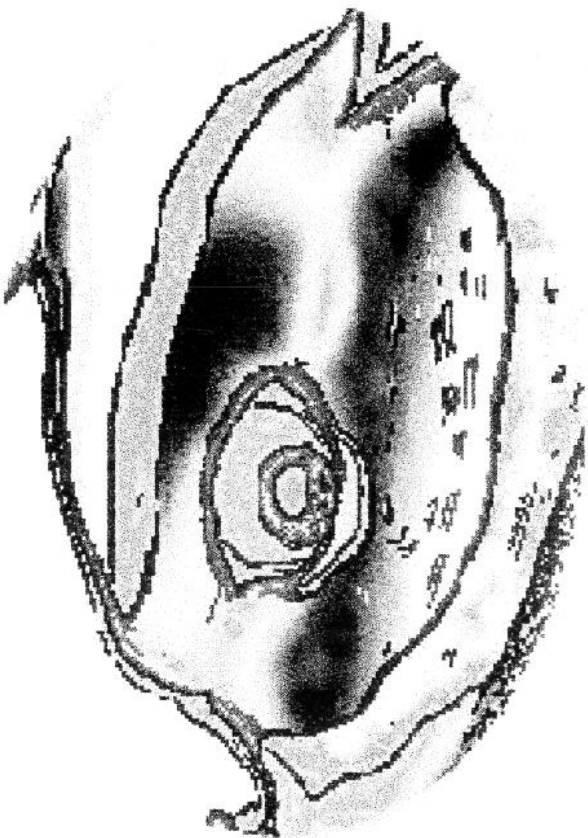
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