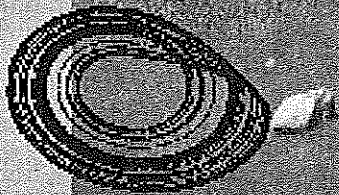
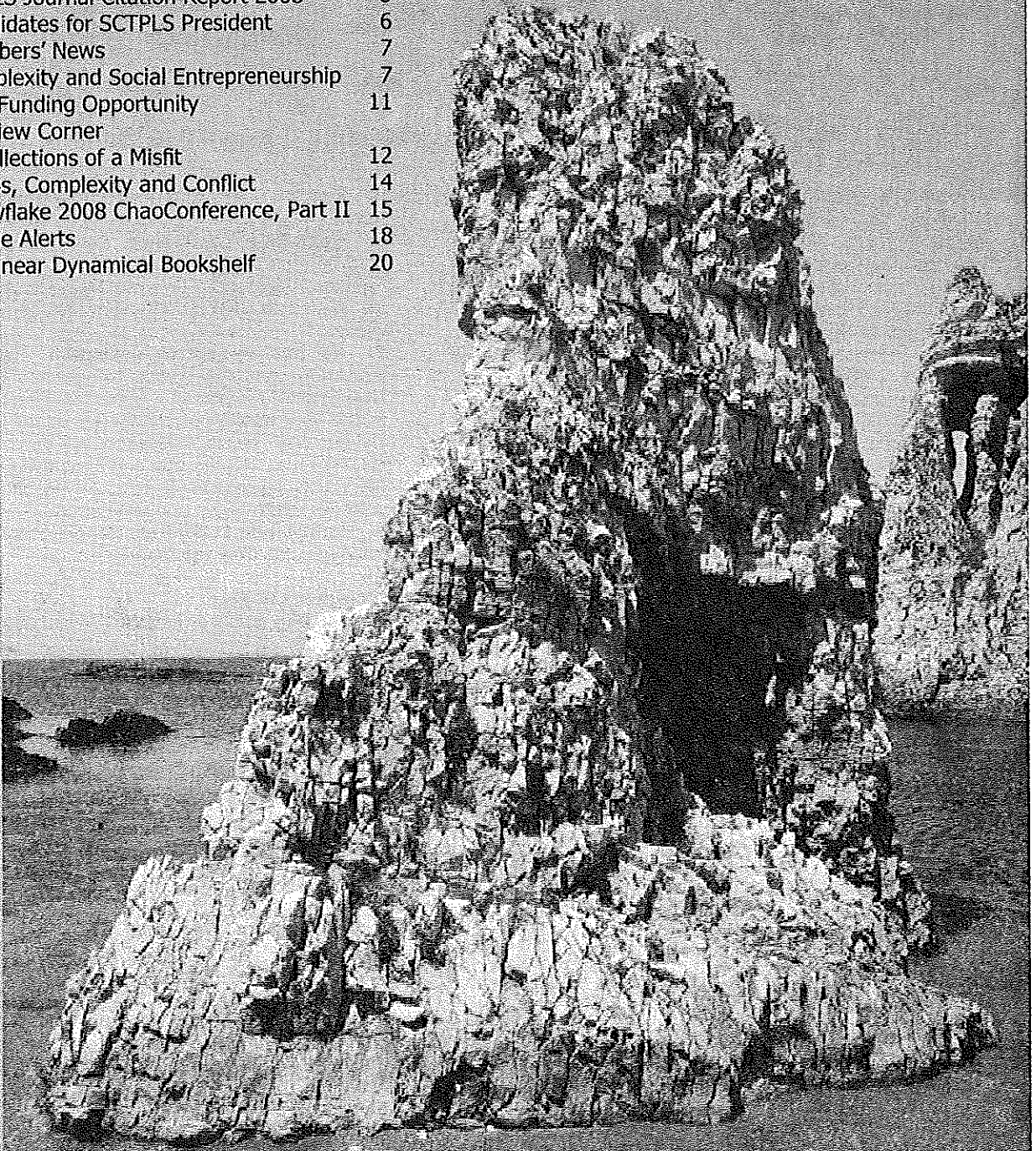


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## 2008 SCTPLS Post-Conference Notes

### Rich conference in Richmond

The Society's 18<sup>th</sup> Annual International Conference in Richmond, Virginia, hosted at Virginia Commonwealth University, was a well-paced event in lovely surroundings. Earnest questions and dialogues enriched and seemed to characterize the sessions and hallway conversations, increasing the benefits of interchanges. Kudos to all who made this conference successful: the Conference Committee, Keynotes, Presenters and Participants, and host. We hope conference papers are flowing into the NDPLS journal's peer-review process!

### Post-conference Publication Opportunity

All presenting conferees were (and still are) invited to prepare their papers for review and possible publication in the Society's research journal *Nonlinear Dynamics, Psychology, and Life Sciences*. NDPLS is peer-reviewed and abstracted in *Psychnfo (Psychological Abstracts)*, *Medline (Index Medicus)*, and *JEL/Econlit*. Click JOURNAL on the SCTPLS web site to access Instructions for Authors.

We hope to see  you published!

## Report on SCTPLS Business Meeting – August 10, 2008

### Business Meeting Minutes

Submitted by Sara Ross, substituting for Joseph Jacobsen, Secretary

The meeting was called to order and facilitated by Jeff Goldstein, in the absences of President Ivelisse Lazzarini and past President Matt Koopmans.

#### 1. Debriefing on the conference.

a. Agreed the facilities were fine, and the support technology provided worked. Key lesson learned is the necessity to have local people who are responsible, committed, and stay on top of things—including communications—from beginning to end. Society's processes must ensure this is the case.

b. Querying possibilities for lower attendance and other venue issues. (i) The higher cost of air travel and shrinking institutional and personal budgets could have been factors. (ii) Pricey hotel may have contributed, a money vs. beauty issue. People certainly free to research where lower cost hotels are, although some said they did not attempt to. We can ensure we consistently publicize a spectrum of lodging possibilities; on-campus housing option good. If we negotiate block discounts with one hotel, such publicity may not be possible. (iii) Richmond not easy to get to via nonstop flights. (iv) Convenience of on-campus food is desirable, not available at VCU all days of conference. (v) Advertising. Local student saw sign in lobby of Student Union building and joined meeting, suggesting we should do preconference advertising at local universities.

c. Suggestion to open up the process of recruiting and selecting preconference workshop proposals, set criteria (e.g., teaching skills) and publicize the solicitation.

2. **2009 Conference location.** The Midwest is next in the cycle. Possibilities: Milwaukee, Madison, Purdue, Chicago, Austin. Will pursue the Austin possibility, attractive with the active, committed presence of Connie Porter and Steven Dietz there.

3. **Nominations for Society President.** Three nominees proposed: Dick Thompson, Barkley Rosser, Jr., and Lynn Winter. Jeff Goldstein will contact Dick and Lynn and check their willingness. As Chair of Nominating Committee, Jeff will get the ballot prepared.

4. **Nominations for Society Secretary.** Jeff will circulate call for nominations for position of Secretary, and place on ballot the names received.

#### 5. Treasurer's Report.

a. Jeff Goldstein moved that the Executive Committee be allowed to raise dues by an amount calculated to take into account inflation since 2002 and indexed to the consumer price index. This would come to an increase of \$10 in current dues at this time. Motion seconded by Barkley Rosser, unanimously approved by members present.

b. Stephen Guastello reported highlights from the Treasurer's report.

6. **Next ISCE Conference.** Executive Committee wants to hold another ISCE in February or March 2010, and to contact Gaetano Aiello about Palermo, Sicily. Steve commented that if we needed an alternative location, Rio de Janeiro could be very viable.

7. **Ad hoc committee activation.** The Membership and Education committees were re-activated by unanimous vote. New Chair of Membership is needed (Sara Ross resigned earlier in the year in view of Newsletter editor commitment). Jayne Fleenor was Chair of Education, will be contacted. Suggestion to pass on to Membership and Executive Committee: Work out reciprocity arrangements (e.g., advertising swaps) with other societies interested in nonlinear approaches.

8. **Publication Committee Report.** Stephen Guastello reported highlights from the report.

### Treasurer's Report

Submitted by Stephen Guastello, Treasurer and SCTPLS CFO

This report summarizes the financial results for the Society for the fiscal year 2007 ending 31 March, 2008. The final net for this year was \$8202 after encumbrances. SCTPLS has been running at a modest surplus consistently since June 1994. The following sections of this report provide the financial details of the Society's operations and the status of special funds.

Table 1. Financial results for FY 2007

Project	Net Income
A. 2007 Conference in Orange	\$5337
B. Deposit on 2008 Conference in Richmond	0
C. INSC conference in Tokyo	7269
D1. Membership fees, institutional subscriptions, individual book sales	(633)
D2. Encumbered amount from FY06 applied	3850
E. Donations to special funds	615
F. Advertising	0
G. Interest on accounts	3579
H. General finance and accounting office	(2000)
Net before encumbrances	\$18,017
I. Donations to special funds (same as E)	(615)
J. Membership fees for 2008-09 and later years received before April 1, 2008	(4200)
K. 2008 Conference expense allocation	(5000)
L. Allocation for new advertising	(1700)
<b>Final net</b>	<b>\$8202</b>

The three main areas of financial operation were the annual conference in Orange CA (Line A, Table 1), the Third International Nonlinear Science Conference in Tokyo (Line C), and the membership-journal activities (Line D). A positive net was recorded for all three areas, after applying the encumbered amount for pre-paid memberships from last year. The total attendance at the 2007 annual conference in Orange 2007 was 65. SCTPLS does not fund travel expenses for the Executive Committee members to the annual conference.

Line D contains receipts from membership fees, institutional subscriptions to *NDPLS*, individual book sales, minus expenses to produce the journal and *Newsletter*, produce the annual art poster, purchase books, and related expenses for Public Relations and other membership operations. Our membership currently stands at 294 active members as of July 21. The institutional subscription level for 2008 increased to 40 subscriptions. Institutional prices for 2009 will reflect a small increase to keep pace with inflation.

Line E: The Society established two special funds in April 2004. The Student Scholarship Fund provides for waivers of conference registration fees for student members who have a technical presentation accepted for the annual conference. The International Hardship Fund provides for reductions in conference registration fees for members who have a technical presentation accepted for the annual conference and who have made a reasonable claim for hardship; travel from a currency-impaired country is the primary example of hardship addressed by the fund program. Other than the qualifications described above, applicants are given awards on a first-come first-served basis to the extent that resources allow. The two funds are maintained by contributions from members. Disbursements are reflected as a lessened amount in Line A. The total balance of the two funds was \$540 at the beginning of FY 2007. Although more offers were made from this fund for the 2007 annual conference, there were two recipients were able to attend the conference. Additional donations were received during the year, and total balance of the two funds was \$765 at the end of FY 2007 for use in the 2008 conference. We anticipate that the funds will be expended at the end of the 2008 conference, however.

SCTPLS has no outstanding debts in the form of bank or other loans, bonds, or accounts payable in excess of 60 days.

### **Publication Committee Report**

*Submitted by Stephen Guastello, Committee Chair*

The SCTPLS Publication Committee currently consists of Terrill Frantz, David Pincus, Stephen Guastello (chair), Ivelisse Lazzarini (ex-officio), and Matthijs Koopmans (ex-officio substituting for Dr. Lazzarini). Its purview covers the development and implementation of editorial policies for SCTPLS publications, which include *NDPLS*, the *SCTPLS Newsletter*, the web site, books, and possibly other publications media. The mainstay of *NDPLS* editorial policy is carried out by its editor (Stephen Guastello) in conjunction with its Editorial Board. The Committee has tertiary responsibility for the *SCTPLS Newsletter*. Its editorial purview falls under the primary direction of the Executive Committee, and is produced in conjunction with, and with great appreciation for the efforts of, its current editor Sara Ross. The Committee's activities this year are summarized below.

**NDPLS.** The journal is now published in a smaller font size (10pt) which allows us to pack more material into an issue, improves the look of a page, and is very commonly used by other journals.

Our art editor, Richard Taylor, has now identified cover artists for 2009 and 2010. They are Danny Della-Bosca and Rob Harle respectively, both of whom hail from Australia.

The Committee developed a procedure for selecting *NDPLS* editors, which was published in the January, 2008 issue of the

*SCTPLS Newsletter*. As its first implementation, Stephen Guastello was re-appointed Editor in Chief for a term that concludes with the October, 2013 issue of *NDPLS*.

The Committee developed a system for selling reprints, single articles in PDF format, through the website. The availability of single articles will serve the immediate needs of scholars who do not have institutional subscriptions or access through Interlibrary Loan arrangements. The service is not connected to membership, and should raise a small amount of additional revenue for the Society. It continues to be standing policy for *NDPLS* authors to receive PDF files of their articles upon request at no cost.

The Committee developed a policy for fair use of the PDF files, which appears on the web site at the point of purchase. Under the policy, the Committee (David Pincus, Permissions Editor) has to date declined two requests to post PDF files on open-source web sites.

The Committee has to date declined three requests from two commercial entities to include *NDPLS* articles in full-text indexing services. The rationale is that the computation of royalties was convoluted and would produce revenue less than one institutional subscription per year. Furthermore, if libraries imagined that they had access to *NDPLS* through another product, they would not subscribe to *NDPLS*. The Committee surmises that the economics of full-text systems of these types greatly favor large and expensive journal publishers who might have saturated their institutional markets.

The 2007 citation report appears on the *NDPLS* section of the SCTPLS web site. The current impact factor, which we computed based on ISI *Social Science Citations Index* only, is 1.58. The Committee is aware that the 2007 report is belated, but intends to produce the 2008 report in more reasonable time, and in doing so include citations in *Journal Citation Report*, which is the natural and biological science division of the ISI data base.

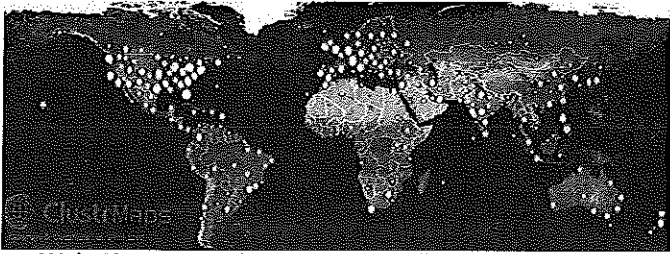
*NDPLS* will have small ads appearing in two of EBSCO's catalogs in 2009. The current version of the on-line catalog offered some interesting price comparisons between institutional subscription rates for *NDPLS* and other nonlinear journals. The comparison information appears as an addendum to this report.

**Newsletter.** The Committee reports a redesign of the cover of the SCTPLS Newsletter beginning with the issue of July-August, 2008. The cover will serve as another venue for nonlinear-inspired art, which is thought to be a growing genre. The first artist in the series is Attilio Taverna from Italy. Two more of his artworks are under consideration for cover display, although the Newsletter is not planning on devoting an annual set to each author, thereby making more opportunity for single works of particular significance.

We are now preparing an e-book of selected feature articles that have been published in the Newsletter over the years 1993-2008. The intention is to facilitate indexing in the *PsycEXTRA* data base (a product of the American Psychological Association), and to inspire more authors to write feature articles for the *Newsletter*. The e-book will be a free download from the SCTPLS web site.

**Books.** The Committee has re-activated its book program on a limited basis, following the procedures used for two previous books published in 1995 and 1996. The first book of the revised program is *Chaos and Complexity in Psychology: The Theory of Nonlinear Dynamical Systems*, edited by Stephen J. Guastello, Matthijs Koopmans, and David Pincus, and published by Cambridge University Press. A description of the book contents appeared in the *SCTPLS Newsletter* issue of July-August, 2008. We expect the book to be ready for sale this fall. Additional titles have not been announced, although the Committee would like to favor ideas that make strategic use of articles published in *NDPLS*.





**Web Site.** Our Web Manager (Terrill Frantz) has installed a map that displays hits to the SCTPLS home page and the main conferences page. The map appears on the home page, and a still-frame of the map current through August 8, 2008 appears in this report. The bubbles are in three sizes representing 10 hits or fewer, 11-100, and 1000+ hits from a given area.

The SCTPLS web site was moved to a new server and a new ISP in October, 2007. The new server is more powerful than the old one, and gives us more flexibility for adding new features. The transition work was extensive, but Terrill was able to make the shift seamlessly.

The Committee has started its search for new web page designs. Lynn Winter contacted a designer on our behalf, but concluded that the designer did not come up with anything that represented an improvement. Ryan Schoenbeck, one of our newer members, has volunteered to develop some potential designs for us.

The Conference page now contains sets of conference abstracts from the 2003-2007 SCTPLS Annual International Conferences, and the 2006 and 2008 INSC conferences, which have been re-edited and converted into PDF format with new cover pages. These sets were prepared for indexing and inclusion in *PsycEXTRA* through an arrangement with the American Psychological Association that was made last fall. The 2008 set should be ready soon, and abstract sets from 2003 and earlier will be reconstructed for this venue as time permits.

New items have been added to "Resources for Students and Teachers," the most notable of which is the glossary of basic nonlinear science terms.

### **Addendum**

#### **Institutional Price Comparisons for Journals**

We were able to collect some price comparisons for the on-line versions of some other nonlinear science journals that are listed in EBSCO's *On-line Media Catalog*, using the index terms: *Nonlinear Dynamics*, *Complexity*, and *Chaos*. The catalog currently lists 2008 prices as shown, although the price changes for 2009 will be entered between now and October. The column for 2009 estimated prices is based on 2008 plus 3% inflation. The actual institutional prices for *NDPLS* are shown in the table for 2008 and 2009. The prices above are loosely proportional to the annual size of the journal and its page and type sizes, but are also dependent on whether the publisher is a professional society or a commercial publisher.

EBSCO lists only *Chaos*, *Solitons*, and *Fractals*, in print+online only, for \$4051. The reduced price shown in the table is based on Elsevier's recent pricing policies for on-line versions only as we understand them. Similarly, EBSCO lists only \$989 for *Mathematical Psychology* and \$6161 for *Physica D* in print+online. The same comparison adjustments were made here.

EBSCO lists \$314 for *British Journal of Mathematical and Statistical Psychology* for print+online. Because we are uncertain of the British Psychological Society's pricing strategy policy in this regard, no adjustment was made for BJMSP. *NDPLS* is available in a print+online package for \$250 for 2008 and \$265 for 2009 volume years.

*Chaos and Complexity Letters* is not listed in the EBSCO electronic media catalog. The table shows the last known price

for the print edition, which was listed as \$275 in Vol. 3, No. 2, 2008. The same 3% was added to estimate the price for 2009.

*Discrete Dynamics in Nature and Society* is listed in the EBSCO catalog as print+online. Starting in 2007 Hindawi, its publisher, changed all its journals to open access, and authors pay to publish their work in the journal. Hindawi is apparently charging for the print in the catalog listing.

### **NDPLS Journal Citation Report 2008**

*Compiled by Stephen Guastello, Mark Lynn, & Meghan Doyle, Marquette University*

Impact and Immediacy factors are now available for *NDPLS*, current through December 2007. We compiled Impact and Immediacy Factors based on information available in ISI's *Web of Science*, which encompasses a data base of approximately 4500 scientific journals plus approximately 1400 journals categorized as social sciences.

**Impact Factor** – We used the traditional computational method, which is the number of citations of *NDPLS* articles that were published over a 5-year period divided by the number of articles published during that period. Thus, for this 2008 report we counted the citations to *NDPLS* articles that were published in 2002-2006 that were cited in articles that were published in 2003-2007, plus any citations that we found for those articles at the time they were in press and not yet published in *NDPLS*. *NDPLS* published 100 articles during the years 2002-2006. We found 129 citations to those articles in *Web of Science* journals, plus 62 more citations in *NDPLS* 2003-2007. The total of 191 citations divided by 100 articles produces a current impact factor of 1.910.

The Impact Factor does not reflect citations to *NDPLS* articles that were originally published before 2002. Many of the earlier articles continue remain influential to works currently appearing in *NDPLS* and in other journals.

**Immediacy Factor** -- This is the number of citations of *NDPLS* articles within one year of the date of publication of each article. In other words, citations for 2002 articles that would count for this index would have had to be published in 2002 or 2003, and could possibly include citations to an *NDPLS* article in press insofar as that information could be ascertained from the data base. For articles published in 2001-05, there were 57 qualifying citations in the *Web of Science* data base. There were 33 additional citations within *NDPLS* for *NDPLS* articles. The total of 90 citations divided by 100 articles renders an immediacy factor of 0.90.

**Other nuances** – We are aware the ISI's *Journal Citation Reports*, which are produced for some of the journals in the *Web of Science*, are now based on an exposure window of two years instead of five years. The earlier thinking was that the five year time period constituted the average "half-life" of an article's influence at the time it was instituted. The two-year system allows for more recent updates regarding a journal's influence with less influence of the past, but in our opinion, permits incomparable levels of fluctuation for relatively small-sized journals. The two-year system is accompanied by a new index of the journal's half-life, which purports to individualize the computation of the half-life. The half-life index often produces the default value of 10 years for journals that are relatively new, often less than 10 years old. We do not have an opinion on its merits at this time.

The Impact and Immediacy factors reported here supersede the values verbally reported at the SCTPLS Business meeting, which were based on the previous year's data collection for articles that were published 2001-2005.

**Table 1. Institutional Prices for Nonlinear Journals in On-line Format**

2008 USD	2009 Est.	Title	Publisher	Origin
3542	3648	Physica D	Elsevier	Netherlands
2731	2813	Int. J. Bifurcation and Chaos	World Scientific	Singapore
2343	2413	Chaos, Solitons, and Fractals	Elsevier	UK/Netherlands
795	814	Emergence: Complexity in Orgs	ISCE	USA
735	757	Complexity	Wiley	USA
569	586	Mathematical Psychology	Elsevier	Netherlands
568	585	Computational Complexity	Birkheuser	Switzerland
553	570	Journal of Complexity	Elsevier	Netherlands
535	551	Chaos	Amer Inst Physics	USA
360	371	Nonlinear Dynamics and Systems Th.	Informath	Ukraine
318	328	Advances in Complex Systems	World Scientific	Singapore
314	323	Brit. J. Math and Stat Psych	Brit Psyc Society	UK
284	293	J. Computational Nonlinear	Amer Soc Mech Eng	USA
275	283	Chaos and Complexity Letters	Nova Science	USA/Italy
225	240	NDPLS	SCTPLS	USA
195	201	Discrete Dynamics in Nature and Soc	Hindawi	Egypt
140	144	Studies in Nonlinear Dyn Economics	Berkeley Elec Press	USA



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### Statements by Candidates for SCTPLS President

*It's election season in the Society. Ballots for the next President are in members' hands as this Newsletter goes to press. The following are the candidates' statements as reported on the ballots.*

#### J. Barkley Rosser, Jr., Ph.D.

I am Professor of Economics at James Madison University. I have served on the board of editors of *NDPLS* since its beginning, and I also edit the *Journal of Economic Behavior and Organization*. I am honored to be nominated for this position, and I would be willing to serve in it at some point. At this point in time, however, I feel that my opponent is the better candidate based on his ability to organize international conferences, and I urge you to vote for him as the next president of the SCTPLS. I hope to see SCTPLS continue to expand its links and cooperation across more disciplines and to involve scientists in more countries around the world.

#### Dick Thompson, Ph.D.

I am currently the President and CEO of High Performing Systems, Inc., a management consulting company that has been researching and applying nonlinear dynamics to organizations since 1984. I completed my doctorate in 1981 at the University of Georgia (UGA) in psychology and served as a professor and department chair. Abe Tesser introduced me to nonlinear dynamics, and especially catastrophe theory, while I was at UGA. I have made a career of working in and integrating the theoretical, research and applied dimensions of NDS. I am currently a board member for the University of Georgia's Institute of Artificial Intelligence.

I have served in leadership capacities for several international societies, large and small, and have experience creating conditions that allow for the emergence of systemic growth in global contribution, membership and conference attendance. Our global mission through SCTPLS and our own humanity requires us to use our knowledge of NDS and our collective membership intelligence to help resolve global issues. We have the knowledge, resources, skill sets, experience and ability to reshape the trajectory of human consciousness and, consequently, the future of humanity—and perhaps the earth.

There are many factors affecting the size of SCTPLS' membership. I have the experience of reanimating organizations and creating organizational growth in both the public and private sectors. As president I will apply my collaborative skills to build membership. We have a strong base of highly intelligent members who can all benefit from expanding the size of SCTPLS. In addition to current benefits such as the SCTPLS Newsletter, annual conference, discounts on NDS & chaos related books, book reviews and NDS Journal, we will explore quarterly workshops, virtual presentations by NDS discipline leaders on their current work, research papers, copies of articles, global project participation, more research collaboration, webinars, more networking, more graduate student participation, increased multi-discipline membership, expanded relationships with other societies, reduced rates for multiple society membership, an enhanced website with articles, videos, etc., more member recognition in the Newsletter, global impact, to name a few.

I present at several conferences each year in different disciplines and bring fresh ideas and techniques for enhancing conference attendance. I believe in long range (at least 5-10 years out) visionary conference planning that can be adapted at the operational and tactical level as we move through time toward the specific yearly milestones. Adopting this type of longer-range planning will allow us to develop strategic themes to support the SCTPLS vision. Additional

techniques for increasing the power of our annual conference and attendance include, but are not limited to: Establishing a larger conference team, a powerful multi-disciplined conference program, keynotes who are leaders in their field with presentations integrated in to the particular conference theme, enhanced pre-, onsite and post networking opportunities, presenter bios, presentation abstracts, presentation handouts & takeaways, opportunities to meet book authors, books at a discount, project collaboration meetings, strong marketing to members, non-members and other organizations and marketing by SCTPLS members.

By taking on a global focus, building our membership and putting on "the" NDS related conference of the year (each year) we will begin to create a synergistic effect that may become a reinforcing loop for all the areas discussed above. I would like to have the opportunity to assist SCTPLS in moving to the next level.

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## Members' News

**Ichiro Tsuda** let us know about his contributions in these recently published articles. Also see Robert Gregson's comments about one of these in the *Re-View Corner's Article Alerts*, below.

Fukushima, Y., Tsukada, M., Tsuda, I., Yamaguti, Y., & Kuroda, S. (2007). Spatial clustering property and its self-similarity in membrane potentials of hippocampus CA1 pyramidal neurons for a spatio-temporal input sequence. *Cognitive Neurodynamics, 1*, 305-316.

Hatakeyama, M., & Tsuda, I. (2007). Internal logic viewed from observation space: Theory and a case study. *BioSystems, 90*, 273-296. Presents a new framework for neurocognitive experiments. "We show that our framework predicts the existence of unidentified types of neurons, thereby the framework can be used to propose new types of experiments."

Matsumoto, K., Tsuda, I. & Hosoi, Y. (2007). Controlling engine systems: A low-dimensional dynamics in a spark ignition engine of a motorcycle. *Z. Naturforsch, 62a*, 587-595.

Pan, X., Sawa, K., Tsuda, I., Tsukada, M., & Sakagami, M. (2008). Reward prediction based on stimulus categorization in primate lateral prefrontal cortex. *Nature Neuroscience, 11*, 703-712.

Tsuda, I., & Fujii, H. (2007). Chaos reality in the brain. *Integrative Neuroscience, 6*, 309-326. *Editor's note: See the Article Alert below.*

**Joe Jacobsen** recently finished teaching a course in business economics in Quito, Ecuador, and shared the following report with us.

Ecuador was both physically and intellectually rewarding. The capital, Quito (pop  $\approx$  2,000,000) is about 10,000 feet above sea level and I quickly realized this when I went for my usual 5 mile run that turned out to be a 1 mile run. There is about 20% less oxygen this high. An exhausting climb up the Pichincha Volcano took me 15,670 feet above sea level. While at the equator, the sun went down and it was chilly. Ecuador has rain forests, a dry interior, snow packed mountains, volcanoes, beaches and of course, the Galapagos Islands. The country is divided up into three regions, the coast, the Andes and the Amazon Basin.

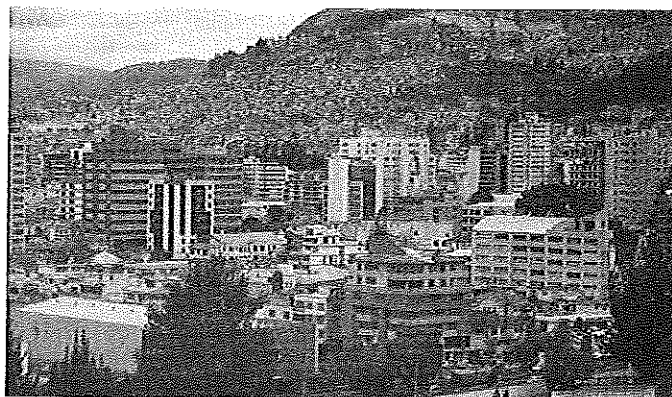
The price of a US gallon of unleaded gasoline was US \$1.07 with a government subsidy. The currency is the US dollar and the students were concerned that this government decision may have been a mistake. I wonder what they think now. There is a 35% tax on automobiles but food and housing are relatively inexpensive.

The students were grad level with a few post grads from Ecuador, Columbia and Peru. They were concerned about the rain forest disappearing and the receding snowpack. All of them worked in large organizations and the course was a four day, 8 hours a day workshop about mathematical modeling of economic systems. The students' math and science abilities and interest were superior. They were very diligent: if a focus was not about math or science, they considered it fluff.

This was my first time teaching through a translator and I primarily agreed to take the gig for the exercise. Lo and behold, it was easy working through a translator because mathematics is a universal language. As a result, minimal translation was needed.

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***Have you noticed? Your Newsletter welcomes photos from you! What better venue to titillate fellow members with eye-pleasing and awareness-raising delights?!***



**Quito, Ecuador © 2008 Joseph Jacobsen.**  
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# Feature Article

## Complexity and Social Entrepreneurship: Findings from a Conference

Jeffrey Goldstein, Adelphi University

### Introduction

A groundbreaking event had the spotlight April 24-26 at my school, Adelphi University (located in Garden City, New York), as it hosted the First International Conference on Social Entrepreneurship, Systems Thinking, and Complexity. The conference was sponsored by Adelphi University and was co-sponsored in association with the Institute for the Study of Coherence and Emergence (ISCE) and The Plexus Institute. ISCE publishes not only the quarterly journal *Emergence: Complexity and Organizations* (of which I am one of the editors-in-chief) but a host of other publications centering on the sciences of complex systems. The Plexus Institute is devoted primarily to complexity applications in healthcare, including healthcare institutions. The conference was supported by funds from the office of Adelphi's President, Robert Scott, the office of the Provost, Marcia Welch, the School of Business, a generous grant from Tom Shinnick, Chair of the Business Advisory Board of the School of Business, and Dean Anthony Libertella's Family Foundation.

Besides myself, two of my colleagues at Adelphi worked to put the conference together: Prof. James Hazy and Prof. Joyce Silberstang. We three are forming the kernel of a complexity group within the School of Business at Adelphi. We were aided in this effort by several other colleagues working in the area of systems and networks plus the hard work of several of our graduate assistants and graduate students, in particular Karolina Baker. In addition, we received invaluable help from the Dean's secretaries Kathy Dillon and Barbara Kenny.

Three main reasons motivated our decision to convene this particular conference. The first was our growing recognition that although the burgeoning field of social entrepreneurship was getting increased publicity, its inspiring stories show an insufficiency in their theoretical trends. They tend to emphasize a narrative structure characterized by heroes and heroines facing nearly insurmountable impediments yet overcoming these obstacles through their charismatic powers (see, e.g., Bornstein, 2004; Westley, Zimmerman, & Pattan, 2007). Although such stories are indeed inspirational, this focus on the heroic quest downplays the many important factors at work in the success of such programs. Factors like viable social networks, innovative organizational forms, and other features, all of which seem particularly apt to a complexity interpretation, all surely take their places in interrelated fashion with the individuals given prominence in heroic narratives. To attribute successes to individuals without recognizing the accompanying factors and features—the full complex system dynamics, in other words—indicated to us that the field in general lacked a solid theoretical foundation. Indeed, it became apparent that the leading funders throughout the world for social entrepreneurial programs (I'll get to a preliminary definition of social entrepreneurship below) tended, in their initial push for practical outcomes, to curtail theoretical examinations of these programs. Yet, we also knew that this dearth of theory would be changing soon since several universities (including some "elite" ones) in the US and the UK had received large grants to launch academic programs on social entrepreneurship.

The second reason, related to the first, was that our complexity group at Adelphi was seeking to create a Center for

Complexity Studies in the School of Business at Adelphi. This Center would include degree-granting programs as well as other programmatic forms of executive development and consulting. Focusing our proposed Center on the application of complexity and systems thinking to the world of social entrepreneurship seemed to fit nicely with the range of expertise I and my colleagues had ourselves been developing over the past years, expertise not only in complexity and systems perspectives but in entrepreneurship, leadership research, group process, and organizational theory in general. For example, we had recently published an edited volume on complexity applied to leadership (Hazy, Goldstein, & Lichtenstein, 2007).

The third reason was our growing realization of the many serious social problems that were falling through the cracks of the social safety nets in the United States and abroad, safety nets that were themselves fraying due to both inadequate funding due to government neglect and poor infrastructure. It seemed that if research into the dynamics of complex systems was to have any real staying power, one way it could demonstrate its merit was to help improve social and cultural conditions. Here we were inspired by the great quote of Kurt Lewin: "there is nothing more practical than a good theory." We sincerely believed that research into complex systems was indeed resulting in very good theories and we wanted to see just how good these theories had become by trying them out on difficult practical settings like those found in social entrepreneurial projects.

To articulate what exactly comprises *social entrepreneurship* is not a straightforward task. Generally, the term refers to those kinds of grass-roots initiated projects that focus on some kind of social or cultural improvement utilizing multi-funding sources as well as attempting to generate income in an entrepreneurial fashion. At least that was a sort of starting definition as we organized the conference. However, one of the big learnings that has taken place as a result of the conference is the need to expand this definition to include a whole host of new organizational forms and alliances coming together in a cooperative fashion that generate *social value* which addresses some of the unique and pressing challenges facing the economic and social situations of the 21<sup>st</sup> century. This systems thinking approach to social value resonates with the *societal* emphasis that shows up in the Swedish Knowledge Foundation's (2008) definition: "Societal entrepreneurship is an initiative aimed at improving that which is missing or not working in the social structure: new solutions that create a sustainable society – economically, socially and ecologically."

Thus, we recognize now that our earlier understandings of the "what" and the "how" of social entrepreneurship should be joined with this "why:" if they are to be effective, social entrepreneurial efforts should generate sufficient social value to address contemporary challenges. It is not just about worthwhile, multi-actor, multi-funder improvement projects and generating income in an entrepreneurial fashion; it is also about meaningful, sustained changes in complex social systems.

## The Conference

Since this was to be the first conference applying complexity and systems thinking to social entrepreneurship, at least that we were aware of, we really had no idea how many people were out there who were interested in giving papers at such an event. We figured on an audience of maybe 40 to 50 and we set out to encourage participation worldwide by offering some full and partial scholarships to insure we were getting actual practitioners from parts of the world where adequate financial resources were simply non-existent. Attendees could present papers, provide poster sessions, be involved in panel discussions, and/or simply attend.

We were surprised, therefore, that participation in the conference exceeded our expectations, with 65 participants representing an astounding 30 countries (some of those foreign participants residing in the US). We thus had a hearty mix of people from different countries, economic statuses, and professional backgrounds. The countries represented included (in no special order): Romania; Switzerland; UK; Mexico; Canada; Croatia; Indonesia; Germany; Greece; Italy; the Democratic Republic of the Congo; Bangladesh; New Zealand; Norway; Columbia; South Korea; Bulgaria; Pakistan; India; Sweden; USA; Brazil; Hungary; Ireland; Ghana; Haiti; Ecuador; Turkey; and Taiwan.

Presentations covered such themes as defining social entrepreneurship using insights from complexity and systems thinking, cross-sector partnering, social entrepreneurial programs among indigenous populations, the role of emergence and dynamical systems theory in understanding social entrepreneurial programs, complex hierarchies and organizational tasks, the intersection of economics and complexity, social value creation, and many others. In general we had a nice blend of theoretical and case study-oriented presentations as well as a panel discussion on economic issues.

We also had two keynote addresses on social enterprise and the economics of social entrepreneurship.

The conference design enabled participants to engage the first evening's

panel speakers as well as subsequent keynotes. These whole-group exchanges seeded our new learnings and suggested challenges ahead. For example, as Jim Hazy summarized an exchange after one keynote, it seems clear that interdisciplinary breadth that integrates knowledge from complexity and computational sciences with the social sciences will be important. After all, before social entrepreneurial efforts aim to change existing social systems, it is vital to understand what functions the various systems have been serving and what has made those often very enduring systems work—or no longer work—to begin with.

## Publication Outcomes of the Conference

Six papers were selected from the presentations to be published in a Special Issue of *Emergence: Complexity and Organization*. This issue, Volume 13, Number 3, Fall 2008 is now in the printing phase although it is already available for online subscribers. The Table of Contents includes:

"Editorial Introduction: Complexity and the Generation of Social Value" - Jeffrey Goldstein and James Hazy (United States)

- "The Social Entrepreneurship Matrix as 'Tipping Point' for Economic Change" - Brenda Massetti (United States)
- "Complexity and Social Entrepreneurship: A Fortuitous Meeting," J. Goldstein, J. Hazy, & J. Silberstang (United States)
- "A Spiral of Innovation Framework for Social Entrepreneurship: Social Innovation at the Generational Divide in an Indigenous Context" - P. Tapsell & C. Woods (New Zealand)
- "Social Entrepreneurship as a Performance Landscape: The Case of 'Front Line'" - M. L. Rhodes & Gemma Donnelly-Cox (Ireland)
- "Adaptive Responsibilities: Nonlinear Interactions in Cross-Sector Social Partnerships" - May Seitanidi (England)
- "Social Entrepreneurship as an Algorithm: Is Social Enterprise Sustainable?" - Jeff Trexler (United States)

The Special Issue also includes a Classical Paper by the late sociologist Walter Buckley who had coined the expression "complex adaptive system" actually in 1968, long before Santa Fe Institute days: "Society as a Complex Adaptive System" with an Introduction by D. Schwandt and J. Goldstein. There is also an essay on the conference and its themes by Ron Schultz, one of the conference keynoters.

In addition, because the conference elicited many other excellent papers, we are putting together an edited volume that will include the papers from this Special Issue of *E:CO* plus an additional 15 to 20 papers. I announced a call-for-papers for this edited volume at August's International Conference of the Society for Chaos Theory in Psychology & Life Sciences in Richmond, Virginia. This call will be open until mid-November, 2008; please send submissions that adhere to *E:CO* guidelines (<http://emergence.org>) to [goldstei@adelphi.edu](mailto:goldstei@adelphi.edu).

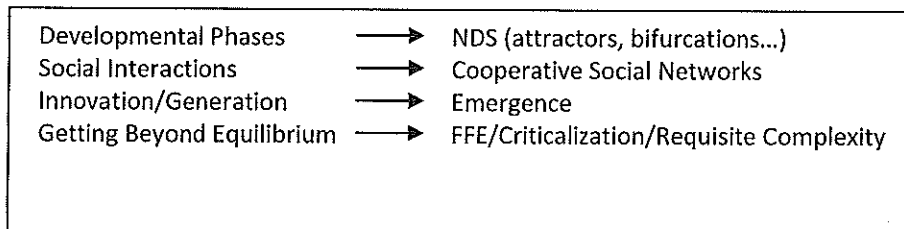


Fig. 1: Social Entrepreneurship and Complexity Constructs

## Complexity and Social Entrepreneurship

The heroic quest nature of the stories coming out of the field of social entrepreneurship is worth elaborating since besides its

inspirational nature, it can be interpreted as also serving to hamper theoretical studies of these types of projects/programs. An example is the vivid story concerning the very successful social entrepreneurial program *Associação Saúde Criança Renascer* ("The Association for Rebirth in Children's Health," recounted in Bornstein, 2004) founded in 1991 in Rio de Janeiro, Brazil, by the Pediatrician Vera Cordeiro. Originally begun as a way to reduce the recidivism rate of sick children living in the slum conditions of Rio's infamous *favelas*, *Renascer* grew to include addressing many of the other needs of the people residing in the favelas such as sanitation, health education, job training, the opening of cottage type businesses, and so forth. Although the way the story is told emphasizes Dr. Cordeiro's charismatic skills as the key to the success of the program, she herself places the onus of success on how she "had brought people together...it was their collective energy that made it all happen" (Bornstein, 2004, p. 145). There's a critical difference between the charismatic capabilities of one person and the cooperative nature of social networks as to the ultimate reasons for the success of a social entrepreneurial program. This is analogous to the current utilization of complexity notions applied to leadership studies, which shift attention away from charisma to the complex social



dynamics actually more paramount in the success of organizations (Plowman & Duchon, 2007).

Although there's no doubt that such programs require a lot of dedication and hard work, often, particularly in the beginning, of only a few people, it has to be the social networks that are formed and energized which makes such programs succeed in the long run. And it is from the sciences of complex systems that the study of social networks and dynamical systems can aid in the theoretical understanding of the success factors of social entrepreneurial programs. We believe this is a natural fit, and the work presented during the conference supported that connection. Figure 1 summarizes some of the ways voiced at the Conference that constructs from complexity theory were being applied to the world of social entrepreneurship. These indicate how social entrepreneurship has complexity written all over it!

The last row of Figure 1 concerns the need to get beyond equilibrium-based frameworks, which in complexity science typically falls under the rubric of the far-from-equilibrium on non-equilibrium conditions associated with self-organization as well as those conditions in a dynamical system which represent nearing bifurcations points. A sign that the social entrepreneurial world may be catching up to complexity notions in this respect is the "getting beyond equilibrium" language thinking that can be found in the online application form found at the well-endowed Skoll Foundation (founded by Jeff Skoll, one of E-bay's first presidents).

Equilibrium describes a stable state... economic or social... controlled by and benefiting established entities... Skoll is seeking SEs [whose approaches] can change the equilibrium by fundamentally transforming the lives of marginalized populations...to eliminate a problem by solving its root cause or to create global impact by driving universal adoption of a new innovation by all others who address the same issue" ([www.SkollFoundation.org](http://www.SkollFoundation.org)).

The nature of social entrepreneurial programs in terms of both their evolving through various developmental stages and their need to track and measure a host of input and output variables make them an excellent field in which to apply the nonlinear dynamical systems constructs of attractors, bifurcations, and so forth (Goldstein, Hazy, Silberstang, 2008). In this context, it is important to simultaneously consider the convergent, generative, and divergent dynamics at work not just in the internal organizational infrastructure of social enterprises but between such organizations and their various environments (clients, funders, community members, suppliers, etc.).

It's just about a no-brainer to recognize the powerful role that the complexity idea of emergence can play regarding the requirement for dramatic innovation in forming social entrepreneurial projects. Recent work to decouple emergence from some of the "folklore" that has grown up around the notion of self-organization suggests that emergence just doesn't somehow "magically" take place on its own but instead demands "containers," constraints, and novelty-generating operations (Goldstein, 2006; 2007). Indeed, emergence, because it utilizes already existing building blocks but applies operations which recombine these existing elements of order, need not rely on vast infusions of funding to get started. This aspect of emergence is analogous to how Kary Mullis, a Nobel Laureate for his invention of polymerase chain reaction (PCR), sees the working of creativity: "In a sense, I put together elements that were already there, but that is what inventors always do. You can't make up new elements, usually. The new element, if any, it was the combination, the way they were used."

Furthermore, as the case of *Renascence* in Rio de Janeiro discussed above shows, successful programs are insured not so much by the special skills possessed by the founders of social entrepreneurial programs, as they are by the *social networks* that leaders link together and facilitate. It is here where recent research into the graph theoretical properties of social networks can be so helpful to those embarking on social enterprises (e.g., see Jones, 2007).

These few highlights are all that can be included in this brief report, and of course do not do justice to the entire conference. For a fuller discussion of content and ramifications, see Goldstein and Hazy (2008) and Goldstein, Hazy, and Silberstang (2008).

### **A New Center for Social Entrepreneurship and Complexity at Adelphi University**

There are important implications from one of the key findings coming out of April's First International Conference on Social Entrepreneurship, Systems Thinking, and Complexity at Adelphi University. As described above, we gained a greatly expanded and enriched understanding of what social entrepreneurship appears to be all about. Included within this expanded definition are all the novel and diverse organizational forms which increase *social value* in the communities in which social entrepreneurial programs are established. Such programs even demonstrate the potential for increasing *social capital* through the augmentation of cooperative interactions within and among different social networks. This is an area that economic theory based on traditional assumptions has tended to neglect, even economic theory based on game theoretical models of cooperative games which doesn't take into consideration the supreme value of networks of interactions.

We are now in the midst of creating a Center for Social Entrepreneurship and Complexity at Adelphi as a flagship for developing complexity-inspired theoretical underpinnings of social entrepreneurship, following through on many of the ideas that surfaced at the conference. This Center is dedicated to the goal of understanding and effectuating social value creation through the agency of social entrepreneurial and social enterprise programs. The Center's aim is to become a leading global hub for applying complexity science concepts that push forward research, training, and practical applications in order to foster greater social entrepreneurial know-how and expertise. The activities of the center will be three-fold:

- Organize and sponsor international conferences of leading scholars and experts in complexity and social entrepreneurship to mutually exchange and apply their respective insights;
- Develop and deliver executive education and related programs as well as provide education in complexity, systems thinking, and social entrepreneurship to undergraduate and graduate students. This will lead to undergraduate and graduate degrees in this area of research and practice;
- Become a worldwide center for research and publication in the field, particularly with respect to how advances in complexity science can be applied productively in this arena of social action as well as the reciprocal direction of influence. This entails that the center will be setting up partnerships with institutions with similar aims throughout the world.

Watch for news about upcoming conferences and events regarding the new Center in *Chaopsych*, the newsletter, and the Adelphi website: [www.adelphi.edu](http://www.adelphi.edu).

## References

- Barabási, A. (2002). *Linked: The new science of networks*. New York: Penguin Group.
- Bornstein, D. (2004). *How to change the world: Social entrepreneurs and the power of new ideas*. New York: Penguin Books.
- Goldstein, J. & Hazy, J. (2008). Editorial: Complexity and the generation of Social Value. *Emergence: Complexity and Organization*, 10(3), vi-x.
- Goldstein, J., Hazy, J., & Silberstang, J. (2008). Complexity and social entrepreneurship: A fortuitous meeting. *Emergence: Complexity and Organization*, 10(3), 9-24.
- Hazy, J., Goldstein, J., & Lichtenstein, B. (Eds.) (2007). *Complex systems leadership theory*. Mansfield, MA: ISCE Publishing.
- Jones, G. T. (2007). A NetLogo model for the study of the evolution of cooperation in social networks, *Conference Proceedings: North American Association for Computational Social and Organizational Science*, Atlanta, GA. <http://law.gsu.edu/gjones/publications.htm>
- Knowledge Foundation. (2008). *Societal entrepreneurship*. Stockholm: Stiftelsen för kunskaps. <http://www.kks.se/templates/StandardPage.aspx?id=12615>
- Plowman, D. A., & Duchon, D. (2007). Emergent leadership: Getting beyond heroes and scapegoats, in J. Hazy, J. Goldstein, & B. Lichtenstein, (Eds.), *Complex systems leadership theory*, pp. 109-128. Mansfield, MA: ISCE Publishing.
- Westley, F., Zimmerman, B., & Patton, M. (2007). *Getting to maybe: How the world is changed*. Toronto: Vintage.

### NSF Funding opportunity

NSF announced its new "Cyber-enabled Discovery and Innovation (CDI)" solicitation and urges us to "stay tuned" for an updated "Dear Colleague Letter." It encourages Submission of Proposals involving Complexity and Interacting Systems to Programs in the Social, Behavioral and Economic Sciences. Note that letters of intent are not required. Preliminary Proposal deadline for Type I is December 8, 2008 and for Type II, December 9, 2008. Full proposals by invitation only. The CDI solicitation is available at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf08604](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf08604).



"The center of the world" Quito, Ecaudor.

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## Re-View Corner

The Re-View Corner invites members to pull up a chair, sit down, and take time to share what they are reading, learning from, experiencing, reacting to, and reviewing.

### Little Known Facts and Circumstances of the Society's Roots

*Editor's note: This feature is a sp(l)ace to cocreate our organizational memory by becoming (more) aware of our history and making it at the same time. Recollections galore are invited, and especially from pioneers in the Society!*

### Recollections of a Misfit

By Terry Marks-Tarlow

I remember well my first visit to a Chaos Society meeting. It was the inaugural conference held at Saybrook Institute in San Francisco. I truly wondered what I was getting myself into. Professionally I was a clinical psychologist in private practice and unaffiliated with any university setting. But I'd always had a secret intellectual life. In fact, the first day I entered grad school at UCLA, I left my department in search of strange fringes to minor in, and wound up with courses like trance-cultural psychology to appease my own consciousness altering fascination.

After finishing grad school in 1983, I stumbled into nonlinear dynamics by accident. I'd done my dissertation on depression. Then I realized to my horror that I had no interest in depression whatsoever. I went through a mid-life crisis early, faced up to creativity as my true passion in life, and then read everything I could on the subject. I concocted a course on unleashing your creativity for UCLA Extension, knowing full well that teaching is the best way of learning. I'd hoped to slink into a new area of expertise without anyone noticing. But fate had other ideas. A huge lecture series on creativity was being planned alongside my rinky-dink course. At the 11<sup>th</sup> hour, the moderator got cancer, and I was asked to fill in for her. Terrified and ashamed at my own lack of credentials, I agreed anyway.

Taking on this huge responsibility opened up undreamed of vistas. One of the sessions I moderated included Oscar Janiger, a psychiatrist from Santa Monica, California, who had fed LSD to Cary Grant and Anaïs Nin, among other artists, in the 1960s to study the impact of this newly discovered drug on their creativity. Scared to come forward sooner, Os was only now making public the results of his "social experiments." He was close friends with Frank Barron plus a cousin of Alan Ginsberg, and became my desperately needed creativity mentor. Through Os I met and befriended the late and great physicist, Richard Feynman. For several years Feynman and I shared weekly drawing sessions. Recognizing a once in a lifetime opportunity to pick the brain of the reputedly smartest man in the world, I started fiendishly to read up on science. This is how I came across fractals. I ran immediately to Feynman to ask, "Don't you think fractals are profound?"

What happened next serves as the basis for my very own Feynman story. Given that this tale occupies the middle three chapters of my book just published, *Psyche's Veil: Psychotherapy, Fractals and Complexity* (Marks-Tarlow, 2008), I'll leave that story aside for now. Suffice to say that my quest for new knowledge about fractals is what drove me to attend the first Chaos conference. My initial experience at the Society consisted of Fred Abraham channeling Leibniz during his opening remarks as one of the Society's founding fathers. I'd taken a workshop with Fred's brother, Ralph, who I rather worshipped, in my intellectual groupie sort of way, as the Father of chaos theory math. So who was this crazy sibling?

Then things got even weirder. Fred's speech inspired a woman in the audience to stand up and passionately declare orgasm as the ultimate form of chaos. Meanwhile I sat there taking all of this in, quaking in my seat. What had I gotten myself into? Unlike my UCLA Extension experience this time it wasn't me, I so much worried about, it was everyone else. Who were all these crazy people? And what was I doing here with them?

Although I haven't attended every single Chaos Society conference since then, having taken a few years off when my two children were young, I have come to most. Each year, the same intense ambivalence arises before I come. Why do I come when the conferences are so small? When they are filled with subjects so far from my field? When I so often must travel far from home? When I don't even get any professional credit? But every year my doubts are more than allayed by wholly unexpected and stellar experiences I wind up cherishing by the time I leave.

In truth, the reason I keep coming back is because I am now entirely clear that I too am one of those crazy people. Further, the relationships I've nurtured at and through the Society have proven to be the most intellectually stimulating and productive of my life, opening door after door to friendship and further collegial adventures. Let me recount some of the major ways folks have affected me. I got my first major boost from Steve Guastello, backbone of the techies, when he believed in my early vision of the self as a dynamical system. Steve's encouragement and fine editing allowed me to publish a purely theoretical paper in *Nonlinear Dynamics, Psychology and Life Sciences*. My confidence about my viewpoint strengthened even more when a team of French researchers, Delignières, Fortes and Ninot (2004), empirically tested and verified a prediction I made that changes in the self would follow a power law distribution.

Another early collaboration came through mathematician, Jungian psychologist, and magician, Robin Robertson, who dazzled us all with his wit and intelligence. With Feynman now dead, I transferred my intense need to prove fractals are profound to Robin. Our discussions led to a joint presentation at the Chaos Society in 1999 on Spencer-Brown and the Oroboros, the snake that bites its own tale. I covered self-creation in mythology, and Robin covered the self-referential mathematics of Spencer-Brown. The talk morphed into a paper for *Cybernetics & Human Knowing*, "Varela and Uroboros: The Psychological Significance of Re-entry" in the 2002 memorial issue devoted to Francisco Varela. The marvelous Allan Combs had hopped on board for publication of that piece, and then brought a version of the paper to a cybernetics conference in Vienna. Subsequently Allan and I teamed up to create a poster at the Tucson Conference, Towards a Science of Consciousness, linking William James' radical empiricism with the Buddhist notion of the empty self through the mathematics of Spencer-Brown.

After Robin had introduced me to Spencer-Brown's "Laws of Form"—maybe the only book in history with footnotes longer than the text—my thinking really took off. I had discovered a way to use Spencer-Brown's notation to assert some fundamental tenets of mysticism—that at the level of first distinctions, representations of self, world and other are indistinguishable. In 2003 I presented this insight to the Chaos Society in a three-way presentation with one of our Society's former Presidents, Dick Bird, author of *Chaos and Life* (2003), plus Stephen Soyer-Owens, who was interested in what he called "hyperdimensional experience" and had written a dissertation on fractal patterns in Shakespeare's *Hamlet*. Our three-way email dialogues lasted years, reaching deep into the soul and encouraging the unique creative visions for each of us.

In another thread of connection, after meeting Franco Orsucci, a psychoanalyst and Chaos Society President in Italy, I

expanded a conference talk I had given in 2000 into a paper for Franco's new journal, *Chaos and Complexity Letters*. I re-visited the myth of Oedipus by viewing the Sphinx's riddle as a paradox of self-reference, whose solution propelled humankind from concrete to metaphorical thinking. With the paper also linked to the power of Turing machines, Franco kindly invited yet another version of this work into his latest edited book with Nicolas Sala, *Reflecting Interfaces: The Complex Coevolution of Information Technology Ecosystems* (Marks-Tarlow, 2008).

Meanwhile in 2004 I finally satisfied my need to prove fractals are profound. Robin had written a beautiful paper in *Psychological Perspectives* on the history of human consciousness as reflected by the discovery of mathematical symbols. Starting with zero, and then moving to infinity plus its many flavours, Robin ended his historical account of consciousness with Gödel as the mathematician to end all mathematical speculation. Gödel had developed self-referential methods to prove that no system of logic, including mathematics, can simultaneously be consistent and complete. I extended Robin's history a step further, by using my knowledge of Spencer-Brown plus personal forays into the meaning of fractal dimensionality. I proposed fractal geometry as the next step in self-referential complexity within human collective consciousness. Another Chaos Society friend, Hector Sabelli, brought this paper, called "Semiotic Seams: Fractal Dynamics of Re-entry," to his philosophy club in Chicago shortly before his recent medical mishap. A mathematician named Lou Kauffman who has collaborated with Hector on *BIOS* (Sabelli, 2005), grew entranced with the notion of the fractal self. Most recently Lou and I are building a mathematical and empirical argument for fractals bridging the gaps between multiple levels of description of the self, ranging from physiological, neurobiological to psychological, social and cultural levels.

All of these thematic threads are now interwoven in *Psyche's Veil*, an opus that has taken me more than a decade to write. Three drafts rose like phoenixes from the ashes before the material finally became embodied enough to birth. I am truly grateful for the help of everyone mentioned above, plus other key individuals from the Chaos Society who played a role in moving this book along. Yet another Society President, Bob Porter, and I connected deeply as he transitioned from academia into clinician. Some case material in the book emerged from a clinical workshop Bob, Susan Mirow and I did together at the Society in 2002. Susan and I are doing another joint talk this year on a complexity model for attunement and attachment. I find her work breathtaking and am honoured to include some of her stunning visuals and text for science boxes in my book based on her nonlinear techniques for measuring physiological variability. Tobi Zausner, our highly talented resident artist from last year, and author of *When Walls Become Doors* (Zausner, 2006), generously allowed me use one of her beautiful paintings in my book. And completing the Uroboric circle with which I began these Society memories, my many thanks to Fred Abraham who put aside Leibniz in order to create a technical image of sensitive dependence on initial conditions for my book. I also appreciate the opportunity to remember so many fabulous people. My deep apologies to everyone else I left out...

## References

- Bird, R. (2003). *Chaos and life*. New York: Columbia.
- Delignières, D., Fortes, M. and Ninot, G. (2004). The fractal dynamics of self-esteem and physical self. *Nonlinear Dynamics in Psychology and Life Sciences*, 8, 479-510.
- Marks-Tarlow, T. (*in press*). Alan Turing meets the Sphinx: Some new and old riddles. *Chaos & Complexity Letters*.
- Marks-Tarlow, T. (2008). Riddle of the Sphinx: A paradox of self-reference revealed and re-veiled. In F. Orsucci & N. Sala (Eds.), *Reflecting Interfaces: The Complex Coevolution of*

- Information Technology Ecosystems* (pp. 21-32). Hershey, PA: Idea Group.
- Marks-Tarlow, T. (2008). *Psyche's veil: Psychotherapy, fractals and complexity*. London: Routledge.
- Marks-Tarlow, T. (2004). Semiotic seams: Fractal dynamics of reentry. *Cybernetics & Human Knowing*, 11(1), 49-62.
- Marks-Tarlow, T., Robertson, R., & Combs, A. (2002). Varela and Uroborus: The psychological significance of reentry. *Cybernetics & Human Knowing*, 9(2), 31-47.
- Marks-Tarlow, T. (1999). The self as a dynamical system. *Nonlinear Dynamics, Psychology, and Life Sciences*, 3(4), 311-345.
- Robertson, R. (1989). The evolution of number: Self-reflection and archetype of order. *Psychological Perspectives*, 20(1), 128-141.
- Sabelli, H. (2005). *BIOS: A Study of Creation*. Singapore: World Scientific.
- Zausner, T. (2006). *When walls become doors*. New York: Harmony.

## Conference Report

### First International Conference on Chaos, Complexity and Conflict

L. Deborah Sword, University of Phoenix, Calgary

In June 2008, 71 professionals and practitioners from an inter-disciplinary array of fields attended the first International Conference on Chaos, Complexity and Conflict, hosted by The Werner Institute for Negotiation and Dispute Resolution at Creighton University, in Omaha, Nebraska. The unifying attraction for the two disparate areas of inquiry was the research and application of complexity science to conflict analysis, management and resolution. It was an international experience, with complexity science and conflict academics and practitioners from throughout the United States, and from Australia, Britain, Canada, and China.

The objectives of the conference were to develop: (a) useful frames from complexity science and chaos theory to apply to conflict studies; (b) new approaches towards individual, organizational, and other types of conflict systems that take into account the increasing complexity in all levels of society; (c) strategies to unlock any mindset of linearity blocking the creative approaches to conflict and its resolution; and (d) congruence among complexity principles, conflict resolution, group decision-making, and the emerging practices of each of them. The conference fostered cross-fertilization of theory, application, and practice within and across each discipline by introducing trans-border professionals.

#### Overview of the conference

On the initial evening, Sidney Dekker, Professor of Human Factors and Aviation Safety, and Director of Research at Lund University School of Aviation, in Ljungbyhed, Sweden, introduced attendees to the nomenclature and principles of complexity in the contexts of investigating human error in aviation accidents and analyzing the role of accountability through the complexity lens. The next morning, well-known stalwarts Jeffrey Goldstein, speaking on emergence and leadership, and Stephen Guastello, speaking on chaos and pattern recognition, were guides for those wanting to integrate complexity science to conflict research and practice. They and complexity and conflict specialist Glenda Eoyang gave overviews of key complexity science principles and practical ways to use them in human dynamic systems.

Conflict specialist Bernie Mayer gave complexity science attendees a quick overview of peace and conflict studies frameworks, and then had a public dialogue with complexity

specialist Wendell Jones about the emerging issues in each field, and how each could benefit from a mutual knowledge transfer. Conflict produces enough data for complexity scientists to work on for millennia. Complexity science labs offer conflict practitioners useful frameworks for conceptualizing conflicts. It should be a natural match between those who study humans in conflict and those who study humans in systems.

The afternoon break-out sessions covered topics of: (a) conflict engagement; (b) human factors in complex systems; (c) collaborative learning in complex environmental conflicts; (d) requisite cognitive capacity in conflict communication; (e) fitness landscapes of complex organizational systems; (f) the emergence of cooperation in complex social networks; (g) complex healthcare systems; (h) a complex model for understanding the conflict in Columbia (i) a computation lab for complex adaptive systems; (j) and using game theory to create cooperation. Attendees then came together for a facilitated debrief before the banquet, which featured another public dialogue between Bernie Mayer and Wendell Jones about the contrasting and complementary aspects of the frameworks for looking at human systems.

The conference closed with a world café on the topic of what attendees wanted to carry forward out of the intersections created at the conference. This conference was a first step in creating a group of researchers and practitioners who can act as interpreters between the complexity science and conflict theory modeling and the conflict practice models. While conflicts are a rich source of data for complexity researchers, there is much less obvious applicability of complexity science research to conflict practice. While many practitioners are now claiming to use complexity principles in their consultations, there is not much agreement on what that means. The knowledge transfer between the lab and the field was improved at the conference through the questions about translating espoused theory into theory-in-use.

#### One use of complexity science in conflict management

When I started my doctoral research applying complexity science to conflict analysis in 1998, I was questioned on whether conflict was produced by a complex adaptive system. By the 2008 Conference on Chaos, Complexity and Conflict, that is just assumed to be true, and we could move to deepen our dialogue of using complexity science in the multiple contexts of conflict analysis, management and resolution.

Those who are steeped in complexity science may not be concerned with how agent-based computer modeling research is used in the field. While conflict resolution practitioners appreciate an elegant theory, they need it to be useful when people are yelling or weapons are drawn. Conflicts run in real time; it is often impossible to call a time out to run a simulation. In my conflict practice, I translate complexity science conflict data into an analysis for my conflict mental map of what is happening with the parties to the conflict, in the immediacy of moments that can be very heated.

Mental maps are the cognitive processes through which people make sense and meaning of their situations and the beliefs that support their worldviews (Peterson 1999). Conflict mental maps are especially useful in the stress and urgency of conflict situations. When I am in the midst of a tense group process, I use conflict mental maps the way some people play blitz chess under time constraints, with accelerated decision-making about the current action and future directions. I make sense and meaning of conflicts' initial conditions (Tidwell 1998), on a fitness landscape that includes the line of sight from the future looking backwards (Holland 1995). By collating these insights on the conflict mental map, I design the process going forward.



Everyone has a mental map of whatever conflict he or she is experiencing. Without it, the conflict is little more than raw data the antagonists throw into the conflict system and there would be no sense to make of it. Thus, complexity science adds a layer of understanding to conflict mental maps that help me design a group process, intervene intelligently, coach the parties helpfully, and work towards resolution or management usefully. Using complexity to complement conflict theory, the conflict mental maps expanded the available theory-in-use with formulations of boundaries, attractors, power, parties, media inputs, learning, governance and democracy, and risk assessments.

#### **Where to find more information about the conference and the topics**

The Werner Institute for Negotiation and Dispute Resolution has created a database of those interested in the research, practice and applications of complexity science and conflict. Additional information is available from Bryan Hanson ([BryanHanson@creighton.edu](mailto:BryanHanson@creighton.edu)) and on the website <http://law.creighton.edu/wernerinstitute/complexityconference>

The collected papers from the International Conference on Chaos, Complexity and Conflict will be published in the Winter volume 10 of *E:CO (Emergence: Complexity and Organization)*, ISSN: 1521-3250. The journal will be available at <http://emergence.org>. Both individual papers and the journal collection are online by subscription or one-time purchase.

#### **References**

- Holland, J. H. (1995). *Hidden order: How adaptation builds complexity*. Reading, MA: Perseus Books.
- Peterson, J. B. (1999). *Maps of meaning: The architecture of belief*. New York: Routledge.
- Tidwell, A. C. (1998). *Conflict resolved? A critical assessment of conflict resolution*. New York: Pinter.

## **Reflective Report**

### **The Snowflake 2008 ChaoConference: A Personal Commentary, Part II** *by Fred Abraham*

In the first report on the Winter Chaos Snowflake Conference (Wesleyan University, Middletown, CT. Feb. 22-4, 2008) published in the April 2008 Newsletter, I identified first three themes, evolution, existentialism, and emancipation, putting them under Tytel's admonition that context matters, and using VanderVen's metaperspective of philosophical hermeneutics as a common place for their discussion. We viewed mainly the contributions of Sabelli (in absentia), Tytel, Wensing, Porter, and myself. Here I want to continue to mention the contributions of others within those contexts, knowing that it is impossible to capture the great chemistry of our mutual interactions.

Jerry Chandler (chair of Washington Evolutionary Systems Society) has been developing a formal logical or meta-symbol system for chemistry, the Perplex Number System, which he also applies to natural language, mathematics, and biology. This places the effort to a certain extent in a hypothetico-deductive and semiotic contexts, and thus seems rather structuralist at first blush. The structuralist approach looks for universal invariants in language and logic, and the efforts of de Saussure, Lévi-Strauss, and others, morphed into post-structuralism, where formal structures became more fluid and multiple under the influence of cultural and linguistic contexts.

The real challenge for Chandler is to explain how the system can develop to explain evolution, that is, going from simple chemical reactions, to how contextual issues in a developing complex system can be incorporated to explain evolution: stellar, geochemical, biochemical, biological, cultural, psychological, etc. The foundations of such change are reflected in his statement about syduction and emergence:

Syduction is a creative logical operation . . . conjoining diagrams. It extends a spatial pattern of symbols by incorporating a new symbol into the pre-existing pattern. . . The positions of the new relationships become part of the internal memory of the new symbol, such as within positions within chemical isomers. Meso-sorites, sequences of meso-syllogisms, can be applied to generate any desired pattern of symbols, any relevant logical diagram. . . The concept of self-reflexive properties of the perplex number system within living systems opens new opportunities for the study of the dynamics of emergence of life and mind. (Chandler, 2008.)

Roulette Smith has presented brilliant theories of memory and disease related to basic molecular genetics, especially those related to so-called junk DNA which constitutes a large part of chromosomal material. This year he probed further into other psychological realms, notably that of the problem of "aberrant common sense." His motivation was to help people who were afflicted with this malady, which he observed in some schools. This approach is sort of a biological structuralism, in which such terms as "psychoviruses," "functional strokes," etc. predominate. If true, then Smith can be making a serious contribution to the dealing with these conditions, and may well put the category on the diagnostic map. It does recall the great sociobiological debate (Seegerstråle, 2000) in which there was a strong challenge to such biologizing. Those of us critical of sociobiology then, have seen some of their contentions come true, and the evaluation of the debate was that there were excesses of oversimplification on both sides of the debate, so we hesitate to be too critical out of the gate. His approach deserves a chance. Even before the Snowflake Conference, there was debate on his proposals, both on the Jaspers Forum and our Winter Conference posting and blogging (Wiki style) at *Implexi Mundi*. Linda Dennard (prevented from attending by aberrant airplane common sense) comments as follows:

Thank you, Dr. Smith, for a very interesting and thought-provoking article. I have several comments, which, I confess, are framed by my own understanding of complexity which in turn is informed by a good deal of postmodern, postcolonial, and phenomenological philosophy. As you see, I have my biases. The comments concern the definition of common sense, the deficit analytical framework in which it appears, an observation that sense-making is more dynamical than the more metaphysical noun of 'common sense' and that co-adaptation and emergent patterns of behavior that occur in this sense-making might provide an alternative framework for both diagnosis and treatment. (Dennard, 2008)

Stanley Krippner's comments to Smith provide one view of the scope of Smith's coverage:

I have read your paper. You have hit some high notes, e.g., experimental effect on page 2 {6, 16, 82, 98}, DNA and non-genetic information on page 3 {10, 23, 101, 111} (extremely controversial, of course), in utero experiences and their effect of behavior {23} (page 9), Lamarckian evolution {25} (same page), the three divergent strands of common sense {13, 14, 16, 19, 28} (page 10), separation of children from military mothers {30, 31, 32} (page 11) which I think is one of the most important contributions of this

paper, the fact that unprotected sex during one night stands shows a LACK of common sense in the Age of AIDS {33, 34, 35} (page 12), the provocative notion about junk DNA {55} (page 17), the example {62} on page 18 is a good one but needs more context, the example {65} of page 19 in 1985 is excellent (you could easily collect data to show that math and reading skills go along with common sense), the vignettes 69 on page 21 show the cross-cultural aspects of common sense as does general anxiety disorder {73} on page 24, and the meta-transpersonal perspectives is a fresh slant {76-82} (page 25). Now what you need is an operational definition of common sense. {cf. 84, 89} To start, couldn't you say that "common sense" is the ability to make decisions (that are functional for the individual as well as for his/her social group) based on experience and past learning? {cf. 89} I see common sense as a skill, an ability, and a learned behavior. Of course there are biological predispositions to it, as there are to all human abilities. But you have hit on an important topic and I hope you follow up on it! (Krippner, 2008.)

Other comments and Smith's rebuttals can also be found at *Implexi Mundi* and Jaspers Forum.

Bob Eldridge brought some of his economics students to verify the dynamic way he approaches education, having gotten his university to commit real money to their investing in the market. He reviewed

"the changes from "standard" finance theory to the newer concepts of a psychologically oriented structure of decision making in asset markets. This change (a paradigm shift?) has come about based on the number and size (and frequency?) of anomalies that "standard" theory cannot explain. The objective is to suggest some areas of joint research between the field of psychology and finance that can advance the understanding of: a) what causes "bubbles" in asset markets and b) the identification of market actions that might portend a bubble forming and its subsequent collapse." (Eldridge, 2008.)

This is clearly a case where context matters, the context of the limbic system, learning, and the culture of the markets. Again the meaning of models has to incorporate contextual features, but runs up against an infinite, or at least a huge number of them still knocking on the door from the outside. The fall 2008 crisis in US and global markets shows just how complex the system is. Now we segue to another presentation because Bob's contribution was somewhat in contrast to this contextual dynamical approach.

Steve Cushing came because we had met the previous fall at the Jungian Assisi Conference where I was lecturing. There we discovered that our paths had crossed before (without actually meeting) at UCLA when he was covering, for the campus paper, a sociobiological kind of battle in which I was involved. Being a bright and verbal fellow I felt he would fit in with our Winter Conference, despite his reservations of neither being familiar with dynamics nor having a relevant topic to present. Nonetheless he gave a totally fascinating as well as relevant talk on a favorite topic of his, communication failures leading to plane crashes (Cushing, 1994), in the spirit of seeing if we chaos-minded folk could help him solve some of those problems. Of course we have already talked about the dynamics of language, via hermeneutics, structuralism, semiotics, and post-structuralists, where such features and metaphor and metonymy bring contextual features into improved communication. While such features could contribute to airplane safety, other features, such as "ambiguity, homophony, reference, implicit inference, intonation, code-switching, and routinization" often cause serious, fatal, problems. Here is the lead-up to one crash:

Pilot(P) to copilot(CP) (in Spanish, S): Tell them we are in an emergency.

Copilot to Controller(CT) (in English, E): We're running out of fuel.

P to CP: Digale que estamos en emergencia.

CP to P: Si, señor, ya le dije.

C to CT (in E): We'll try once again. We're running out of fuel.

P to CP (in S): I don't know what happened with the runway. I didn't see it.

CP to P (in S): I didn't see it.

P to CP (in S): [Advise the controller that] we don't have fuel.

CP to CT (in E): Climb and maintain 3,000 and, ah, we're running out of fuel, sir.

CT to CP (in E): Is that fine with you and your fuel?

Cove Neck, New York, 25 January, 1990; Cushing, 2000, pp. 44-45.

"[Here] the pilot tells the copilot, in Spanish, to inform the controller that an emergency prevails, but the copilot tells the controller, in English, only that the plane is running out of fuel. He then tells the pilot, in Spanish, that he has conveyed that the plane is in an emergency, even though that is not, in English, what he has actually said. The controller utters what he erroneously takes to be, three conceptual repetitions of the pilot's words—that is, [running out of fuel instead of in an emergency]. These are ineffective in conveying to the controller the proper degree of urgency, because the heightened sense of urgency conveyed by *emergency* in the aviation context makes the repetition incorrect. The problem is probably compounded here . . . by the fact that the language being used is a technical variant of a language other than the speaker's own, leaving him twice removed from the vernacular with which he is most familiar. The aircraft subsequently ran out of fuel and 73 of the 159 people aboard died. . ." (ibid.)

Note that there are several contextual features involved: flight conditions, missed sighting of the landing field, language nuances, some unnoted features leading to the pilot's adding some context meant to reinforce the emergency message never delivered, and possibly some arrogance of controllers toward foreign flight personnel. Even if the communication were represented with symbolic dynamics, dynamics' answer to structuralist demands, such demands for improvement in the rules surrounding such air control communication, as Bob Eldridge suggested would be the case in the military where rules would be rigidly learned and executed, such contextual features would still have to be recognized and represented.

Several of the members of our Snowflake Cabel have presented issues in education since the very first conference. They include Carlos Torre, Karen VanderVen, Doris Fromberg, David Gibson, and another friend going back to our days together doing neurophysiological research at UCLA, Martin Gardiner. I won't attempt to cover their contributions, space is running out, so I suggest consulting their work at *Implexi Mundi*. Two of them, Karen and Doris have emphasized the importance of play in early education, and have devoted their careers to it. But after all this time, it is only since our conference that I have come to appreciate the considerable importance of it. I noted that play was involved in all of their work. Carlos had students play at developing solutions for educational problems in the New Haven educational system—a self-organizational activity, their solution was presented to the city council (Torre, 1995). David Gibson has two educational projects involving high school and university students globally on the internet, in one with teams competing to provide solutions to ecological problems, and another using a virtual university in which the students not only fly into classrooms,

they construct the virtual campuses, carry on casual conversations, etc.

Martin has been researching using enrichment programs at a preschool level with participatory music programs involving the Kodály method. His work shows that not only are intellectual activities improved in subsequent years, but also socialization is improved. While not involved in this field, my own projects have found students in elementary school in the US and the Philippines learning hexadecimal number system when learning computer music-making, logo computer programming to crash cars into trees on the computer screen, and some trig to fly rockets in the desert, wading in tide pools to learn nature and science, creating a school in a van where students would climb trees and teach each other how to read; and at secondary levels using art and computers to learn dynamics and science.

Of the themes that I have stated for the Snowflake Conference summary, this report dynamically illustrates Mallory Tytel's "CONTEXT MATTERS," emancipation in the liberalization of education and the safety of air traffic, and hermeneutics in the discussions of the evolution and liberalization of language. Several members' (Frank Mosca, Mark Filippi, Tina Champagne, George Muhs, and Linda Dennard) contributions have not yet been discussed, and I will report these in the future. These reports are also being posted on *Implexi Mundi* for those of you who occasionally misplace your back issues of the Newsletter.

#### References

- Chandler, J.L.R. (2008). *Synduction, the Genesis of Memory, and the Habits of the Mind*. Prepared for the Winter Chaos Conference.
- Cushing, S. (1994). *Fatal Words: Communication Clashes and Aircraft Crashes*. Chicago: University of Chicago Press.
- Cushing, S. (2008). *Miscommunication-caused Aircraft Accidents*.
- Dennard, L. (2008). Comment 10 on Smith's paper.
- Eldridge, R. (2008). *Behavioral Finance: Decision Making in Asset Markets*.
- Fromberg, D.P., & Bergen, D., (Eds.). (2006). *Play From Birth To Twelve: Contexts, Perspectives, And Meanings*. Cambridge: Harvard.
- Gardiner, M. (1996). *Nature*, May. See also [http://www.brown.edu/Administration/News\\_Bureau/1997-98/97-080i.html](http://www.brown.edu/Administration/News_Bureau/1997-98/97-080i.html)
- Gibson, D. (2008). Student Internet Projects with Nonlinear Dynamics/Complexity.
- Gibson, D. (2008). Modeling classroom cognition and teaching behaviors.
- Krippner, S. (2008). Operational Definitions. Comment 4 taken from Jaspers Forum and copied to *Implexi Mundi*.
- Segerstråle, U. (2000). *Defenders of the Truth: The Sociobiology Debate*. Oxford: Oxford.
- Smith, R.W. (2007). A Transpersonal Approach to Helping Unknowingly Needy and Worried Well Persons: An Example of *In Situ* Diagnoses and Follow-Up in the Study of Common Sense and Aberrant Common Sense in Post-World War II Germany. Paper presented to the 4<sup>th</sup> International Conference on Humanistic and Transpersonal Psychologies and Psychotherapies, China, September 24-26, 2007. <http://www.blueberry-brain.org/winterchaos/RoulettiInChina.htm>
- Smith, R.W. (2008). On the Economics of Chaos and Aberrant Common Sense. Prepared for the Winter Chaos Conference.
- Surap, M. (1988/1993). *Post-structuralism and Postmodernism*. Athens: University of Georgia.
- Torre, C. (1995). Chaos in the Triadic Theory of Psychological Competence in the Academic Setting. In Abraham, F.D. &

Gilgen, A.R., (Eds.), *Chaos Theory in Psychology*. Westport: Greenwood/Praeger.

VanderVen, K. (2008). *Promoting Positive Development in Early Childhood: The Early Childhood Developmental Asset Framework*. New York: Springer.

VanderVen, K., & Fromberg, D. (2008). *Play, Power, & Polarities*.

## Article Alerts

**Benardete, D. M, Noonburg, V. W. & Pollina. B. (2008). Qualitative tools for studying periodic solutions and bifurcations as applied to the periodically harvested logistic equation. *The American Mathematical Monthly*, 115, 202-219.** A well explained and illustrated paper about a model that has been used in ecological studies, but could equally well be a model for some social processes that lead to the survival or extinction of cultures. Compare the qualitative analyses in the now popular book by Jared Diamond, called *Collapse: how societies choose to fail or survive*. See Bookshelf this issue --RAMG.

**Cervantes, I., & Femat, R. (2008) Intermittent operation of linear driven switched systems. *International Journal of Bifurcation and Chaos*, 18, 495-508.** The time series that are the working records of the evolution of nonlinear dynamics characteristically show short periods with repeated structure but at the same time erratic occurrence in the series. We cannot predict when the next one will occur, except as statistical averages. Anyone who has perused the score of Schubert's Sonata in B flat major D 960 will I think know what I mean when I refer to arpeggios and what in my 1983 book on Time Series in Psychology called 'embedded episodes'. But these short recurrent and identically structured episodes arise at apparently random intervals, and importantly may be not activity but blanks. Such short blanks are called 'breathing' in dynamics, and have been revisited in a new paper by Cervantes and Femat. It is shown that although regular and chaotic phases evolve irregularly for a given system, their average behaviour is surprisingly regular with respect to a bifurcation parameter. The phenomena share some structural characteristics with intermittency. This problem relates to the modeling of biological piecewise continuous systems. Switched systems can show both chaotic and intermittent operations or breathing. – RAMG

**Feudel, U. (2008). Complex Dynamics in Multistable Systems. *International Journal of Bifurcation and Chaos* 18, 1607-1626.** Contact: [u.feudel@icbm.de](mailto:u.feudel@icbm.de). I draw attention to this new and useful review paper. The paper gives a wide overview of applications in different disciplines. In various places I noted references to methodological procedures that have to be used to explore multistable systems. These are not much referenced in discussions on this chat page, and with the increasing number of papers mixing brain dynamics with behavioural data, as for example featuring in neuroeconomics, some updating would be welcome. --RAMG

**Hopfield, J. J. (2008). Searching for memories, sudoku, implicit check bits, and the iterative use of not-always-correct rapid neural computation. *Neural Computation*, 20, 1119-1164.** A new paper by J. J. Hopfield is always worth some careful attention, particularly one that simulates some psychological processes which have not previously been modeled closely. The article is about a model of an associative memory based on an excitatory-inhibitor network and the conceptually related mathematics of a Sudoku solver. They share the feature that the algorithm that the network carries

out rapidly is not the ideal algorithm for the purpose, leading to errors or illusions in the answers when the problem is difficult. It describes how erroneous answers in neural computations can contain implicit check-bit patterns that identify them as erroneous when they are "seen" by other networks of neurons. In this way a correct answer can be found by iterated use of a nonideal algorithm. The model can be plausibly related to actual biological processes in the brain. I think the article is important and related to complexity and attractor dynamics. -- RAMG

**King-Casas, B., Shart, C., Lomax-Bream, L., Lohrenz, T., Fonagy, P., & Montague, P. R. (2008). The rupture and repair of cooperation in borderline personality disorder. *Science*, 321, 807-810. 8 August.** Email contact [rmontague@hnl.bcm.edu](mailto:rmontague@hnl.bcm.edu). I draw particular attention to this new paper. It deserves comment and publicity. Perhaps Bob Porter should be invited to comment. This is accessible on [www.sciencemag.org](http://www.sciencemag.org) where you will need the supporting on line material as well to make detailed sense of what has happened. The work described involves clinical interviews, neurophysiological scanning, and game theory plays between two players, all at the same time, and international collaboration between the USA and England. I believe this is an important methodological precedent, and indicates the way some psychological research is going to go for those who have the resources.--RAMG

**Sakamoto S. and Ghanem, R. (2002). Polynomial chaos decomposition for the simulation of non-Gaussian non-stationary stochastic processes. *ASCE Journal of Engineering Mechanics*, 128, 190-201.** The chaotic data preparation that they used started with random numbers from a gamma distribution, then built in correlations over "time" of different strengths to emulate the deterministic feature of chaos. Then to analyze it, and this was the main concept of the paper, they produced a modification of Karhunen-Loève algorithm. The K-L algorithm takes a group of variables and finds an optimal polynomial fit among them. K-L was designed to work with static data, hence the need identified by S & G to make an adaptation to a dynamic time series.

Sakamoto and Ghanem were working with one time series at a time, but it looks as though their idea could generalize to a system of inter-related variables. The new algorithm was computationally intense requiring severe computer memory to carry out. What could this algorithm be used for, I wonder? If it appeared in an engineering journal, somebody wants to do point estimation. A different source (in the form of an e-mail announcement in April) indicated that there's a one-day seminar on the calendar in Manchester UK where the featured speaker is exploring the K-L algorithm for analyzing brain images, such as fMRIs.

That brings us to another interesting development. The April, 2008 issue of *Current Directions in Psychological Science* is an extra-large special on "The Interface between Neuroscience and Psychological Science." For those who do not subscribe (are not members of the Association for Psychological Science, CDPS specializes in brief summary articles of important areas of psychology. Nonlinear dynamics applications have shown up in CDPS occasionally over the years. I scanned all the reference lists, however, and K-L is not in any of them.

Could there be an exponential alternative to K-L? Given the foregoing story, especially about the brutal computational demands of Sakamoto and Ghanem's new algorithm, it almost looks as if I had the solution years ago (Guastello, 1995, Chapter 3). Recall that any nonlinear function can be reproduced by a polynomial series if the degree of the polynomial is high enough, that's still a lot of parameters for a

complex time series. The small set of exponential functions that I've been using for data that could be chaotic cuts down the number of parameters by long shot, and often gives a very good fit between the model and the original data. A clear and direct method of point estimation is desirable in addition to an accurate qualitative model.

Dominic Nathan, Michelle Johnson (at MU) and I recently found that the exponential model series did a better job of modeling reach and grasp movements (OK, not brain images just yet), compared to 5<sup>th</sup> and 7<sup>th</sup>-degree polynomials, which are the current state of the art models in therapeutic robotics (which is our application as well). A paper on this topic is scheduled for the SCTPLS conference in August in Richmond. --S. J. Guastello.

#### References

- Guastello, S. J. (1995). *Chaos, catastrophe, and human affairs: Nonlinear dynamics in work, organizations, and social evolution*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Wiener, N. (1938). The homogenous chaos. *American Journal of Mathematics*, 60, 897-936. *The title and date say it all, almost.*

**Tsuda, I. & Fujii, H. (2007). Chaos Reality in the Brain. *Journal of Integrative Neuroscience*, 6, 309-326.**

They review basic concepts of dynamical systems, and then focus on cortical transitory dynamic behaviours observed during task-related actions of animals, and provide a dynamical interpretation of such transitory behaviours in terms of chaotic itinerancy. The paper focusses on irregular and aperiodic but ordered transition behaviours. I wonder what the anti-Darwinians make of this sort of approach?

--RAMG

## *The Nonlinear Dynamical Bookshelf*

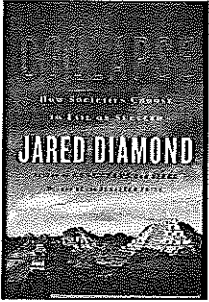
*This feature depends on material people send to us. Thanks to all who do. If you find a new nonlinear book and would like to share the joy, please send the full citation with descriptive information to [register@societyforchaostheory.org](mailto:register@societyforchaostheory.org) with the message heading "Nonlinear Bookshelf."*

**Allen, P. M., Richardson, K. A., Goldstein, J. A., & Snowden, D. (Eds.). (2007). *Emergence, Complexity & Organization*, Vol. 9. Mansfield, MA: ISCE. ISBN: 9780981703237.** Organizations of all kinds struggle to understand, adapt, respond and manipulate changing conditions in their internal and external environments. Approaches based on the causal, linear logic of mechanistic sciences and engineering continue to play an important role, given people's ability to create order. But such approaches are valid only within carefully circumscribed boundaries. They become counterproductive when the same organizations display the highly reflexive, context-dependent, dynamic nature of systems in which agents learn and adapt and new patterns emerge. The rapidly expanding discussion about complex systems offers important contributions to the integration of diverse perspectives and ultimately new insights into organizational effectiveness. There is increasing interest in complexity in mainstream business education, as well as in specialist business disciplines such as knowledge management. Real world systems can't be completely designed, controlled, understood or predicted, even by the so-called sciences of complexity, but they can be more effective when understood as complex systems. While many scientific disciplines explore complexity principally through abstract mathematical models and simulations,



Emergence: Complexity & Organization explores the emerging understanding of human systems from both the 'hard' quantitative sciences and the 'soft' qualitative perspectives.

This 2007 Annual includes articles from Alice MacGillivray, Dale Lockwood, L. Deborah Sword, Gerald Midgley, Viveca Asporth, Jack Meek, and many more, which explore a range of complexity-related topics from philosophical concerns through to the practical application of complexity ideas, concepts and frameworks in human organizations. Also included are a series of four reproductions of classical papers in the fields of complexity and systems, each with critical introductions that explore their modern relevance: "The Philosophy of the Present" by George Herbert Mead (originally published in 1932); "Emergence" by Michael Polanyi (originally published in 1966); "The Theory of Complex Phenomena" by Friedrich August von Hayek (originally published in 1967); "The Pretence of Knowledge" by Friedrich August von Hayek (originally published in 1975).



**Diamond, J. (2005). *Collapse: How societies choose to fail or survive*. New York: Viking Penguin. ISBN 0 7139 9862 8.** his million-copy bestseller **Guns, Germs, and Steel**, Pulitzer Prize winner Jared Diamond examined how and why Western civilizations developed the technologies and immunities that

allowed them to dominate much of the world. Now in his brilliant companion volume, Diamond probes the other side of the equation: What caused some of the great civilizations of the past to collapse into ruin, and what can we learn from their fates?

Diamond weaves an all-encompassing global thesis through a series of fascinating historical-cultural narratives. Moving from the Polynesian cultures on Easter Island to the flourishing American civilizations of the Anasazi and the Maya and finally to the doomed Viking colony on Greenland, Diamond traces the fundamental pattern of catastrophe. Environmental damage, climate change, rapid population growth, and unwise political choices were all factors in the demise of these societies, but other societies found solutions and persisted. Similar problems face us today and have already brought disaster to Rwanda and Haiti, even as China and Australia are trying to cope in innovative ways. Despite our own society's apparently inexhaustible wealth and unrivaled political power, ominous warning signs have begun to emerge even in ecologically robust areas like Montana.

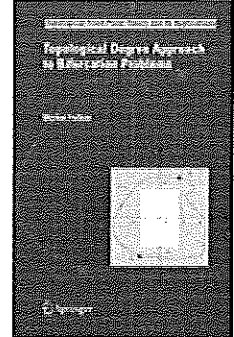
Brilliant, illuminating, and immensely absorbing, **Collapse** is destined to take its place as one of the essential books of our time, raising the urgent question: How can our world best avoid committing ecological suicide? --*Publisher*

**Dennard, L., Richardson, K. A., & Morcol, G. (Eds.). (2008). *Complexity and policy analysis: Tools and concepts for designing robust policies in a complex world (Exploring Organizational Complexity Volume 2)*. Mansfield, MA: ISCE Publishing. ISBN: 978-0-9817032-2-0.** It is well known and acknowledged that public policies are inherently complex. But the implications of complexity theory (or complex adaptive systems theory) for policy analysis have not been explored fully. The authors of this volume offer perspectives and methodological tools to fill this gap. Among the questions explored in the volume are, does complexity theory offer a 'new science', an alternative way of thinking to the pervasive rationalism of the mainstream policy analysis, or is it merely a novel analytical tool kit? Does the theory suggest a new way of knowing—and consequently solving—complex public policy problems, for example? How does the theory conceptualize

complexity, and is this different from common understandings of the term? What should be the involvement of policy analysts in the process of change from the perspective of complexity theory? Does the theory support or suggest a complexity ethics? The authors of the book also illustrate how agent-based models, the most commonly applied tool of complexity theorists, can be used in policy analysis, as well as creatively applying other methods such as Q-methodology and qualitative case study in understanding complex social problems.

**Feckan, M. (2008). *Topological degree approach to bifurcation problems*. New York: Springer.**

Topological bifurcation theory is one of the most essential topics in mathematics. This book contains original bifurcation results for the existence of oscillations and chaotic behaviour of differential equations and discrete dynamical systems under variation of involved parameters. Using topological degree theory and a perturbation approach in dynamical systems, a broad variety of nonlinear problems are studied, including: non-smooth mechanical systems with dry frictions; systems with relay hysteresis; differential equations on infinite lattices of Frenkel-Kontorova and discretized Klein-Gordon types; blue sky catastrophes for reversible dynamical systems; buckling of beams; and discontinuous wave equations. Precise and complete proofs make this book valuable to both the applied sciences and mathematical fields, ensuring the book should also be of interest to physicists and theoretically inclined engineers interested in bifurcation theory and its applications to dynamical systems. Includes rigorous proofs of chaotic solutions for discontinuous differential equations and differential inclusions. Covers bifurcations of periodic solutions in differential inclusions and systems with relay hysteresis. Examines the persistence of traveling waves under spatial discretization of sine-Gordon and Klein-Gordon partial differential equations. Details topological degree theory for discontinuous wave partial differential equations. Presents chaotic behavior of maps possessing topologically transversally intersecting invariant manifolds. -- *Publisher*



**Juarrero, A., & Rubino, C. A. (Eds.). (2008). *Emergence, complexity and self-organization: precursors and prototypes (Exploring Complexity Volume 4)*. Mansfield, MA: ISCE Publishing. ISBN: 978-0-9817032-1-3.** Emergence, Complexity, and Self-Organization have become vital focuses of interest not only in the fields of science and philosophy but also in the wider worlds of business and politics. This book presents a series of essays by thinkers who anticipated the significance of those issues and laid the foundations for their current importance. Readers of this book will encounter the important and varied figures of Immanuel Kant, John Stuart Mill, Charles Saunders Peirce, Henry Poincaré, Henri Bergson, Alfred North Whitehead, and the British "Emergentists" Samuel Alexander, C. Lloyd Morgan, and C. D. Broad. They will also find essays by the South African thinker and statesman Jan Smuts, the American philosopher Arthur Lovejoy, the eminent physicist Erwin Schrödinger, two more recent thinkers on emergence, P. E. Meehl and Wilfred Sellars, and Ludwig von Bertalanffy, one of the founders of General Systems Theory. In their detailed and comprehensive introduction to the collection, editors Alicia Juarrero and Carl A. Rubino set the essays in contexts stretching from Heraclitus, Parmenides, Plato, Aristotle, and

Hegel to some of the religious, scientific, and philosophical challenges we face today. --*Publisher*

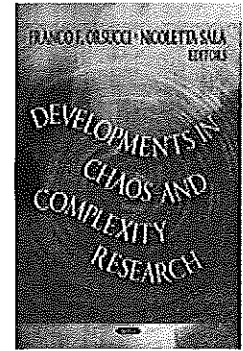
**Novak, M. M. (2006). COMPLEXUS MUNDI: Emergent Patterns in Nature. Singapore: World Scientific.** 360 pp. The dynamics of complex systems can clarify the creation of structures in Nature. This creation is driven by the collective interaction of constitutive elements of the system. Such interactions are frequently nonlinear and are directly responsible for the lack of prediction in the evolution process. The self-organization accompanying these processes occurs all around us and is constantly being rediscovered, under the guise of a new jargon, in apparently unrelated disciplines.

This volume offers unique perspectives on aspects of fractals and complexity and, through the examination of complementary techniques, provides a unifying thread in this multidisciplinary endeavor. Do nonlinear interactions play a role in the complexity management of socio-economic-political systems? Is it possible to extract the global properties of genetic regulatory networks without knowing the details of individual genes? What can one learn by transplanting the self-organization effects known in laser processes to the study of emotions? What can the change in the level of complexity tell us about the physiological state of the organism? The reader will enjoy finding the answers to these questions and many more in this book.

**Contents:** Structure of Genetic Regulatory Networks: Evidence for Scale Free Networks (L S Liebovitch et al.); Modelling Fractal Dynamics (B J West); Fractional Relaxation of Distributed Order (R Gorenflo & F Mainardi); Fractional Time: Dishomogeneous Poisson Processes vs. Homogeneous Non-Poisson Processes (P Allegrini et al.); Markov Memory in Multifractal Natural Processes (N Papisimakis & F Pallikari); Description of Complex Systems in Terms of Self-Organization Processes of Prime Integer Relations (V Korotkikh & G Korotkikh); Dynamical Decomposition of Multifractal Time Series as Fractal Evolution and Long-Term Cycles: Applications to Foreign Currency Exchange Market (A Turiel & C Perez-Vicente); Fractal Sets from Noninvertible Maps (Ch Mira); A Generative Construction and Visualization of 3D Fractal Measures (T Martyn); Complexity in Nature and Society: Complexity Management in the Age of Globalization (K Mainzer); Fractals, Complexity and Chaos in Supply Chain Networks (M Pearson); The Effects of Different Competition Rules on the Power-Law Exponent of High Income Distribution (K Yamamoto et al.); Synergetics on Its Way to the Life Sciences (H Haken); Complexity, Fractals, Nature and Industrial Design: Some Connections (N Sala); Modelling Pattern Formation Upon Laser-Induced Etching (A Mora et al.); Fractal Properties of Some Machined Surfaces (T R Thomas & B-G Rosén); Fractals, Morphological Spectrum and Complexity of Interfacial Patterns in Non-Equilibrium Solidification (P K Galenko & D M Herlach); Competition of Doublon Structure in the Phase-Field Model (S Tokunaga & H Sakaguchi); Study of Thermal Field in Composite Materials (P Stefkova et al.); Simulation of Geochemical Banding in Acidization-Precipitation Experiments In Situ (M Msharrafieh et al.); Bulk Mediated Surface Diffusion: Non Markovian and Biased Behavior (J A Revelli et al); Multifractal Formalism for Remote Sensing: A Contribution to the Description and the Understanding of Meteorological Phenomena in Satellite Images (J Grazzini et al.); The Distance Ratio Fractal Image (X-Z Zhang et al.); Iterated Function Systems in Mixed Euclidean and p-Adic Spaces (B Sing); Multifractality of the Multiplicative Autogressive Point



Processes (B Kaulakys et al.); Analysis of Geographical Distribution Patterns in Plants Using Fractals (A Bari et al.); Hierarchy of Cellular Automata in Relation to Control of Chaos or Anticontrol (M Markus et al.); Fractal Analysis of the Images Using Wavelet Transformation (P Jerabkova et al.); Clustering Phenomena in the Time Distribution of Lightning (L Telesca et al.); A Cornucopia of Connections: Finding Four Familiar Fractals in the Tower of Hanoi (D R Camp); Monitoring the Depth of Anaesthesia Using Fractal Complexity Method (W Klonowski et al.) The Complex Couplings and Gompertzian Dynamics (P Waliszewski & J Konarski). --*Publisher*



**Orsucci, F. F. & Sala, N. (2008). Developments in Chaos and Complexity Research. Hauppauge, NY: Nova Science Publishers.** ISBN: 9781604563405. This book presents the latest leading-edge international research on artificial life, cellular automata, chaos theory, cognition, complexity theory, synchronisation, fractals, genetic algorithms, information systems, metaphors, neural networks, etc.

**Contents:** Ethos in Everyday Action: Notes for a Mindscape of Bioethics (Franco F. Orsucci); Detection of Transient Synchronization in Multivariate Brain Signals, Application to Event-Related Potentials (Axel Hutt and Michael Schrauf); A Brief Note on Recurrence Quantification Analysis of Bipolar Disorder Performed by Using a van der Pol Oscillator Model (Elio Conte, Antonio Federici, Gianpaolo Pierrri, et al.); Comparison of Empirical Mode Decomposition and Wavelet Approach for the Analysis of Time Scale Synchronization (Dibakar Ghosh and A. Roy Chowdhury); Non-Invasive Assessment Of Risk For Severe Tachyarrhythmias By Means Of Non-Linear Analysis Techniques (Rita Pizzi , G. Inama, O. Durin, C. Pedrinazzi); Recurrence Quantification Analysis, Variability Analysis, and Fractal Dimension Estimation in 99mTc-HDP Nuclear Scintigraphy of Maxillary Bones in Subjects with Osteoporosis (Elio Conte, Giampietro Farronato, Davide Farronato, et al.); - Detecting Low Dimensional Chaos in Small Noisy Sample Sets (Nicolas Wesner); Alan Turing Meets the Sphinx: Some Old and New Riddles (Terry Marks-Tarlow); Forecasting of Hyperchaotic Rössler System State Variables Using One Observable (Massimo Camplani and Barbara Cannas); Parallel Implementation of Shortest Paths Problem on Weighted Interval and Circular Arc Graphs (Prمود K. Mishra); Fractal Geometry in Computer Graphics and in Virtual Reality (Nicoletta Sala); A Sensitivity Study on the Hydrodynamics of the Verbano Lake by Means of a CFD Tool: The 3D Effects of Affluents, Effluent and Wind (Walter Ambrosetti, Nicoletta Sala and Leonardo Castellano); The Buyer Decision in the Housing Industry (Michael Nwogugu); On The Choice Between Renting and Home-Ownership in the Industry (Michael Nwoguru); Climatic Memory Of 5 Italian Deep Lakes: Secular Variations (Elisabetta A. Carrara, Walter Ambrosetti and Nicoletta Sala) --*Publisher*

**Schuster, H. G. (Ed.). Reviews of nonlinear dynamics and complexity: Volume 1.** E-Book series: <http://www.researchandmarkets.com/reports/c84828>. Adopting a cross-disciplinary approach, the review character of this monograph sets it apart from specialized journals. The editor is advised by a first-class board of international scientists, such that the carefully selected and invited contributions represent the latest and most relevant findings. The resulting review enables both researchers and newcomers

in life science, physics, and chemistry to access the most important results in this field, using a common language. H.G. Schuster is Professor for Theoretical Physics. His research activities include the study of nonlinear systems by methods of statistical mechanics, applying analytical as well as numerical tools. Motivations are taken from neurobiological and biologically adaptive systems in order to design statistical models of their basic properties. Professor Schuster is active as author and editor of research monographs and topical handbooks on chaos theory, nonlinear dynamics and neural networks, but also on popular science books.

**Sun, R. (Ed.). The Cambridge handbook of computational psychology. (2008). New York: Cambridge University Press.** ISBN: 9780521857413. This book is a definitive reference source for the growing, increasingly more important, and interdisciplinary field of computational cognitive modeling, that is, computational psychology. It combines breadth of coverage with definitive statements by leading scientists in this field. Research in computational cognitive modeling (or, simply, computational psychology) explores the essence of cognition and various cognitive functionalities through developing detailed, process-based understanding by specifying computational mechanisms, structures, and processes. Given the complexity of the human mind and its manifestation in behavioral flexibility, process-based computational models may be necessary to explicate and elucidate the intricate details of the mind. The key to understanding cognitive processes is often in fine details. Computational models provide algorithmic specificity: detailed, exactly specified, and carefully thought-out steps, arranged in precise yet flexible sequences. These models provide both conceptual clarity and precision at the same time. This book substantiates this approach through overviews and many examples.

**Vesterby, V. (2008). Origins of Self-Organization, Emergence, and Cause. (Exploring Complexity Volume 3). Masfield, MA: ISCE Publishing.** ISBN: 978-0-9817032-0-6.

This book is about how emergence, self-organization, and cause come into existence. These fundamental processes play roles in the origins of virtually everything, thus the book describes the basics of how everything comes into existence. Development plays many roles in the origins of emergence, self-organization, and cause. With factor development, factors such as emergence originate in simple form in simple situations, and occur in more complex form in more complex situations where additional factors are playing roles. With situation development, the interrelations of two to many factors change through time. Development can be creative, leading to progressive increase in complexity. It is a universal factor that provides a way to develop a universal conceptual model: Understanding development, emergence, self-organization, and cause, provides the opportunity to become a modern generalist. A modern generalist thinks in the mode of these factors, using them as intellectual tools of exploration, analysis, understanding, and description. The modern generalist mode is like a Rosetta Stone of understanding. It translates the intrinsic deep structure of reality, into a form that can be comprehended by a living mind.

**Voinov, A. (2008). Systems Science and Modeling for Ecological Economics. New York: Academic Press.**

Robert Gregson reports that nonlinear dynamics is the underlying theme throughout this book, and that it has a great section on software. Synopsis from <http://esrevs.co.uk>: For centuries humankind's involvement with the planet and its ecology has been lacking in proper care and attention. Now that the consequences of this mismanagement are clear, it is more important than ever that as well as understanding the

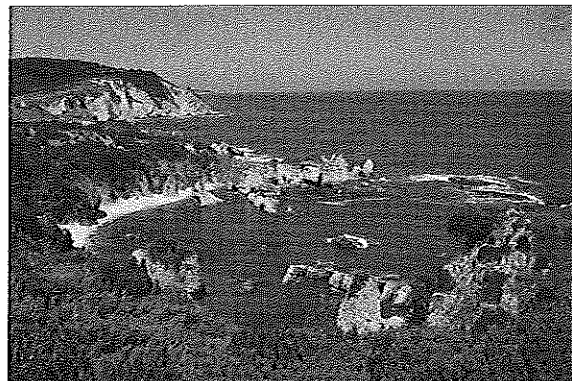
processes of ecology, we must bring new rigor to environmental management thinking.

Modeling is a powerful tool in ecological economics. Models can be simple or complex, conceptual or numerical, formal or verbal. Successful models need to be based on a culture of modeling - a basis of good modeling practice. Systems Science and Modeling for Ecological Economics stresses that if we develop common standards for our models, it will be easier to communicate ideas, to find common ground, to avoid conflict, and to make the right decisions.

Alexey Voinov provides hands-on experience and involvement in all the major stages of modeling, from data acquisition, to model building and testing. A web course is included with demonstration versions of the modeling software discussed, available for readers to download for their own research applications. On each model, ecological researchers and students have the option to perform tests, change the parameters, explore, ask questions, and find appropriate answers. This unique interactive format provides these readers with a concrete guide to develop practices in ecological modeling.

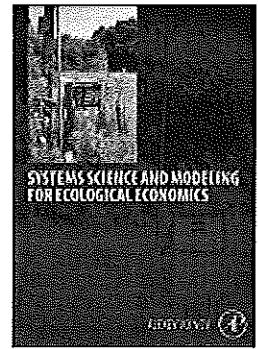
**Zaslavsky, G. M. (2008). Hamiltonian Chaos and Fractional Dynamics. Oxford, UK: Oxford University Press.** ISBN: 9780199535484. The dynamics of realistic Hamiltonian systems has unusual microscopic features that are direct consequences of its fractional space-time structure and its phase space topology. The book deals with the fractality of the chaotic dynamics and kinetics, and also includes material on non-ergodic and non-well-mixing Hamiltonian dynamics. The book does not follow the traditional scheme of most of today's literature on chaos. The intention of the author has been to put together some of the most complex

**Contents:** CHAOTIC DYNAMICS; 1. Hamiltonian dynamics; 2. Examples of Hamiltonian dynamics; 3. Perturbed dynamics; 4. Chaotic dynamics; 5. Physical models of chaos; 6. Separatrix chaos; 7. Chaos and symmetry; 8. Beyond the KAM-theory; 9. Phase space of chaos; FRACTALITY OF CHAOS; 10. Fractals and chaos; 11. Poincare recurrences; 12. Dynamical traps; 13. Fractal time; KINETICS; 14. General principles of kinetics; 15. Levy processes and levy flights; 16. Fractional kinetic equation (FKE); 17. Renormalization. --*Publisher*



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