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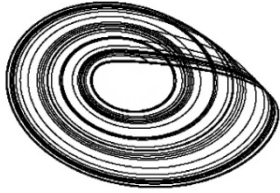
NEWSLETTER

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CALL FOR ABSTRACTS

For the 19th Annual International Conference
Marquette University, Milwaukee, WI USA ~ July 23-25, 2009

We invite interested scholars to present and discuss recent developments in nonlinear dynamical system theory, which includes chaos, attractors, bifurcations, fractals, catastrophes, agent-based and other complex systems, and related topics. Over the years, the SCTPLS conferences have inspired and supported scholars from an array of disciplines to find new ways to develop their theoretical and empirical work in an integrated approach to life sciences.

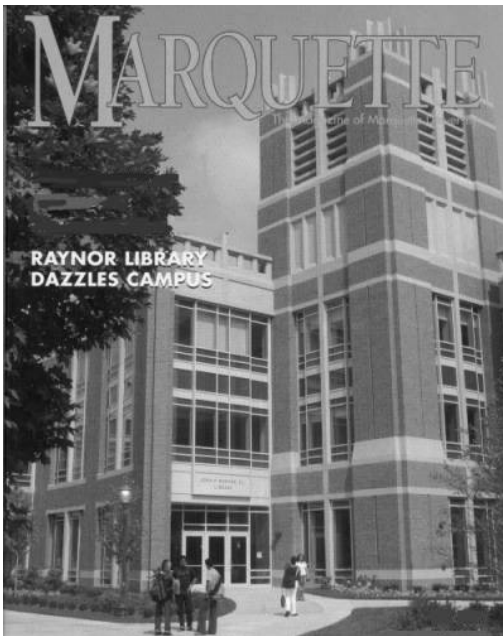
The Society for Chaos Theory in Psychology and Life Sciences is a multidisciplinary organization, and its conferences present work in all areas of psychology, general biology, neuroscience, medicine, and the social sciences, as well as anthropology, art, education, literature, mathematics, philosophy, and physics. The program will include workshops, invited addresses, symposia, panel discussions, a poster session, and sessions of individual papers. Advances in basic or applied research, developments in theory, reports of empirical results, and methodological papers are all welcome. We continue to encourage all nonlinear scientists, including graduate students who might be finishing up a dynamical thesis or dissertation, to consider sharing their ideas through paper presentations, chairing a roundtable session, or by proposing other alternative presentation formats, such as posters, product demonstrations, short workshops, or debates around controversial topics.



Join us for the longest-running annual showcase of nonlinear dynamics applications for psychology, life sciences, and beyond.

Instructions for Abstracts

Abstracts should be between 150-250 words for posters, individual papers, short workshops, and other alternative formats. The connection to nonlinear dynamics, chaos, complexity, fractals, or related concepts should be clear to the reader. Include a short background on each speaker/author.



Abstracts may be up to 500 words for symposia or panel discussions. For symposia, abstracts should reflect the content of EACH speaker's contribution and indicate the relevant background of each speaker. The format for a symposium is for all speakers to give presentations, followed by or interspersed with discussion. Symposium organizers are encouraged to include a discussant. For panel discussions, abstracts should provide a brief overview of the topic, and indicate the relevant background of the panelists and sample questions they will address. The format for a panel discussion is an introduction to the topic and the speakers, after which the panelists address a series of questions or issues (rather than giving a series of presentations).

Each person submitting is limited to a maximum of two presentations as first author. It is acceptable to be a co-author on additional work submitted by others.

The deadline for submissions is April 30, 2009.

Submit abstracts electronically at

<http://www.societyforchaostheory.org/conf/2009/cfp.html>

Four Exciting Pre-Conference Workshops Announced!

These lively, half-day workshops on July 23 are designed to teach useful skills and methods. Designed to meet learning objectives, they are great conference take-aways!

Self-Organization - Julien Clinton Sprott

(8:30am - 12:30pm)

Complex patterns are common throughout nature, from the distribution of the galaxies in the Universe to the organization of neurons in the human brain. It is generally assumed that such complex structure must have a complex cause, but it may be that the patterns spontaneously arise through the repeated application of simple rules. This workshop will provide examples of self-organization in nature and will describe six simple computer models that can replicate the features of these patterns. The models typically produce fractal spatial structure and chaotic temporal dynamics characterized by power laws and unpredictability, even when the models are simple and purely deterministic. Workshop participants will be challenged to propose simple models of complex systems that potentially exhibit self-organization in fields as diverse as physics, ecology, political science, economics, sociology, and art.

Julien Clinton Sprott, Ph.D. received his B.S. in physics from the Massachusetts Institute of Technology in 1964 and his Ph.D. in physics from the University of Wisconsin in 1969. He worked at the Oak Ridge National Laboratory for several years before returning to the University of Wisconsin to join the physics faculty in 1973. In 2008, he became an Emeritus Professor of Physics. His research has been primarily in the area of experimental plasma physics and controlled nuclear fusion. In 1989 his interests turned to nonlinear dynamics, chaos, fractals, and complexity. He has authored or coauthored over 300 scientific papers in these and related fields. He has authored or coauthored six books, 25 hours of physics educational videos, and four commercial software packages. He received the John Glover Award from Dickinson College, the Van Hise Outreach Award for Excellence in Teaching from the University of Wisconsin-Madison, and a Lifetime Achievement Award from the Wisconsin Association of Physics Teachers for his work in public science education.

Agent-Based Modeling and Social Networks

- Terrill L. Frantz *(8:30am - 12:30pm)*

This workshop introduces participants to the network-oriented, agent-based model developed by Carnegie Mellon University to study organization and group behavior. The model is embodied in a software program called Construct. Construct simulates and models groups and organizations as complex social-technical systems

and captures the variability in human and organizational factors; these characteristics are modeled as multi-level social networks. The nonlinearity of the model generates complex temporal behavior due to dynamic relationships among agents. These dynamic relationships are grounded in structuration theory which is the notion of construction and reconstruction of the social system through human interaction based on rules and resources. The changes in the social system are defined and analyzed through the lens of social and dynamics network analysis. These techniques have been used for analysis and consulting in industry (health care, aerospace, consulting, professional associations, financial), non-profit and emergency response (charity foundation, American Red Cross), higher education (universities), military (DARPA, ONR) and government (NSF, NASA). Participants will be introduced to the theory behind the model in a lecture-format and will be shown operational aspects of the simulation software in a demonstration-format.

Dr. Terrill L. Frantz, Ed.D. works in the Center for Computational Analysis of Social and Organizational Systems at Carnegie Mellon University, which brings together computer science, dynamic network analysis and the empirical study of complex socio-technical systems to develop a better understanding of the fundamental principles of organizing, coordinating, managing and destabilizing systems engaged in real tasks at the team, organizational or societal level. Dr. Frantz's primary research focuses on organizational merger integration and statistical analysis of social networks. He holds degrees from Pepperdine University (Ed.D. Organizational Change), New York University (MBA), and Drexel University (BS, Business Administration). He is currently studying for a Ph.D. in Information Science at Carnegie Mellon.

Using Markov Chains for Modeling, Simulation, & Analysis - Stephen J. Merrill

(1:30pm - 5:30pm)

Markov chains can be used to model dynamical processes, analyze general time series, provide simulations of time series with the same properties as a given series, and for 1-d dynamical systems with a parameter, uncover the bifurcation structure. In this workshop, all of these topics will be discussed with examples. All participants will receive a CD with data and

algorithms in MATLAB (m-files) to facilitate their own use of these methods.

Stephen J. Merrill, Ph.D. is Professor of Mathematics at Marquette University in Milwaukee. His research involves using mathematical models to answer biological, clinical, and theoretical problems. He has held visiting positions at the Lefschetz Center for Dynamical Systems (Brown University), the Santa Fe Institute, and Los Alamos National Laboratory. Dr. Merrill edits the Computational Modeling section of the Journal of Immunological Methods and serves on the Editorial Board of Nonlinear Dynamics, Psychology, and Life Sciences.

The Nonlinear Model of Hierarchical Complexity: How Order is Constructed in the Process of Emergence - Sara Nora Ross

(1:30pm -5:30pm)

With an emphasis on dynamics of emergence, this workshop introduces a general theory and its methods, the nonlinear Model of Hierarchical Complexity, which accounts for and measures emergence. As a math-based formal theory, the Model applies to all information-organizing tasks, from simple organism behaviors to the most complex human behaviors. Its nonlinearly-increasing orders and discrete state transition steps

result in an inherent power law, a fractal dimension of 1.37. Its theory and a breadth of applications are published in a 2008 special issue of World Futures: The Journal of General Evolution, 64(5-7), co-edited by Ross with Michael Commons, originator of the Model. The workshop is relevant to anyone who wants to analyze and measure behaviors, whether in consulting or research, whether quantitatively or qualitatively. Participants will apply the new skill to their own examples to reinforce learning and understand the broad applicability of the measure. Methods include presentation, individual and group exercises, reflection, and discussion.

Sara Nora Ross, Ph.D., has been studying micro, meso, and macro transition dynamics of increasing complexity since the 1980s in individuals, groups, communities, and societies. With a keen interest in the applied and scientific dynamics of decision making, she discovered and continues to develop the measure of nested fractals of hierarchical complexity in ubiquitous phase transitions that account for emergence, integrating the micro- and macro-development of entities. She is founder and president of ARINA, publisher of the journal *Integral Review: A Transdisciplinary and Transcultural Journal for New Thought, Research, and Praxis* and *The Integral Process for Working on Complex Issues*. She teaches at Antioch University McGregor in Ohio.

Two Dynamic Keynotes!

Mohammed Dore - Sunset Keynote Speaker



Abstract: The Economic Downturn of 2007-2008

The world has a history of financial crisis and business cycle downturns. Linear models of business cycles cannot explain these repeated crises and downturns. Each time, rational agents are persuaded that "this time it is different." While the crises repeat, there is also emerging novelty that linear models cannot handle. This presentation describes nonlinear dynamics of business cycles, how they were evident in the credit crisis of 2007-2008, and legislative foibles associated with empirically determined turning points or singularities in the economic time series. A vector autoregression model confirms the crucial role played by credit.

Guy Van Orden - Banquet Keynote Speaker

Abstract: Living in the Pink



Purposeful acts appear pre-prepared as propensities to act. Propensities anticipate possible actions appropriate to the context at hand and consistent with the history of the actor. Anticipation, in this sense, situates the actor in the future, so far as circumstances allow. A conceptual tool to make sense of anticipation is self-organized criticality. The embodiment of anticipation self-organizes to stay close to critical points or choice points for possible actions. This hypothesis explains a growing body of research, focused on patterns of variation in sickness and in health, to gauge the anticipatory poise that precedes repeated actions.

Two ways to register for the conference!

- Online at <http://www.societyforchaostheory.org/membership.html>
- By mail, using the registration form on p. 15 of this issue of the Newsletter

Conference Lodging

SCTPLS will be managing registration for the conference, workshops, and lodging. The conference lodging facility will be the Straz Hall of Marquette University. The Marquette facilities offer single and double lodging, private bath, and internet connection.

Publication Opportunity

All presenting conferees are further 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 *PsycInfo* (*Psychological Abstracts*), *Medline* (*Index Medicus*), *JEL/Econlit* and other important databases. *NDPLS* uses American Psychological Association (APA) style. Click JOURNAL on the SCTPLS web site to access Instructions for Authors. All SCTPLS members receive *NDPLS* and the *SCTPLS Newsletter* as a benefit of membership. *NDPLS* accepts manuscripts all through the year, but **please use September 1, 2009 as the target date for submitting conference-related papers**; the journal would like to have as many articles based on conference presentations as possible ready for the same issue.



March 9 (Monday). Early-bird abstract submissions will receive a reply after this date.

April 30 (Thursday). Call for abstracts closes.

May 15 (Friday). All acceptances finalized by Program Chair.

June 1 (Monday). Students who have a paper accepted for presentation must be active members by this date in order to qualify for a Scholarship Conference Fee Waiver. www.societyforchaostheory.org/membership.html Qualifying students should contact Dr. Dick Thompson dick@hpsys.com if they are interested in this opportunity.

June 22 (Monday). All speakers must register by this date to remain on the program.

July 1 (Wednesday). Cancellations of conference registration and lodging will be subject to a 25% service charge starting on this date.

July 8 (Wednesday). Last day for early-bird conference registration. Last day for conference lodging. We cannot guarantee the availability of lodging units after this date. Cancellations of conference registration and lodging will be subject to a 50% service charge starting on this date.

July 15 (Wednesday). Cancellations of conference registration and lodging will be subject to a 75% service charge starting on this date.

July 22 (Monday). We regret that we cannot offer any refunds for cancelled registrations or lodging received after this date.

July 22 (Wednesday). Arrive if attending morning workshop or starting the fun early!

July 23 (Thursday). On-site registration and workshops starting 8:30 AM. Sunset session with guest speakers

July 24 (Friday). Conference day. Reception and banquet starting at 5:30. Guest speaker.

July 25 (Saturday). Conference day. Annual business meeting.



The ever-adaptable Milwaukee Art Museum!



Help us promote our Conference! Circulate our announcements!

The 4th INSC in Sicily



The 4th International Nonlinear Science Conference is now planned for March 2010 in Palermo, Sicily, at the University of Palermo. Our local hosts and conference chairs will be Gaetano Aiello and Maria Brai, who are both nonlinear biophysicists. Dimitrios Stamovlasis—who has been a remarkable service to the Society for his work organizing managing various aspects of the previous INSCs in Heraklion (with Sifis Micheloyannis) and Tokyo (with Yuji Aruka)—will be joining us on the INSC conference committee in 2010 as well.

The University of Palermo's history dates back to the mid-15th Century. It was shut down by King Ferdinand for 37 years, then refounded in

1805 in its present charter. Today, the University of Palermo presently has a student population of around 50,000 and a staff of over 2,000. Palermo itself is the capital of Sicily (Italy), and was founded in the 8th Century BC (in the way things were founded in those days), and since then has experienced strong cultural contributions from the Phoenicians, the Greeks, Romans, Arabs, Byzantines, other European influences, and of course Modern Italians.

Specific dates and timetables will be forthcoming in the Newsletter, the SCTPLS web site, and e-mail announcements. Stay tuned to all the usual channels for further developments.



Members' News

Grant H. Brenner, M.D., an Interpersonal-Relational Psychoanalyst and Psychiatrist with an interest in nonlinear science, is a member of the Society since 2004. In addition to private practice, teaching, supervision, and related activities, he has a long-standing interest in disasters and trauma, traveling to Mumbai, India in January of 2009 following the paramilitary terrorist attacks to conduct disaster mental health training and capacity-building with providers, journalists, and affected families as a volunteer with Disaster Psychiatry Outreach in collaboration with Greenleaf Integrative Strategies. To read about this and view photos, visit www.DPOTalk.blogspot.com. Also, he and co-editors Daniel Bush M. Div. and Joshua Moses M.A. are pleased to announce the publication later this year of their book *Creating Spiritual and Psychological Resilience: Integrating Care in Disaster Relief Work*, from Routledge (available on pre-order from the publisher). He has lectured on the use of complexity theory in psychoanalytic psychotherapy, incorporated key concepts from complexity theory in his publications, and is offering an elective on this topic in 2009 as part of the William Alanson White Institute's Psychoanalytic training program.

Stephen Guastello was interviewed on National Public Radio on February 3 on the topic of the impact of the economic crisis on individual stress levels and the impact

of stress on health. When asked if the stress levels were higher for white collar employees than for blue collar employees, he replied that the distinction between white collar and blue collar workers is not as meaningful today as it might have been in the past. Unemployment and mortgage foreclosures and other debts affect all sectors of the economy, and a lot of the individual differences in experience depend on how much debt anyone might have incurred shortly before the economy snapped.

Terry Marks-Tarlow had a "Meet the Author" event on the web's Facebook from March 9 to 19, sponsored by Grant Brenner, the New York psychiatrist/psychoanalyst. It included a free online discussion in the facebook group platform area of the Psychoanalysis, Culture, and Evolving Society facebook group. Get this: The first chapter of *Psyche's Veil* is downloadable free on Terry's website at <http://www.markstarlow.com/default.htm> The Meet the Author event page is here. <http://www.facebook.com/event.php?eid=3D49492099430&ref=3Dts>. In connection with that event, check out the video Terry has posted on You Tube. It's a dance performance of the book with other goodies narrated by Terry. You can access it by typing in *Psyche's Veil* in YouTube's search box, or go directly to it at <http://www.youtube.com/watch?v=GvPH94TMhY0>. Also see the David Pincus interview of Terry below!

And More News

New Instructions for NDPLS Authors

New instructions for authors have been loaded to the NDPLS web site www.societyforchaostheory.org/ndpls. Although the general instructions for formatting manuscripts is mostly unchanged, the new instructions are mostly concerned with technical updates for the preparation of graphics and mathematical material. Manuscripts should still be submitted in MS Word or PDF, and a Word file will still be required prior to publication of the article. Word files should be saved in the 2003-06 edition of Word; .DOCX files from the Vista series are not being used at this time. The NDPLS web site can also be reached from the SCTPLS home page.

Resources for Students and Teachers

The Education and the Publications Committees have updated the section of the SCTPLS web site, "Resources for Students and Teachers" at www.societyforchaostheory.org/tutorials. If you have not visited the site recently, updates you can expect are

mostly related to psychology applications and nonlinear methods. The committees are now building Menu 4 which features resources in nonlinear methods. Members are encouraged to submit more tutorial materials for the site to Jayne Fleener, Dean of Education at Louisiana State University, fleener@lsu.edu, who is the chair of our Education Committee. Please consider writing brief yet instructive pieces on most any aspect of nonlinear dynamics; educational materials for classroom demonstrations and methodology topics are especially welcome at this time.

Chaos in July

NDPLS has a special issue planned for July, 2009 on "Chaos, in Honor of E. Lorenz" which will commemorate and explore his contributions to nonlinear dynamics and their applications in psychology, economics, ecology, and aesthetics. The special issue is guest-edited by Mohammed Dore. Dore will be one of our featured speakers at the SCTPLS Conference in Milwaukee, July 23-25.

Feature Article

Resilience Engineering Wants to be Nonlinear

Stephen Guastello, Marquette University

The concept of resilience engineering appeared on the radar screen as a new frontier for both human factors engineering and nonlinear dynamical systems applications, courtesy of an edited collection from Hollnagel, Woods, and Leveson (2006). In the introduction, Woods and Hollnagel (2006) make reference to accidents as nonlinear events that can be produced by properties of the complex adaptive system (CAS) and self-organization. Although they did not characterize the CAS as such, it was clearly the meaning conveyed. Indeed the answer to the question, "What is an organization?" has evolved in the 20th century from a bureaucratic and mechanistic conceptualization to a humanistic one where human beings rather than machine parts live, work and contribute; to an organic concept where the organization as a whole should be regarded as a living system; to the complex adaptive system (CAS) which derives many of its features from nonlinear dynamical systems (NDS) theory. Dooley (1997) first articulated the connection between organizations and the CAS, and others have expanded on it further, with some calling attention to the NDS processes involved (Anderson, 1999; Dooley, 2004; Guastello, 2002, 2009; Kiel, 2007; Uhl-Bien & Marion,

2007) and others calling attention to the psychology of adaptation without any direct mention of NDS principles (Bledow, Frese, Anderson, Erez, & Farr, in press; Burke, Stagl, Salas, Pierce, & Kendall, 2006; Pulakos, Arad, Donovan, & Plamondon, 2000).

Regarding occupational and public safety issues, Woods & Hollnagel (2006) indicated that the prevailing notion of safety climate needs to be expanded, not simply by one variable at a time, but rather by a paradigm shift in approach. The concept of safety climate was introduced by Zohar (1980) as an outgrowth of the concept of organizational climate, and addresses all the specific ways in which an organization and its members contribute to occupational safety. Although the concept has been influential, its correlation with actual accident rates and experiences has been limited (Clarke, 2006). The flow of causality in the safety climate concept is thought to be circular, with both bottom-up and top-down influences operating. Positive safety participation by individuals contributes to a positive climate that is substantially mediated by management, which in turn further influences individual participation and safety behavior. Actual accident experiences are also thought to contribute to the safety climate, with

negative climate shifts likely when accidents occur or the overall rate is too high (Clarke, 2006; Guastello, 1989; Neal & Griffin, 2006; Zohar & Luria, 2005; Zohar & Tenne-Gazit, 2008). This is a blueprint for an emergent phenomenon (Sawyer, 2005), which is a self-organizing process, and which is often characterized as a phase shift when changes (a phenomenal accident or accident rates in this case) occur in the environment (Guastello & Liebovitch, 2009). Indeed the first seven chapters of Hollnagel et al. (2006) were aggregated under the heading "Emergence."

The expansions advocated by Woods (2006) involve a focus on the organization's buffering capacity to forestall an actual accident, its degree of flexibility versus stiffness, and maintenance of its margin of safety versus cutting it close. Resilience involves both downward influence from management and its policies and upward influence from the operators "on the sharp end." Resilience effects are once again emergent processes and examples of supervenient effects.

Several of the contributions to Resilience Engineering dissect some organizational safety systems, such as the Dutch railway system (Hale & Heijer, 2006), famous incidents such as space shuttle explosions, or the Walkerton water contamination epidemic (Leveson et al., 2006). Communication links within those systems could have provided reasonable amounts of control to keep the system operating properly. The implication is that redundancy improves reliability, which is a well-known principle of human factors. Critical links were not fully operational, however. For instance, Walkerton is a small community in Ontario, Canada, which managed its own water treatment. The employee who was primarily responsible for maintaining proper chlorination levels decided that he and perhaps others preferred non-chlorinated water. The regional government that had previously checked the water quality on a regular basis dropped out of the system leaving the full responsibility to the local agents. Nothing bad happened until one day it did: A torrential rain in a farm region washed large amounts of animal waste into the water supply, resulting in supercritical bacteria counts, seven deaths, and more than half the town's population becoming seriously ill (Vicente & Christofferson, 2006). Had the communication loops been fully functional, the tragedy would probably not have occurred, according to Leveson et al. (2006).

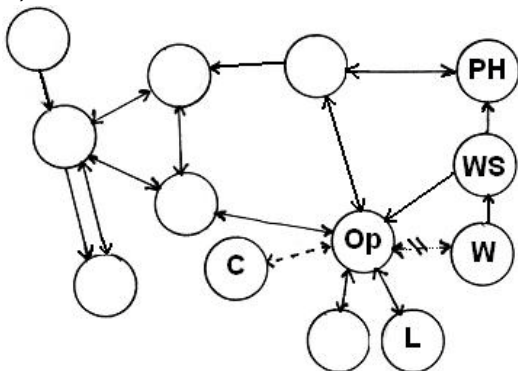


Figure 1. Linkage system for agents during the Walkerton contamination accident.

Figure 1 is a network based on Leveson et al.'s configuration for the principle agents involved in the Walkerton epidemic. The Public Utilities Commission (C) only communicated with the Public Utilities Operations (Op) on financial matters. The links between Op and the control of the wells (W) lapsed, disconnecting the wells from the private lab tests (L) and all the other governmental offices. Tests that could have been made on the water system (WS) did not register a problem until the problem flowed into the Public Health (PH) sector.

One recurring theme in resilience thinking, NDS, and elsewhere is that the concept must be more than a metaphor. It must be possible to formulate and test explicit hypotheses germane to the construct or its surrounding theory. We consider some options here with the foreshadowing that Resilience Engineering lends itself to more than one dynamical process. The first to consider is the use of network robustness. It was well-known decades ago relative to simple parallel and serial-parallel hybrid systems that robustness is reliability, and reliability increases with redundancy. Thus it follows that a network is robust to the extent that there are multiple pathways between any two (important) points; studies in telecommunications networks reify this point (Dana, Zadeh, Noori, & Ali, 2008), while biologists also note the connections between robustness, resilience, and self-organization (Lesne, 2008).

The theme of stiff versus flexible systems, which Sheridan (2008) also emphasized as a feature of resilience, is a metaphor from material science. A piece of material that is subjected to sufficient amounts of stress will show a certain amount of deformity, or strain. Rigid materials will break, while flexible materials will rebound. The amount of deformity induced by stress is the stress-strain ratio. The connection between material

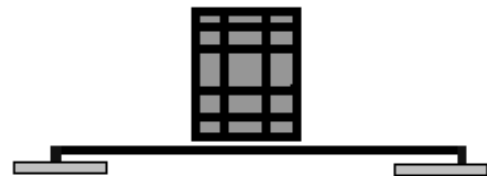


Figure 2. Buckling of an elastic or rigid beam when weight is applied vertically.

strain and the cusp catastrophe was made some time ago with regard to physical materials (Zeeman, 1977) and human systems (Guastello, 1985). Figure 2 shows a beam of relatively stiff material that is pin-jointed at both ends. A weight is placed on the beam. If the material is rigid, and the weight is not supercritical, there will be little visible buckling. When the vertical weight becomes too large, the beam will snap. If, on the other hand, the material has a high degree of elasticity, the weight will cause the beam to waffle, more weight could cause it to waffle more, but the beam would not snap.

The beam-buckling relationship is characterized as a cusp catastrophe model (Fig. 3). The amount of vertical

weight is the asymmetry parameter. The modulus of elasticity of the material is the bifurcation factor, with low elasticity located at the high end of the bifurcation axis.

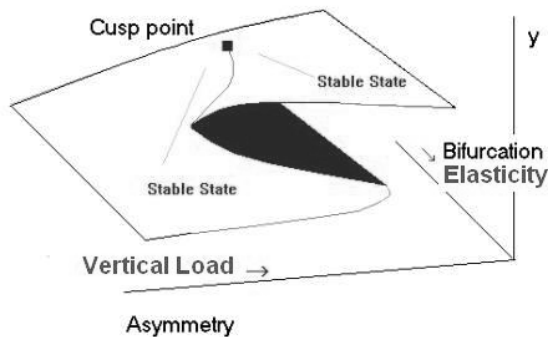


Figure 3. Catastrophe model for the buckling of an elastic or rigid beam.

For human performance systems, the system begins on the lower sheet of the surface where the time to complete the task and the error rate are relatively low. As increased work demands are piled on, no change in work performance occurs until suddenly it does, whereupon work completion time or error rate increases dramatically. For physical labor, some physiological characteristics were identified that distinguished people who were more or less adaptive to changes in the work load. Besides making the point that a connection between human performance and material science existed, the study opened up numerous possibilities for determining the facets of elasticity that would pertain to other types of work or situations. In fact, one could consider what allows some people to bounce back after a traumatic event, while other people would experience serious emotional impairment.

Hollnagel et al. (2006) were particularly concerned with accident prevention, emergency response, and recovery, and recognized accidents as "nonlinear events" if not also discontinuous events. One might consider whether it followed that the beam buckling model transfers to accidents directly. Research in that area (Guastello, 1989, 2003) shows that the cusp catastrophe model is very appropriate for modeling accident processes. The asymmetry and bifurcation variables for the accident model are interpreted generically as environmental hazards and operator load respectively. Here operator load consists of several types of stress and the quality of safety management or climate. Hazards act as the background variable, while operator load acts as the bifurcation factor; the role of stress is different here compared to the beam buckling model. It is also possible to see a new role for the safety climate construct and a considerable amount of value added with regard to the NDS processes.

In summary, resilience engineering, which is the process or procedures for enhancing an organization's

adaptive capabilities, has some clear NDS properties. It is also apparent that more than one type of NDS process is involved. Researchers who hope to develop and test new ideas related to resilience should consider which aspect of resilience is in play in a given application.

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Interview

Interview with *Psyche's Veil* Author Terry Marks-Tarlow

By David Pincus

When I saw that my friend, colleague, and fellow SCTPLS member Terry Marks-Tarlow had completed her book, *Psyche's Veil: Psychotherapy, Fractals and Complexity*, I knew immediately that I wanted to do two things: (a) Read it and (b) ask her questions about it. Terry and I have a complex relationship. Based on my empirical studies so far, and her theoretical and clinical writing, I think we would both agree that this complexity is the result of a lovely fractal, full of many branches, deep integrity, and also many tiny gaps – spaces between her and me, created through the paradox of our great similarity to one another.

Indeed, now that I have read her book, I feel comfortable describing her in sisterly terms – like a twin, a little sister, and a mentor all at once. Clearly this new book from Terry has blown my mind! It is a must read for the practitioners and also the applied researchers among us. I asked her my questions. She responded generously. I hope you find what she says as illuminating, enlightening, and also constructively challenging as I did (and that it attracts you to Amazon to purchase this excellent book if you are so inclined).

Dave: *Psychotherapy is a difficult topic to write about in its own right, and combining nonlinear dynamical systems (NDS) concepts can make it even more difficult. What set of motivations helped most in your starting, and more importantly, sticking with and completing such a large project?*

Terry: Just like this current book, my first one, *Creativity Inside Out: Learning Through Multiple Intelligences*, took over ten years to finish from conception to published product. Once I get an idea to write idea in my head, I'm like a dog with a bone. With my first book, despite the compelling subject and all the effort that went into it, once it was published. Only later did I realize that the real reason: that book was only a warm-up. I was writing about creativity because I wasn't ready to be truly creative yet myself.

For me, *Psyche's Veil* is the real deal. To combine NDS concepts with clinical work in a way that didn't repackage old theory with new language took diving into the depths of myself for over a decade. I had to go through a period of thinking I was crazy. I had to writhe around in my own creative agony. I had to wait until the material descended from my head into my body as lived experience. I had to produce two complete manuscripts and then trash them both. Only after all this, did the final

form emerge. Why did I write the book? In sum, I had to in order to maintain my sanity and esteem.

Dave: *Tell us about the process of finding Routledge as your publisher, for the benefit of other members who may be inclined to publish texts in the area of NDS. Many of us have found that publication in traditional outlets, including journals and publishing companies, can be more difficult than the publication of more traditional (linear) concepts. Do you think the publication of *Psyche's Veil* with Routledge is a sign that things are changing within the mainstream outlets?*

Terry: Finding a publisher was a long and grueling process. Part of the problem came from trying to hawk drafts of the book that weren't ready. Another difficulty was the lack of successful precedents in an industry getting steadily more conservative. In this economic climate, most presses want less risk and greater assurance of a "hit."

In general, Americans have a more difficult time appreciating my work in NDS than Europeans and Australians, who are less inclined to focus on behavior and "how-to" prescriptions, and more interested in existential issues that relate to meaning-making and pattern detection. I got rejection after rejection from American publishers.

I was very discouraged but still doggedly determined. In the end, it was Allan Schore who pointed me in the right direction. Allan has been great in his steady alignment with my visions, ideas and writings. He suggested I try Routledge, a British publisher that proved just the right fit. Not only does Routledge have a strong psychoanalytic interest, but it also has recently acquired many of the American presses that had previously rejected my work. I found great satisfaction in this. In fact, I felt as if I'd hit the jackpot. Kate Hawes, the Senior Editor there, generously allowed me to format the book myself. With over one hundred images in *Psyche's Veil*, about forty are my original drawings. There is also an insert of color plates produced by fractalist artists. The one cost for all this creative freedom was having to do the major editing myself.

Dave: *What are the main things you would like psychotherapists to take away from your book? What are the more practical aspects that they may use on a day to day basis?*

Terry: I hope that psychotherapists will be better able to discern and respect what can't be known with certainty during clinical work. While immersion in the mess is intense and not always pleasant, perhaps we can all relax a little more by recognizing its necessity. Let's embrace the ambiguities, contradictions, and lack of control over details and outcome. Let's stop trying to be accountable at impossible levels and resist formulating uselessly precise predictions and prescriptions. By recognizing the uniqueness of each therapist-patient pair, as re-configured anew in each clinical moment, let's renew our

fervor to engage fully with our whole selves. Through its self-organizing wisdom, our bodies often know better than "we" do. This throws us back to our clinical intuition, however much it operates in the dark. By beginning in motion and assuming movement and flux at the core of healthy complexity, the NDS approach is well suited to aspects of being, feeling, intuiting relating and meaning-making that are central to deep change during psychotherapy and in life broadly.

To help address these challenges, *Psyche's Veil* offers therapists nonlinear lenses to detect complex patterns that aren't about logical so much as emotional sense. These patterns tie things together under the surface. They are more evident during transition times—psychologically when we are in crisis, physiologically when we move between activities. Nonlinear patterns are holistic. They exist under chaos. They occupy the *space between* self, world, and Other. By spanning different scales of space and time as well as the full gamut from physiology to psychology, from matter to spirit, these patterns connect us to nature at large. I hope readers walk away recognizing the NDS paradigm as a metaframework that is both grounded yet flexible enough to unify diverse psychological theories plus the art, science, and spiritual aspects of psychotherapy

As for what's practical, learning how to feel better on a day to day level is to me the bottom line. This requires continually integrating feedback, learning how to learn, being oriented to detecting the novel, embracing our vulnerabilities, and opening ourselves up to unexpected outcomes. A nonlinear perspective immerses us in what is discontinuous, spontaneous, emergent, and new. It's the stuff of creativity, growth, change and evolution in nature. I am deeply gratified that some people walk away from reading *Psyche's Veil* not only with new ideas, but also with new feelings and insights. The book is multifaceted enough to serve as a fractal mirror reflecting something different for each person, depending on their unique history and dynamics. One man describes a different understanding of his past; another a new insight into her previous psychotherapy; a third finds inspiration to choreograph an improvisational dance performance for kids. These unexpected and wildly divergent responses both reflect the book's contents as well as my own processes in writing *Psyche's Veil*.

Dave: *What are the deepest, most transformational, topics?*

Terry: I believe my most original contribution involves how fractal geometry illuminates psychological boundaries—between inner and outer, subjective and objective, one person and the next, mind and body, brain and mind. There are no clean lines dividing any of these realms. Instead fuzzy fractal boundaries both separate and connect these nested realms of wholeness. Fractals have something to say about the "truth" as discovered by science; about "beauty" revealed by nature's artistry; and about "goodness" that emerges

when we recognize the fundamental equivalence of self and other.

Fractal construction/discovery is observer-dependent to a level beyond the participant-observer model offered to psychoanalysis by classical physics. With a fractal metaphor, it doesn't just matter *where* we therapists stand, it also matters exactly *how* we look, including the scale of observation we use. There is something intrinsically soothing about fractals. Not only are they beautiful, but they are profound. Their patterns in nature are both immanent and transcendent. They manifest within various time and size scales, at the same time they are characteristic of none. After blowing away the dust of chance, after sinking beneath the turbulence of chaos, we find a still place in which to rest. Here fractals help us to tap into a feel for the whole, by revealing how the parts and pieces of experience emerge from the global level, while in turn reflecting it. Fractals span the infinite spaces extending between ordinary, finite dimensions. They grant a glimpse into Blake's universe in a nutshell.

To deeply understand fractals is to wrap your mind around something extraordinarily beautiful yet sensibility shattering. It allows us to hold the complexity of convoluted, recursive patterns. It permits the embrace of contradiction and self-reference, when what appears outside of us circles back round to define what is inside. Fractals touch the magic of Merlin's bag, where the closer we look, the more there is to see. Yet in a nonlinear universe, magic resides comfortably within science. Because implicit systems in the body are better connected to the surrounding environment than our conscious minds, fractal boundaries model full interpenetration at the edges. We are fully enfolded within the universe at the same time as the universe is fully enfolded within us. To me, this is the stuff of mystical vision.

Dave: *You mentioned to me that your use of imagery in the text was intended to counterbalance much of the technical information pertaining to NDS, to allow the more intuitive aspects of NDS to be represented. Can you tell us more about your plan in this regard, and if it relates to your writing about right and left brain balance within the contents of your text?*

Terry: Within the psychotherapy literature, there are two main uses of images. One involves ancient mythology and art to portray cultural influences, such as exists within the Jungian tradition, and especially archetypal psychology. A second use of images inside clinical literature involves the art of patients, as it illustrates conflict and transformation. In *Psyche's Veil*, I do something a bit different. I illustrate my own ideas largely with my own drawings. There is something very powerful about imagery. Language is inherently linear. A string of sounds or written words is uttered, heard and read in single, linear sequence of sounds over time. Language is powerful enough to depict nonlinear concepts, but this is a bit baffling, like a Stroop test

where the word "brown" is written in orange ink instead of brown ink. Self-contradiction adds a level of confusion. Maybe this is why we in the West have been resistant to nonlinear thinking versus other cultures, such as the Japanese or Chinese, who use pictograms instead at the basis of language.

An image allows simultaneity of complex expression, and so carries great potential for the direct illustration of nonlinearity. In *Psyche's Veil*, I have tried to produce images that illustrate complex ideas. There is also something inherently soothing about art that helps reduce people's fear of science and math. When I illustrate my ideas with my art during professional Powerpoints, people get mesmerized and less on edge about scary new ideas. I was approached by a woman after the UCLA Attachment Conference last year, where I presented a clinical case using nonlinear concepts. She had just learned that her mother went into the hospital right before my talk and was afraid she wouldn't be able to concentrate. Instead she found herself getting lost in my extensive use of art and imagery. NDS is such a highly visual science. Our culture is getting more visually oriented with sites like YouTube and Facebook. As a search engine, Google now favors video over verbal presentations. I believe the more picture-oriented we get when teaching nonlinear concepts, the more digestible the ideas will be.

Dave: *You use NDS variably throughout the text as model and metaphor. This tends to be a recurring topic on the chaopsyc listserve as well. What is your view of model and metaphor, how do the two relate, and how should NDS be used in either context to assist in the work of psychotherapy?*

Terry: There have been many discussions and arguments about the use of NDS as model versus metaphor. An either/or framework is easily reified with a group such as ours that is strongly divided into researchers versus practitioners. Many of us more grounded in empiricism find it downright painful when people grab nonlinear ideas and churn out metaphor without fully understanding the ideas. Such practices are partly what give metaphor a bad rap.

From a developmental perspective, metaphor is the right-brain, cognitive mechanism by which we bootstrap concepts. As Lakoff has illuminated, we begin with concrete, embodied understanding of the world, which gets leveraged towards more abstract, symbolic thinking. Metaphor isn't purely about cognition. Instead it represents a fusion of sensation, emotion, and imagination, as processed creatively by the right side of the cerebral cortex. These ideas are explored more fully in Arnold Modell's book, *Imagination and the Meaningful Brain*.

As an artist, I love metaphor. As a therapist, I'm hooked on the power of the metaphorical imagination to harness the body. As a Yogini and dancer, I tap into metaphor partly through the fusion of senses plus inner attunement to body processes as an interface with

brain/mind/body system of patients. In psychotherapy, metaphor is central to the change process. Those spawned from nonlinear science seem ideal, because change itself is inherently nonlinear. Perhaps this is why clinical metaphors emerge so often and spontaneously, whether from patients or therapists, from the heart of the work. Metaphors are also inherently nonlinear by pointing simultaneously in multiple directions, while implicating both similarities and differences. Metaphor is also self-referential, through pointing outwards towards the world, yet sweeping back to implicate its author as well. Metaphors are so basic to all human conception, that some people even believe that the hardest core discipline of all—mathematics—is inherently metaphorical. The idea of “number,” for example, implies different concepts whether considered “a point in a line,” “a member of a set,” or “a unit of measurement.”

I don't perceive such a necessary dichotomy between NDS concepts as model versus metaphor. Nonlinear methods implicate nonlinear metaphors at the base of their model. Both the universe and metaphors are intrinsically nonlinear. The more inclusive our metaphors, the more they mirror the fundamental nature of the universe, and the more accurate our methods become. This convergence of domains is why *Psyche's Veil* dances back and forth among art, psychology, science, mythology, and spirituality. Ultimately, all are different ways of knowing by which we circle around to the same truths using different paths.

Dave: *Where do you think the field of psychotherapy is headed? Will there be more integration among approaches? Will NDS become more mainstream in practice and in research? What books on similar topics do you think will appear? And will you be writing any more books? If so, what are you considering?*

Terry: I believe the field of psychotherapy is moving away from the kind of fragmentation by which theories proliferated in the image of their originators, and where people tried to emulate their intellectual heroes. Different ideas have come and gone according to social trends. Within psychology turf wars have existed for which theory is best, which is “right,” which has the biggest following. I believe we're inching towards Freud's original vision of a neurology-based psychology as expressed in his Project for a Scientific Psychology. Shortly before he died, Francisco Varela wrote about the remarkable capacity for brain research to integrate first-person subjectivity with third-person observation. It is this capacity that captures the nonlinear uniqueness of each therapist/patient pair in each moment. Brain research allows us to ground all abstractions in material processes. The nonlinear paradigm gives us the tools to embrace the extraordinary complexity by which biological, psychological, social and cultural levels are interconnected. Rather than choose one theory over

another, we will get more sophisticated in recognizing which theory is useful for which moment with which person for what purpose. By necessity, this level of complexity requires nonlinear methods and thinking.

As for where I'm headed professionally, I have two books slowly simmering in the cooker. One is a professional book on therapeutic creativity and clinical intuition. I will present all change in psychotherapy as a creative act. This book will use the nonlinear paradigm, but this time more implicitly than explicitly. I'd like this to be a really expressive book without scaring people away with math and science. I'm convinced that unless we reconnect with embodied intuition to guide us through the overload of information in our culture, we will drown in poor judgment based on fragmentary and overly abstract reasoning. The second book concerns fractal time, a subject I presented to the Chaos Society conference several years ago and then wrote up in a chapter of a book I recently co-edited with Susie Vrobel and Otto Rössler called *Simultaneity: Temporal Perspectives and Observer Frames*. This one will be geared more to the general reader. It will conceptualize time in a way more organic than classical clockwork. Fractal time reflects how the body operates simultaneously on nested time scales, some more precisely coupled than others. This book will offer a system of managing time that is based on being and unfolding rather than doing and controlling.

Worthy book

I want to draw attention to a new book, of which I have just got a copy. So if anyone has a question about some specific section I could try and answer it.

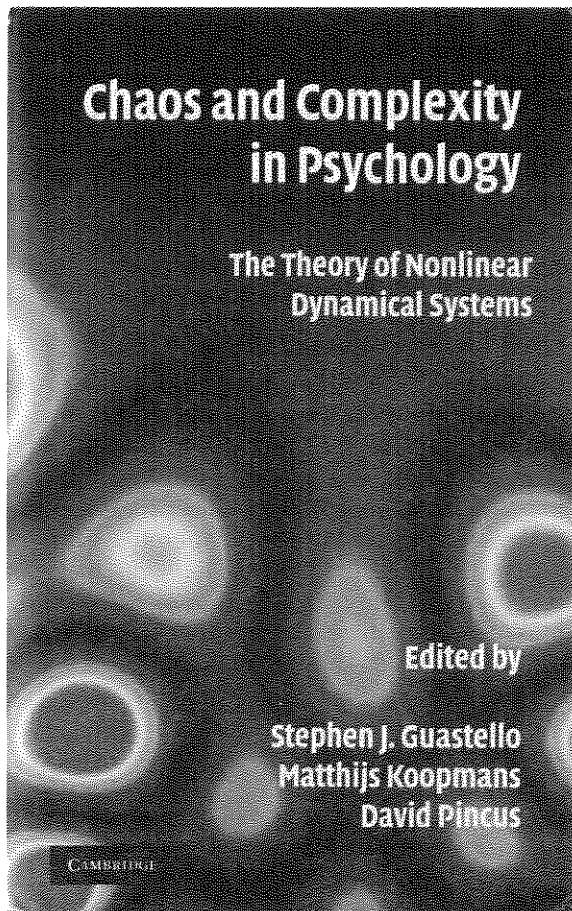
It is Chater, N. & Oaksford, M. (Eds.) (2008). *The Probabilistic Mind: Prospects for Bayesian Cognitive Science*. Oxford University Press. ISBN 978 0 19 921609 3
Over 40 different authors contributed, from both sides of the Atlantic, and Australia. It is divided into the sections, Foundations, Inference and Argument, Judgment and Decision-Making, Categorization and Memory, Learning about Contingency and Causality.

Is it not about Chaos, but I found the work on various measures such as Kullback-Liebler information and entropy a valuable survey.

Obviously there is a lot on subjective probability, and on linguistics and language acquisition. Rational and probabilistic decisions under incomplete information and uncertainly get a lot of useful coverage. This is an active area of research, in which quite a bit has evolved in the last decade, both in terms of our understanding of cognition, and in methodology that rests on Bayesian experimental design and analysis. I commend it to you all. – RAMG

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their chapters delineates where conventional thinking leaves off and NDS has been necessary to answer difficult questions. The chapters then move on to capture the state of the science in each topic area. Taken together these chapters indicate that NDS can be meaningfully applied throughout psychology and that it offers many original perspectives on new questions and old questions to which we thought we already knew the answers.

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Nonlinear Dynamical Systems (NDS) theory is the study of how complex processes unfold over time. The early days of NDS in psychology were rife with excitement. There was so much potential for solving old and new problems and transforming the way psychology was studied that the early pioneers knew it could occupy entire careers. The days of saying, "Here's what chaos and complexity can do!" were gone years ago, however. NDS scholars have embarked on the less glamorous but ultimately more important task of systematic model building and developing an empirical research agenda. The field is moving forward at a rapid pace.

Chaos and Complexity in Psychology is a compendium of the landmark developments and the state of the art in NDS science in psychological theory and research as it evolved in the past two decades. The editors assembled a team of researchers who have already expanded the frontiers of NDS in psychology, and who are actively engaged in empirical research. Each of



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