SOCIETY FOR CHAOS THEORY IN PSYCHOLOGY & LIFE SCIENCES

NEWSLETTER **Vol. 11 No. 3, April, 2005**

Holly Arrow, Ph.D., President, Matthijs Koopmans, Ph.D., President-Elect
Robert Porter, Ph.D., Editor; Stephen Guastello, Ph.D., Production Editor

THIS YEAR'S FOCUS: **NONLINEAR SCIENCE IN CONTEXT**

INTERNATIONAL CONFERENCE DENVER AUGUST 4th to 6th

Also INSIDE: **Nonlinear Psychology and the Tsunami Disaster**

CONFERENCE *DESCRIPTION & HIGHLIGHTS*

In many areas of knowledge, nonlinear science has left its marks. From the use of nonlinear techniques to analyze stock market behavior, irregular heartbeat and changing levels of carbon-dioxide emissions, all the way back to Leonardo DaVinci's dynamical analysis of water streams, nonlinear science has had its place in the world at large. Will it continue to do so? How will it help us predict, for example, the antecedents and consequences of the declining value of the dollar? Help us better understand ethnic conflict and violence? Risky behavior among today's teenagers? How pervasive is the influence of nonlinear science on policy, and how influential, conversely, are policy considerations on the nonlinear-scientific endeavor?

Clearly, science does not take place in a vacuum. To what extent do nonlinear scholars let themselves be guided by society's interests? Should they? Can we, under the cloak of basic science consider ourselves as being answerable only to scientific imperatives, such as the falsifiability and internal consistency of theoretical frames? If science meets agreed upon standards of good scholarship, is it by definition constructive? Is it helpful to be concerned with the metaphysical questions concerning the context in which scholarship is generated? Metaphysical questions such as the good and the bad ramifications of our scholarly activities. How should we deal with potentially adverse consequences of our scientific endeavors? Many would argue that the integrity of nonlinear scholarship is based on its adherence to the values of basic science. Is there a tension between the need to do nonlinear science that is basic and the need to do nonlinear science that is useful, constructive and helpful to practitioners?

NOT TOO LATE TO SUBMIT
Call for Papers deadline revised to
April 22, 2005.
To submit an abstract, click the conference link at
http://www.societyforchaostheory.org

How far can we go, and should we go, taking responsibility for the ramifications of our work in society at large? Or for the way practitioners and policy makers use of scientific findings? How do we facilitate the translation of nonlinear scientific insights into practice? Conversely, how do we encourage nonlinear science to be responsive to the outside world? Many of these questions pervade our work everyday, but we do not always have the time or opportunity to step back and reflect on them. I'd like to encourage submissions that further contemplate this set of issues, or that frame the work being reported in light of these contextual considerations.
–Matthijs Koopmans, President Elect and Conference Chair

IMPORTANT DATES FOR DENVER CONFERENCE

Apr 22 (Fri)	Deadline for submission of abstracts.
May 1 (Sun)	Authors contacted on or before this date.
Jun 20 (Mon)	First schedule of dates and times of presentations with abstracts on the web.

Jul 5 (Tue)	Lodging requests are due. After this date lodging may be requested on an as-available basis.
Jul 10 (Sun)	Speaker registration due (at least one speaker for a listed presentation must register by this date to secure your place on the program). Program revised. 50% cancellation service charge now applies.
Jul 15 (Fri)	Early registration ends. Rates increase $25.
Jul 25 (Mon)	75% cancellation service charge now applies.
Aug 3 (Wed)	Arrive if attending morning workshop next day
Aug 4 (Thurs)	Registration on site, Workshops (8:30 -- 12:30, 1:30 -- 5:30), Sunset Session (5-7 PM).
Aug 5 (Fri)	Conference presentations, Poster session, Banquet and Guest Speaker, Special hosted visit to Chamberlain Observatory.
Aug 6 (Sat)	Conference presentations, Business meeting. Last session ends at 5 PM.
Aug 7 (Sun)	Departure day.

President's Letter, April 2005

Dear SCTPLS Members:

First, a reminder to be sure and submit your abstracts soon for our upcoming Annual conference in Denver this August. You can also find a registration form in this issue. Conferees won't want to miss our two keynote speakers, Marc Lewis and Doug Kiel.

As you are planning your summer, you might want to consider bringing your partner and kids with you, as the Denver area is well worth an extended vacation. Kids will be interested in the world-class Denver Zoo, the most popular attraction in Colorado, home to 4,000 animals on 80 acres. Other attractions include the Denver Art Museum, the Natural History museum, sports events, and of course the Rocky Mountains.

Second, another date to note for next year: March 10-12, 2006. That's when the second International Nonlinear Science Conference (INSC II) will be held in Crete.

Sifis Micheloyannis, who will serve as Facilities Manager, is on the Neurology/Neurophysiology faculty in the Department of Mother-Child Medicine of the University of Crete. He is also Director of the Research Clinical Neurophysiological laboratory of the Medical Division, University of Crete. Ivelisse Lazzarini, who will serve as Program Director, a faculty member at the department of Occupational Therapy, School of Pharmacy and Health Professions, Creighton University, and is also the Occupational Therapy Director for the Institute of Latin American Concerns (OTILAC). Thanks, Ivy and Sifis! I'll wait to enthuse about the attractions of Crete (where I visited decades ago as a child) for a later letter.

--Holly Arrow, President SCTPLS

Conference Speakers Topics Announced

Marc Lewis, Professor in Human Development and Applied Psychology at the University of Toronto, will give the keynote sunset address on August 4.

L. Douglas Kiel, Professor of Management in the Social Sciences Department at University of Texas, Dallas, will present the Banquet Address.

Abstracts of their presentations are reprinted here.

Neural Self-organization and Processes of Emotion

Marc Lewis

Cognitive neuroscientists portray the brain as a computational device for transforming inputs to outputs. In contrast, dynamical approaches model the brain as a self-organizing system that converges to attractors in response to perturbations. Though much improved, this picture is still half complete. Brain activities have to stabilize in order to do their work, but they do so only in the service of emotion. Emotional states emerge through "vertical integration" across the levels of the neuroaxis, including brainstem structures that mediate basic drives and packaged responses, limbic structures that attach emotional significance to events, and cortical structures that modulate and regulate feeling and action. The mechanisms responsible for this integration are intrinsically dynamical and they all play a part in the consolidation of emotion. They include the nested feedback architecture of neural circuitry, the global effects of neuromodulators and neuropeptides, emergent phase synchrony across cortical, limbic and brainstem structures, and the top-down coordination described by Haken's circular causality. Emotional states arising from neural integration capture cognition and action in the moment, but they also drive synaptic changes that underpin personality formation. Thus, stability in real time and stability over development are both outcomes of self-organizing neuroemotional states.

Marc Lewis is a Professor at the Department of Human Development and Applied Psychology, University of Toronto. He specializes in the study of personality development as it relates to emotion. His work is informed by developmental psychology, affective neuroscience, and a dynamical systems perspective on brain and behavior. He has done empirical work in the area of transitions in cognitive and emotional development, and he has developed a state space grid methodology to facilitate the analysis of socioemotional behavior over time. More recent work utilizes electrophysiological methods for identifying the neural underpinnings of emotion regulation in normal and antisocial children. His research outlining the contribution of nonlinear dynamics to our understanding of child and adolescent development has appeared in several highly regarded peer reviewed outlets, including Child Development, Journal of Abnormal Child Psychology, and Developmental Science.

Out of Time and In Over Our Heads: How Efficiency Swamps Individuals and De-Complexifies Organizations

L. Douglas Kiel

Research from the fields of both evolutionary psychology and cognitive psychology reveal that the cognitive capacities of humans seriously lag behind the pace of evolving societal complexity. The continuing demand for efficiency in the developed societies increasingly serves to exacerbate both individual and organization effectiveness. The mantra of constantly doing more with less provides little time for workers to find the slack required for organizational learning. The concept of the learning organization thus is replaced by the entropic organization in which the chaos of innovation is overwhelmed by the chaos of dissipation. In short, workers find themselves out of time and in over our heads. This condition clearly serves neither the purposes of individuals or organizations.

Dr. Kiel will explore what these trends mean for organizations. We may find that the organizational response to evolving societal complexity may require considerably more thought as to the real capacities of the human brain and human organizational forms. The history of management and organizational studies is founded on novel proposals, if not solutions, to the challenges of organizational success. We may need to start with a more basic appreciation of how humans are hardwired before we can create organizations that serve the dual purposes of individual satisfaction and organizational success. The potential chaos created by these new innovations will be one of the great challenges for leaders in the 21st century.

L. Douglas Kiel is professor of management in the Social Sciences Department at University of Texas, Dallas. He is well-known for his books, Managing Chaos and Complexity in Government (1994, Josey-Bass) and Nonlinear Dynamics, Complexity and Public Policy (co-edited, 1999, Nova Science) and related contributions to organizational theory and practice. He was also the guest co-editor of the NDPLS special issue on Agent-Based Modeling (April, 2004).

OVERVIEW OF WORKSHOPS

Full descriptions of all workshops are available on the Society web site and in the January, 2005, Newsletter. If you have any questions, the workshop instructors invite you to contact them at their websites as noted

All workshops are held Thursday, August 4, the day before the conference starts. Fees are $125 or 2 for $200. ($75each for students). More information available on the conference website. – Ed

POWER LAWS at the EDGE OF CHAOS in ORGANIZATIONS

(Introductory Workshop)

Thursday, 4 Aug, 8:30 AM - 12:30 PM

Instructor: Bill McKelvey, Ph.D. , UCLA
CONTACT VIA:
http://www.billmckelvey.org/

Bill McKelvey is a Professor of Strategic Organizing & Complexity Science at the UCLA Anderson School of Management, Los Angeles, CA. His works on nonlinear dynamics in organizational behavior have appeared in Organization Science, Nonlinear Dynamics, Psychology, and Life Sciences, and numerous other venues.

Testing Hypotheses for Nonlinear Dynamics with Popular Statistical Software

(Intermediate Workshop)

Thursday, 4 Aug, 1:30 PM - 5:30 PM

Instructor: Stephen J. Guastello, Ph.D. , Marquette University
CONTACT VIA:
http://www.mu.edu/psyc/guastell.html

Stephen J. Guastello is a Professor of Psychology at Marquette University, Milwaukee, WI, where he specializes in industrial-organizational psychology and human factors engineering. He received his degrees in Psychology from The Johns Hopkins University, Washington University (St. Louis), and the Illinois Institute of Technology. He has written two books and over 90 journal articles and book chapters on various topics in psychology, most of which involve nonlinear dynamics. He is a past president of the Society for Chaos Theory in Psychology & Life Sciences, and currently editor in chief of its research journal, Nonlinear Dynamics, Psychology, and Life Sciences.

Combinatorial Dynamics 1: Basic Structures

(Intermediate Workshop)

Thursday, 4 Aug, 8:30 AM - 12:30 PM

Combinatorial Dynamics 2: Games and Strategies

(Advanced Workshop)

Thursday, 4 Aug, 1:30 PM - 5:30 PM

Instructor: William Sulis, M.D., Ph.D. , Practicing Geriatric Psychiatrist & Academic Professor McMaster University
CONTACT VIA:
http://www.dcss.mcmaster.ca/~sulisw/sulis.html

William Sulis is Associate Clinical Professor, Psychiatry, and Associate Member, Psychology, at McMaster University. He is Director of the Collective Intelligence Laboratory. He has a private practice in Geriatric Psychiatry and holds a Ph.D. in Mathematics. He is an alumnus of the Santa Fe Institute Complex Systems Summer School. He has co-authored 3 books, published 30 papers in Complex Systems Theory, co-directed a NATO Advanced Study Institute and was on the organizing committee of a NATO Advanced Research Workshop. He is a past president of The Society for Chaos Theory in Psychology and the Life Sciences, and is on the editorial board of Nonlinear Dynamics, Psychology, and Life Science.

Registration forms needed for the 15th Annual International Conference are available on http://www.societyforchaostheory.org

Blueberry Brain Institute's 12th Annual Winter Chaos Conference

February 25-27, 2005
Springfield College, Springfield, MA, USA

We asked Fred to send us something about the Winter Conference. Here is his reply.—Ed.

The Winter Chaos Conference was held at Springfield College in Springfield, MA USA. To get a view of the participants and their views and commentary, visit that web site at www.blueberry-brain.org and then click on: Winter Chaos/Snowflake Forum.

Here is a commentary from a new participant this year, Ivy (Ivelisse Lazzarini, who is conference chair for our the Society's International Conference in Crete, March 2006) She refers in this note to the next conference, first weekend in February, 2006, which we chose so as to minimize any conflict with the Crete conference, putting off our Puerto Rico meeting until winter of 2007.

Fred: I am happy to hear that we will be in Puerto Rico in 2007. Know that although I am deeply involved with the SCTPLS international conference, I will also be attending our conference in Pittsburgh. The Snowflake, albeit small, affords a level of exchange and interaction that is very difficult to find elsewhere. I found an extraordinary group of people and a level of camaraderie that I intend to continue to cultivate. It will not be easy to get rid of me. I am here to stay. :) Ivy

REPORTS FROM THE CUSP

Editor's Note: Short research articles, book reviews, and other items of interest are solicited from all members for consideration for publication in **REPORTS FROM THE CUSP.** *Articles are reviewed by the editor and those selected may be edited for length. Ordinarily, only one item will appear per newsletter.* ***Contributions are always welcome.*** *This issue Steve Guastello and associates look at psychology, nonlinear dynamics, and the tsunami.* – Ed.

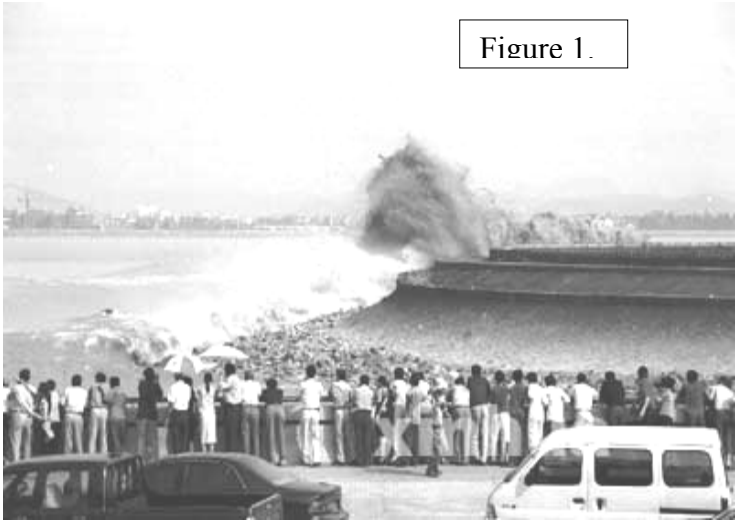


Figure 1.

RISK PERCEPTION WHEN THE TSUNAMI ARRIVED

Stephen J. Guastello, Brian Koch, Gus Koehler, Josh Koyen, Alyssa Lilly, Charlene Stake, Jennifer Wozniczka

The tsunami that occurred in Southeast Asia in December 2004 produced a dilemma in risk perception for many people. The behavior of the ocean was at first fascinating. Water receded from the shore exposing coral and other underwater attractions, and then rushed into shore producing the death and destruction that was well documented. The photographs shown depict a sequence of events that was not uncommon. People were attracted to the shoreline to gawk. Then, too late for many, they noticed the wall of water arriving and eventually interpreted the situation as dangerous. The objective of this article was to produce a model for these perceptions and behavior that could be generalizable to similar circumstances. The cusp catastrophe model this presented here is based on previously known catastrophe models for approach and avoidance behavior and the perception of ambiguous stimuli.

Signal Detection

One might begin a risk perception model by drawing on signal detection theory. In a nutshell, weak signals will produce no response. Signals that are strong enough beyond a threshold level will produce a response. The signals are detected against a noise background, where "noise" could be any irrelevant stimuli. A person's propensity to respond to a signal of a given strength is mitigated by prior exposure to the complex of signals plus noise and by the rewards and costs associated with making errors (Swets, Dawes, & Monahan, 2000).

The simple signal perception and response task is a simple nonlinear process, although it can easily taken for

granted as such. The situation becomes more interesting when the signals are multidimensional, weak, and change over time on a continuous basis. Thus a nonlinear dynamical theory of psychophysics was developed, which incorporates the potential for chaotic responses over time under some circumstances. (Gregson, 1992).

Risk perception in the real world, such as the perception of dangerous situations in traffic, involve complex stimuli that change over time and thus require with some adaptations of the laboratory experiment model. Individuals' experiences with dangerous situations vary and the novice might not be able to interpret signals correctly, compared to the expert, all other things being equal. Sensation-seeking tendencies affect the motivational aspects of stimulus and response. Sensation seekers are not as likely as others to interpret a given situation as dangerous or might actively seek dangerous situations (Rosenbloom & Wolf, 2002).

Ambiguous Figures

The strict signal detection paradigm defines the risk perception task as a discrimination between the presence or absence of a risky stimulus. The tsunami perception task is a bit more complicated because it has the propensity to promote a second behavior – gawking – in addition to the risk aversion behavior. Here some nonlinear dynamics associated with the perception of ambiguous figures are informative. In the classic psychological experience, the stimulus can be perceived in one of two ways with one of two behaviors resulting – Interpretation A and Interpretation B. Variations of the stimuli that are low in overall detail could produce ambivalent responses. Variations of the stimuli that are high in details that favor one interpretation over the other produce distinct responses.

Poston and Stewart (1978) proposed a cusp catastrophe model for this pattern of stimuli and responses, which was empirically validated by Stewart and Peregoy (1983). The bifurcation control parameters in the situation was the total amount of detail inherent in an example of the stimulus. The asymmetry control parameter was whether the details favored one interpretation over the other. If the total amount of detail was relatively strong, the asymmetry variable would play an important role as to when the perception of the stimulus would change from Interpretation A to Interpretation B, and the shift in interpretation was be distinct and discontinuous. Numerous empirical tests of catastrophe models in psychology appear in Guastello (1995) and of course Stewart and Peregoy, 1983).


Figure 2.

Approach-Avoidance Dynamics

The cusp catastrophe model has been suggested in the past as a model for approach-avoidance dynamics (Zeeman, 1977). In Zeeman's classic example, a dog is confronted with a threatening stimulus of some sort. The two stable states of behavior are attack and retreat when the threat arousal is high. The bifurcation factor would be the total level of sympathetic nervous system arousal, which is consistent with known principles of physiology: The fight and flight responses are both produced by high sympathetic nervous system arousal. The choice of the actual behavioral response is a separate matter.

When threatened, a dog will first respond with subcritical behaviors such as snarling and growling. The threat might disappear in the face of the dog's reaction. Zeeman placed these subcritical behaviors on the behavioral response surface between the stable behavioral attractrors and the cusp point, which is the point of greatest instability on the cusp response surface. The asymmetry parameter was not defined, however, until later work on human motivation. The missing parameter was the ability to respond to the threat (Guastello, 1995). If the dog is able to overcome the threat, it would do so or retreat otherwise. The ability variable in these situations would be attenuated by self-efficacy. Self-efficacy is an anthropomorphism, of course; a dog would have simply learned behaviors in response to stimuli and received positive or negative reinforcement for its efforts.

Tsunami Risk Perception

Figure 4 summarizes our adaptation of the foregoing models to the behavior of people shown in the photographs. The two stable states are gawking at the unusual behavior of the water and retreating from the danger.

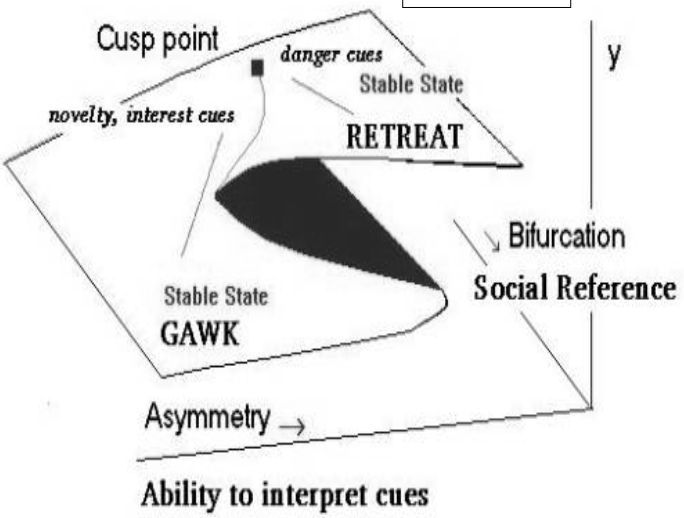
The bifurcation variable was not really a case of weak or strong tsunami signals, as the signals were blatant throughout the process. The variable that was operating instead was the presence of other people, hence the *social reference* variable that is placed on the bifurcation axis. In the social reference phenomenon, people look to other people for information about how to respond. In doing so they might be slow to respond to their own judgment if it is different from the apparent judgment of the group. This phenomenon appears to underlie some of the tacit conformity phenomena that Asch (1956) experimented upon long ago and to some extent the inhibition to give help in a situation where other people are present but are not responding. In a characteristic study of helping behavior, the subject is doing a task in a room either alone or with two other people who might be confederates of the experimenter. The room starts to fill up with stage smoke signaling a fire. The odds of the subject responding to the

stimulus are roughly twice as great and twice as fast if the subject is alone compared to when the confederates are present. A subject working alone is also substantially faster to respond than when two other naïve subjects are in the room (Latan**J** & Darley, 1970). In other words, the presence of other people can help you make the wrong decision, even if the others are not giving you any explicit advice.

The asymmetry variable in the model is the *ability to interpret cues*. This variable preempts the variable for bias in the details because biased or not, the proximal variable to a behavioral response is the knowledge of what the details actually mean. Here we suggest that some individual differences are at play. The sensation seeker will be biased toward gawking even in the face of a clear and present danger. The naïve tourist might be biased toward gawking as well. Local residents on the other hand would be likely to retreat sooner if they are informed about aquatic events. In this case, however, tsunamis are rare, and the local residents might not have known what was happening or what it meant.

The gradients of the cusp response surface are useful aspects of the model. Whereas the bifurcation control parameter would represent the total amount of detail in the ambiguous figures model, we use the gradients to represent the strengths of *cues favoring retreat* and *cues favoring gawking* at the novelty. In an empirical test of the model, variables that measure each of these cue strengths would appear as both bifurcation and asymmetry variables.

Figure 4.



Somewhere in the depths of the catastrophe mechanism is the delay rule, which is not mentioned very often. According to this rule, a delay is expected in a system between the moment when the underlying control variables reach the levels needs for a behavior change to occur and the time when the behavior actually does occur (Zeeman, Hall, Harrison, Marriage, & Shapland, 1976). One must anticipate that some systems are faster acting than others are.

The tsunami stimulus in Southeast Asia was unquestionably strong. Thus the behavioral reactions that it invoked would be located on the high-bifurcation side of the cusp response surface. Small stimuli would produce a different reaction. A tsunami warning was issued in Southern California years ago. People flocked to the waterfront to see it, producing a strong movement to the *gawk* attractor on the response surface. When it arrived, however, it was only three inches high. The crowd dissipated in disappointment, which would be represented as a move toward the low-bifurcation side of the cusp, then a graduate slide to the area behind the retreat attractor.

Generalizability to Similar Circumstances

One aspect of cusp catastrophe dynamics that was not evident among the tsunami watchers was hysteresis. Hysteresis is an oscillation between the two behavior states. It sometimes occurs subcritically on the portion of the response surface between the cusp point and the stable states. If it existed among the tsunami watchers in the photographs, it probably occurred in the mental deliberations between "this is fun" and "this is going to be bad."

Hysteresis can be observed in the precursors to natural disasters that occur more regularly if we take a broader view of time. There are people who erect homes on the sides of mountains in California that are prone to mud slides. The mudslides devastate the homes from time to time, but people erect homes on those sites once again. The homes are designed to stand on stilts, which clearly reflects that the building know what could happen. Although some people only make the mistake once, others try again.

Similarly, people build homes on the flood plains of the Mississippi River. The river overflows and the homes as devastated. The residents build levees on the shore to deter the water flow, which function well up to a point before the homes are flooded out again. In as early as 1859, the Army Corps of Engineers determined that the flood plain existed and floods were inevitable to the extent that they recommended that the area be deterred from settlement. There were obviously reasons, probably of an economic or political nature, that promoted settlements that continue today, even though private insurance companies do not compensate for flood damage to properties located in known flood plains.

Things worked out differently in Pompeii when Mt. Vesuvius erupted in AD 79. According to the reconstruction of the events by contemporary archeologists, the people of Pompeii had a three-day warning. Unusual clouds appeared around the mountain that no one there had ever seen before. The sulfuric acid gas could only have become more annoying as time went on. Two-thirds of the population got the idea that something was very wrong and vacated the city. The last third did not get out in time. What were they thinking?

Extensions of the model in Fig. 4 to these other types of disaster response would all seem to involve social reference as the bifurcation factor. The gradients might be better conceptualized as *utilities* associated with staying or vacating an environment. Perception of physical cues would be a part of the gradients, but perceived utilities, which involve a layer of interpretation. Social reference would contain more than the behaviors of other residents, but would also contain messages about utilities emanating from federal, state, or local governmental agencies.

The asymmetry parameter for the extended model would still contain the ability to interpret cues, but it would have to be broadened to include the ability to leave town – having somewhere to go, being psychologically adaptive at a

deeper level. Koehler (1996) indicated that people who are involved in a disaster are working with a contracted psychological time horizon. Minutes, hours, and days matter. Once the disaster is over, an event that could repeat in a couple years is too far into the future to worry about for people who are preoccupied with, and trying to recover from a disaster that just occurred. Thus longer-term thinking would be a part of the ability to interpret cues.

The risk perception model suggests that some strategies for pre-emptive management during the time period prior to the disaster. The model is sufficient with two control parameters and suggests that the mainstay of behavior management can be accomplished with only two factors properly managed. The first is the asymmetry effect: The public needs to be informed of what could happen and how to protect oneself from possible occurrences, including how to recognize the signs of an forthcoming danger. Many specific points of information could follow from this recommendation; it is worthwhile to reflect that Californians, who are exposed to possible earthquakes, know how to interpret vibrations associated with seismic disturbances, erect buildings differently, and to keep a kit handy containing things they will probably need if disaster does strike.

The second broad strategy involves the bifurcation effect. Public communications need to be made during the impending crisis to remind people of the probable dangers and what they should do. The messages need to be developed separately for different groups that might be prone to interpret things differently: the local urban resident, the rural coastline resident, the tourist, and the sensation-seeker from any point of origin. People would need sufficient warning time, which in turn requires geologic information systems and perhaps some prepared messages. At the same time, the media should exercise caution not to alarm people unnecessarily. The long-run effect of doing so is the cry-wolf effect: No one will pay attention when the alarm is bona fide.

References

Asch, S. E. (1956). Studies of conformity and independence: A minority of one against a unanimous majority. *Psychological Monographs, 70*, 416.

Gregson, R. A. M. (1992). *n-Dimensional nonlinear psychophysics.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Guastello, S. J. (1995). *Chaos, catastrophe, and human affairs.* Mahwah, NJ: Lawrence Erlbaum Associates.

Koehler, G. (1996). What disaster response management can learn from chaos theory. In G. Koehler (Ed.), *What disaster response management can learn from chaos theory* (pp. 2-41). Sacramento CA: California Research Bureau, California State Library.

LatanJ, B., & Darley, J. M. (1970). *The unresponsive bystander: Why doesn't he help?* New York: Appleton-Century-Crofts.

Poston, T., & Stewart, I. (1978). Nonlinear modeling of multistable perception. *Behavioral Science, 23,* 318-334.

Rosenbloom, T., & Wolf, Y. (2002). Signal detection in conditions of everyday life traffic dilemmas. *Accident Analysis and Prevention, 34,* 763-772.

Stewart, I. N., & Peregoy, P. L. (1983). Catastrophe theory modeling in psychology. *Psychological Bulletin, 94,* 336-362.

Swets, J. A., Dawes, R. A., & Monahan, J. (2000). Psychological science can improve diagnostic decisions. *Psychological Science in the Public Interest, 1*, 1-26).

Zeeman, E. C. (1977). *Catastrophe theory: Selected papers 1972-1977.* Reading MA: Addison-Wesley.

Zeeman, E. C., Hall, G., Harrison, P. J., Marriage, H., & Shapland, P. (1976). A model for institutional disturbance. *British Journal of Mathematical and Statistical Psychology, 29,* 66-80.

Authors' note: Stephen Guastello is Professor of industrial psychology and human factor engineering at Marquette University, Milwaukee WI. Gus Koehler is the Principal for Time Structures, a consulting firm in Sacramento, CA; Gus was formerly a manager involved in earthquake disaster response for the State of California. Brian Koch, Josh Koyen, Alyssa Lilly, Charlene Stake, and Jennifer Woznicka are students at Marquette University who are currently enrolled a seminar course on the topic of *Chaos, Complexity and Psychology*; they like to model things. The photographs were taken by an unknown photographer on location in Southeast Asia, and passed around through a lose network of disaster response specialists.

$$\frac{dx}{dt} = \text{sigma}\,(y-x)$$

$$\frac{dy}{dt} = \text{rho}\,x - y - xz$$

$$\frac{dz}{dt} = xy - \text{beta}\,z$$

ANNOUNCING

INTERNATIONAL NONLINEAR SCIENCES CONFERENCE II On the Isle of Crete, March, 2006

Ivelisse Lazzarini has been selected the Chair of INSC II. She writes to say:

I have the privilege of organizing the 2nd meeting of the International Nonlinear Sciences Conference (INSC II) which will be held at the Medical School of the University of Crete, Heraklion, Greece March 10th –12th, 2006.

The principal aim of INSC is to provide a scholarly environment conducive to promote exchanges between an array of disciplines to facilitate research and other academic activities in collaboration with colleagues worldwide. The INSC conference is part of SCTPLS' commitment to advance the study of nonlinear dynamics and its applications. Our refereed research journal, Nonlinear Dynamics, Psychology, and Life Sciences (NDPLS), will be the principal venue for publishing full text articles based on material presented at this conference. Folks interested in publication opportunities are encouraged to prepare their paper for review and possible publication in the Society's research journal. The NDPLS journal is peer-reviewed and abstracted in PsycInfo, Medline, and JEL/Econlit. We feel that this international environment will be productive in terms of opening up new territories to explore and develop partnerships outside the traditional specialties. Nonlinear sciences play an important role in the development of models and applications at all levels of educational and clinical practice. I would like to extend an invitation to all of you involved in developing research and other scholarly activities to participate in our conference.

It is our hope to provide a stimulating scientific program and a multidisciplinary approach to the topics that will be discussed. In March, Crete offers the most amazing environment for visitors: a wide range of cultural events as well as a myriad of activities and fascinating sceneries from a sparkling blue ocean, sandy beaches, mountains and beautiful foliage.

Join us! We are working to make Crete an unforgettable experience.

Exuberance for Dick Bird's Book, *Chaos and Life*.

A book review by Fred Abraham

Like Dick's extraordinary mind, this book takes you on a journey into every corner of science, philosophy, and life. Its breadth of topics is encyclopedic and matched only by the depth and brilliance with which they are explored. There is a unifying theme to the book, and many controversial ideas along the way. It is a lucid but sophisticated coverage of ideas in dynamics. Its basic theme is how iteration in the universe drives cosmic and biological evolution and everyday life, removing the influence of randomness and thus giving meaning to our world, and restoring science's role into providing that meaning. These themes can best be drawn from his preface:

"This book is about chaos and life, and it mostly tells its own story. If there is a subtext it is that the scientific enterprise, which has been the inspiration of our age, is now flagging in that role. I try to explore some f the reasons behind the failure of science to engage the emotions and loyalties of the general population it serves. In my view this is because science has, at lest since the Enlightenment, neglected those aspects of reality that it cannot comfortable incorporate into its associated edifice of belief. . . . This is a gap that science must fill, and fill urgently. This book is in part an attempt to show how this might be done.

"The central theme of this book can be briefly stated: the world is a series of iterative systems; from iterative processes sequences emerge that carry information; our understanding of the world depends on our interpretation of sequence; events in the world occur not randomly, but in an organized way, which means that nature holds many surprises for us as its large- and small-scale organization becomes better known."

SOCIETY SECRETARY'S FAREWELL LETTER

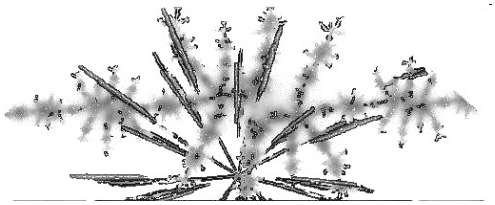
With Mary Ann's retirement from the position of Secretary, the Society loses a long-time, hard working officer. We wish her well, thank her for her devotion and attention to the many details of Society business, and hope to see her at upcoming conferences where she will be freed to attend all the talks, for a change! She recently wrote to CHAOPSYC:

Dear members,

As outgoing secretary, I am taking the liberty of telling you all how much SCTPLS has meant to me. When I first took over from Keith Clayton, nearly seven years ago, I thought of the society as a fellowship of those who, despite opposition from their peers, refused to deny their own understanding of nonlinear dynamical systems, such as showing a simple nonlinear model can account for seemingly complicated phenomena. This character of members was also expressed in the creative ingenuity of membership renewals and conference requests, often making a simple task into a seemingly complicated, but always-joyful conversation. Since then, it has been my privilege to watch the nuts and bolts of the process by which a fellowship of like-minded was turned into a society with considerable, and accelerating, professional stature. For this privilege I am deeply grateful.

I also want to thank those of you who have sent me notes of appreciation, both public and private. Thank you all and best of luck to the new secretary, Dave Pincus, who, as you can see from your mailbox, has hit the ground running.

Sincerely, Mary Ann



NDPLS Plans Special Issues on Nonlinear Methods

The Editorial Board of *Nonlinear Dynamics Psychology and Life Sciences* is planning two special issues on nonlinear methods. They issued the initial call for abstracts in August 2004 in response to the growing literature and debates in these areas. The goals of the project are to inform the readership of the major issues, reveal specific choice points that occur when trying to implement a nonlinear method in a particular type of research application, and to promote solutions to outstanding problems. In particular, the major of the nonlinear methodology literature has not been response to research needs in the social sciences where transient dynamics are found and the time series themselves are short, according to Editorial Board members.

The response to the call was sufficiently strong as to warrant two issues that are scheduled for October 2005 and April 2006. The first issue will consider techniques and issues that are applicable to a wide range of situations, such as hypothesis testing for chaos and fractal dimensions, identification and interpretation of power laws, uses of symbolic dynamics, and the analysis of bios phenomena. The second issue will address problems that are encountered in specific application areas such as the interpretation of phase portraits in animal learning, analyses of time series generated by experiments in human memory, physiology, or psychotherapy.

The *NDPLS* Editor reports that there might be one or two more papers in the second series in addition to those mentioned above, if the authors of the works in progress could complete their revisions in time. The January 2006 issue, which will be published between the two special issues will feature articles from the regular topic areas and will introduce the art feature for 2006. Meanwhile, the following articles have been accepted for publication in NDPLS in their final forms. They will start to appear in issues dated July 2005 through April 2006.

Choi, K. H., Zhong, Y., Wang, H., Ju, J., & Jan, K. Separation of dynamic components of heart rate variability in principal dynamic modes.

Chow, J.Y., Davids, K., Button, C., & Shuttleworth, R. Nonlinear pedagogy: A constraint-led framework for understanding emergence of game play and movement skills.

Delignieres, D., Torre, K., & Lemoine, L. Methodological issues in the application of monofractal analyses in psychological and behavioral research.

Frey, B. B. Adjusting behavioral methods when applying nonlinear dynamical measures: The methodological issue of stimulus rates.

Gregson, R. A. M. Identifying ill-behaved nonlinear processes without metrics: Use of symbolic dynamics.

Guastello, S. J. Statistical distributions and self-organizing phenomena: What conclusions should be drawn?

Guastello, S. J., Craven, J., Zygowicz, K. M., & Bock, B. R. A rugged landscape model of self-organization and emergent leadership in creative problem solving and production groups.

Johnston, W. A. Third nature: The co-evolution of human behavior, culture, and technology.

Heathcote, A., & Elliott, D. Nonlinear dynamical analysis of noisy time series.

Li, J.-S., Krauth, J., & Huston, J. P. Operant behavior of rats under fixed-interval reinforcement schedules: A dynamical analysis via the extended return map.

Mahar, D. The psychophysics of tactile amplitude summation: A test of the n□nonlinear model.

McSharry, P. E. The danger of wishing for chaos.

Rodrick, D., & Karwowski, W. Nonlinear dynamical behavior of surface electromyographical signals of biceps muscle under two simulated work postures.

Sabelli, H., Sugerman, A., Kauffman L., Carlson-Sabelli, L. Bios data analyzer.

Stamovlasis, D. The nonlinear dynamical hypothesis in science education problem solving: A catastrophe theory approach.

Zhang, W-B., Path-dependent economic evolution with capital accumulation and education.

NEW ARTICLES OF ORGANIZATION FOR THE SOCIETY

…will be voted on at the business meeting of the Society in Denver. Some of the changes are both extremely important, and possibly controversial. You may preview these items at the web site below, where they are parked along with comparisons to the old Articles.

There is a link to their web site on the Society's web site, or you may go straight to their URL which is:

www.blueberry-brain.org
and then click on: SCTPLS: Proposed Constitutional Revisions.

the NONLINEAR DYNAMICAL BOOKSHELF

The Bookshelf is composed of items that people remember to send to us. Sometimes we find them ourselves. Have your written a new book on a dynamics topic? Read one lately? You know what to do....

Barnett, W., Deissenberg, C., & Feichtinger G. (eds. 2004), Economic Complexity: Non-Linear Dynamics, Multi-Agent Economies, and Learning, ISETE Volume 14, Amsterdam: Elsevier. This book is the published proceedings of the COMPLEXITY2000 workshop held in Aix en Provence, France, May 4-6, 2000. The sixteen papers in this book - the fourteenth volume in the series International Symposia in Economic Theory and Econometrics (ISETE) - reflect various perspectives on the sources of complex behavior in microeconomics and macroeconomics. Topics addressed include: chaotic dynamics and multiple equilibria; agent-based models; non-equilibrium macro-dynamics; information transmission; and learning mechanisms (e.g., genetic algorithms).

Callebaut, W., & Rasskin-Gutman, D. (Eds. 2005). Modularity: Understanding the development and evolution of natural complex systems. Cambridge, MA: MIT Press. Modularity — the attempt to understand systems as integrations of partially independent and interacting units —is today a dominant theme in the life sciences, cognitive science, and computer science. The concept goes back at least implicitly to the Scientific (or Copernican) Revolution, and can be found behind later theories of phrenology, physiology and genetics; moreover, art, engineering, and mathematics rely on modular design principles. This collection broadens the scientific discussion of modularity by bringing together experts from a variety of disciplines, including artificial life, cognitive science, economics, evolutionary computation, developmental and evolution biology, linguistics, mathematics, morphology, paleontology, physics, theoretical chemistry, philosophy, and the arts.

The contributors debate and compare the uses of modularity, discussing the different disciplinary context of "modular thinking" in general (including hierarchical organization, near-decomposability, quasi-independence, and recursion) or of more specialized concepts (including character complex, gene family, encapsulation, and mosaic evolution); what modules are, why and how they develop and evolve, and the implication for the research agenda in the disciplines involved; and how to bring about useful cross-disciplinary knowledge transfer on the topic. The book includes a foreword by the late Herbert A. Simon addressing the role of near-decomposability in understanding complex systems.

Crowe, B. J. (2005). Music and soulmaking: Music therapy and complexity science. Lanham, MD: **Rowman & Littlefield/Scarecrow Press**. This resource explores fascinating new avenues in music therapy. The author discusses connections between music therapy and theorizes that every little nuance found in nature is part of a dynamic system in motion. She also shows how everything is complexly inter-related and addresses how music is able to touch people in a deep and consequentially healing way. This complex interaction results in what the author terms "Soulmaking", or the ability of music to heal what makes us vital, whole, alive, and balanced. Crowe draws upon her *25* years of experience as a music therapist to flesh out her theory of soulmaking, providing concrete examples of the effect music can have on a wide range of patients with diseases as varied as Alzheimer's and Down Syndrome. She also addresses the four facets of human functioning; mind, body, emotion, and spirit and shows how music can touch them all.

DeLeuze, G. (2005). Pure Immanence: Essays on A Life. Cambridge, MA: MIT Press. The essays in this book present a complex theme at the heart of the philosophy of Gilles Deleuze, what in his last writing he called simply "a life." They capture a problem that runs throughout his work — his long search for a new and superior empiricism. Announced in his first book, on David Hume, then taking off with his early studies of Nietzsche and Bergson, the problem of an "empiricist conversion became central to Deleuze's work, in particular to his aesthetics and his conception of the art of cinema. In the new regime of communication and information-machines with which he thought we are confronted today, he came to believe that such a conversion, such an empiricism, such a new art and will-to-art, was what we need most. The last, seemingly minor question of "a life" is thus inseparable from Deleuze's striking image of philosophy not as a wisdom we already possess, but as a pure immanence of what is yet to come. Perhaps the frill exploitation of that image, from one of the most original trajectories in contemporary philosophy, is also yet to come.

Grimm, V., & Railsback, S. F. (2005). Individual-Based Modeling and Ecology, Princeton University Press, Princeton, NJ. This book is the first major reference on individual-based modeling and its use to develop the theoretical understanding of how ecological systems work, an approach the authors call `individual-based ecology.' The book first provides a general primer on modeling: how to design models that are as simple as possible while still allowing us to address the problems we need to study, and how to move us to address the problems we need to study, and how to move

efficiently through a cycle of model design, implementation, and analysis. Next, the general problems of theory and conceptual framework for individual-based ecology are addressed... A review of over 30 studies illustrates the wide variety of ecological problems that have already been addressed with individual-based models.

Jablonka, E., & Lamb, M. J. (2005). Evolution in four dimensions: Genetic, Epigenetic, Behavioral, and Symbolic. Cambridge, MA: MIT Press. Ideas about heredity and evolution are undergoing a revolutionary change. New findings in molecular biology challenge the gene-centered version of Darwinian theory according to which adaptation occurs only through natural selection of chance DNA variations. In *Evolution in Four Dimensions* Eva Jablonka and Marion Lamb argue that there is more to heredity than genes. They trace four "dimensions" in evolution — four inheritance systems that play a role in evolution: genetic, epigenetic (or non-DNA cellular transmission of traits), behavioral, and symbolic (transmission through language and other forms of symbolic communication). These systems, they argue, can all provide variations on which natural selection can act. *Evolution in Four Dimensions* offers a richer, more complex view of evolution than the gene-based, one-dimensional view held by many today. The new synthesis advanced by Jablonka and Lamb makes clear that induced and acquired changes also play a role in evolution. After discussing each of the four inheritance systems in detail, Jablonka and Lamb "put Humpty Dumpty together again" by showing how all of these systems interact.

They consider how each may have originated and guided evolutionary history and they discuss the social and philosophical implications of the four-dimensional view of evolution. Each chapter ends with a dialogue in which the authors engage the contrarieties of the fictional (and skeptical) "I.M.," or Ifcha Mistabra — Aramaic for "the opposite conjecture" — refining their arguments against TM's vigorous counterarguments. The lucid and accessible text is accompanied by artist-physician Anna Zeligowski's lively drawings, which humorously and effectively illustrate the authors' points.

Janczak A. (2004). Identification of Nonlinear Systems using Neural Networks and Polynomial Models Block Oriented Approach. New York: Springer-Verlag. This monograph systematically presents the existing identification methods of nonlinear systems using the block-oriented approach. It surveys various known approaches to the identification of Wiener and Hammerstein systems, which are applicable to both neural network and polynomial models. The book gives coverage of accuracy and complexity and includes some new and original methods. Graduate student level for students in nonlinear systems.

Leumbruni, R., & Richiardi, M. (Eds., 2004). Industry and labor dynamics: The agent-based computational economics approach. Rivers Edge, NJ: World Scientific. "Wild" stands for "Workshop on Industrial and Labor Dynamics." The workshop focused on the promising use of agent-based simulation for the investigation of labor economics and industrial organization issues. The book includes a selection of contributed papers on methodology, microsimulation of labor dynamics, firm behavior, and industrial clusters and firm interaction.

Lewis, M.D., & Granic, I. (Eds., 2000). Emotion, development, and self-organization: Dynamic systems approaches to emotional development. New York: Cambridge University Press. Self-Organization of Discrete Emotions, Emotion Patterns, and Emotion- Cognition Relations / Carroll E. Izard, Brian P. Ackerman, Kristen M. Schoff; Emotional Self-Organization at Three Time Scales / Marc D. Lewis; Emotions as Episodes of Subsystem Synchronization Driven by Nonlinear Appraisal Processes / Klaus R. Scherer; Surprise! Facial Expressions Can be Coordinative Motor Structures / Linda A.Camras; The Dynamic Construction of Emotion: Varieties in Anger / Michael F. Mascolo, Debra Harkins, Thomas Harakal; The Self-Organization of the Right Brain and the Neurobiology of Emotional Development / Allan N. Schore; Motivation of Neural Plasticity: Neural Mechanisms in the Self-Organization of Depression / Kate L. Harkness, Don M. Tucker; Emotion Is Essential to All Intentional Behaviors / Walter J. Freeman; The Neurodynamics of Emotions: An Evolutionary-Neurodevelopmental View / Jaak Pank; The Self-Organization of Parent-Child Relations: Beyond Bidirectional Models / Isabela Granic; Attachment and Self-Organization / Deborah J. Laible, Ross A. Thompson; The Dynamics of Emotion-Related Behaviors in Infancy / Carolina de Weerth, Paul van Geert; Theoretical and Mathematical Modeling of Marriage / Kimberly D. Ryan, John M. Gottman, James D. Muimy; The Dynamics of Emotional Development: Models, Metaphors, and Daniel P. Keating, Fiona K. Miller.

Recently, principles of self-organizing dynamic systems have been imported into psychology, and especially developmental psychology, where they have helped us reconceptualize basic processes of motor and cognitive development. Emotion, Development, and Self-Organization applies these principles to emotional development. The contributors address such fundamental issues as the biological bases of emotion and emotional development, relations between cognition and emotion in real time and development, personality development and individual differences, interpersonal processes, and clinical implications. The result is a comprehensive and innovative volume that includes the most recent work of recognized leaders in the field as well as contributions by a new generation of theorists who take principles of self-organization as their starting point.— *Publisher.*

Monroe, A: (2005). Interrogation machine: Laibach and NSK. Cambridge, MA: MIT Press. NSK is considered by many to be the last true avant-garde of the twentieth century and the most consistently challenging artistic force in Eastern Europe today. The acronym refers to Neue Slowenische Kunst, a Slovene collective that emerged in the wake of Tito's death and was shaped by the breakup of Yugoslavia. Its complex and disturbing work — in fields including experimental music and theater, painting, philosophy, writing, performance, and design — has an

international following but a powerful and specific cultural context. Within the NSK organization are a number of divisions, the best-known of which is Laibach, an alternative music group known for its blending of popular culture with subversive politics, high art with underground provocation — reflecting the political and cultural chaos of its time.

In *Interrogation Machine,* Alexei Monroe offers the first critical appraisal of the entire NSK phenomenon, from its elaborate organizational structure and its internal logic to its controversial public actions. The result is a fascinating portrait not only of NSK but of the complex political and cultural context within which it operates. Monroe analyzes the paradoxes, perplexities, and traumas of NSK's work at its deepest levels. His investigation of the relationships between conceptual content, stylistic method, and ideological subtext demonstrates the relevance of NSK in general and Laibach in particular to current debates about culture, power, war, politics, globalization, the marketplace, and life itself. As Slavoj Zizek writes in his foreword, Today, the lesson of Laibach holds more than ever.

Monroe uses a variety of theoretical and historical approaches, as is appropriate to the shifting and elusive nature of his subject. The use of theory reflects NSK's own theoretical engagement; it is also a valuable way to read the issues raised by the work. Neither oversimplifying nor uncritically mystifying, Monroe leaves intact the "gaps, contradictions, and shadows" inherent in his subject, demonstrating that "It should still be possible to appreciate the works as art that moves, confuses, agitates, or fascinates."

Strogatz, S. H. (2003). Sync: The emerging science of spontaneous order. New York: Theia. At once elegant and riveting, SYNC tells the story of the dawn of a new science. As one of its pioneers, Steven Strogatz, a leading mathematician in the fields of chaos and complexity theory, it explains how enormous systems can synchronize themselves, from the electrons in a superconductor to the pacemaker cells in our hearts. He shows that although these phenomena might seem unrelated on the surface, at a deeper level there is a connection, forged by the unifying power of mathematics. Along with vivid explanations of cuttingedge theory, Strogatz provides an intimate and highly personal narrative filled with often humerous anecdotes about some of the visionary thinkers of our time. He also describes the startling applications of this new knowledge, such as the harnessing of synchronized electrons to create the world's most sensitive detectors, able to locate oil buried deep underground and to pinpoint diseased tissues associated with epilepsy and heart arrhythmias.--BOOK JACKET

Tschacher, W., & Dauwauler, J-P. (Eds. 2003). The dynamical systems approach to cognition: Concepts and empirical paradigms based on self-organization, embodiment, and coordination dynamics. Singapore & River Edge, NJ: World Scientific. Foreword / HerrnannHaken; Introduction / Wolfgang Tschacher, Jean-Pierre Dauwalder; Intelligent Behavior: A Synergetic View / Hermann Haken; Grounded in the World: Developmental Origins of the Emb;odied Mind / Esther Thelen; Cognitive Coordination Dynamics / Scott Kelso; What is Coordinated in Bimanual Coordination? / Franz Mechsner, Wolfgang Prinz; Cognition in Action: The Interplay of Attention and Bimanual Coordination Dynamics / Jean Jacques Temprado; A Synergetic Approach to Describe the Stability and Variability of Motor Behavior / Kerstin Witte, Holger Bock, Ulrich Storb, Peter Blaser; The Role of Synchronization in Perception-Action / Tin-cheun Chan, Xiaomin Yue, Zhuanghua Shi, Bo Hong; A Mean-Field Approach to Self-Organization in Spatially Extended Perception-Action and Psychological Systems / Till Frank, Peter Beek; Self-Organizing Systems Show Apparent Intentionality / Wolfgang Tschacher, Jean-Pierre Dauwalder, Hermann Haken; The Embodiment of Intentionality / Scott Jordan; Cognitive Science, Representations and Dynamical Systems Theory / Pim Haselager, Raoul Bongers, Iris van Rooij; Self-Steered Self-Organisation / Fred Keizer; Brain Dynamics: Methodological Issues and Applications in Psychiatric and Neurologic Diseases / Laurent Pezard; SJRN (Synergetic Inter-Representation Networks), Artifacts and Snow's Two Cultures / Juval Portugali; Dynamical Systems Theory: Application to Pedagogy / Jane Abraham.

Ward, M. (2002). Beyond chaos: The underlying theory behind life, the universe and everything. New York: Thomas Dunne Books/St Martin's Press. The spread of veins on the backs of our hands mirrors the spread of branches on a tree, fern fronds bear a resemblance to the outlines of fjords, the best-loved classical music echoes the patterns of our heartbeats. The theory of Chaos uses fractal patterns to explain much of the world around us. Could it be that the same laws that govern systems in their critical states also govern some of the most unpredictable events, such as earthquakes, avalanches, the growth of cities, and stock market crashes - even the way businesses are run and the way fashions come and go? Is there a common principle, a universal affinity that binds us to the forces of nature?--*Publisher*. Originally published as *Universality: the underlying theory behind life, the universe, and everything*. London : Macmillan, 2001.

All information you need for the 15th Annual International Conference – DENVER, COLORADO

is available on http://www.societyforchaostheory.org

Hector Sabelli writes to report an update of the web site (http:creativebios.com) of the Chicago Center for Creative Development for two reasons: 1. The publication of the book Bios. 2. The beginning of a web discussion on creative social development. Hector says all are invited to participate.

SPECIAL FEATURE

Review of the Journal of Abnormal Child Psychology's special issue [Dec 2004 v 32 (6)] on advances in process and dynamic system analysis of social interaction and the development of antisocial behavior

David Pincus, Chapman University

Nonlinear dynamical systems (NDS) theory took a large step into the mainstream of clinical psychology in December 2004 with the publication of a special issue of the Journal of Abnormal Child Psychology focused on social interaction in the development of antisocial behavior. In the past 10 years, there has been some notable past empirical work in developmental child psychopathology (i.e., Granic, Hollenstein, Dishion, & Patterson, 2003) and related areas including family systems (Pincus, 2001); marital interaction (Gottman & Levinson, 2002) motor development (Thelen & Smith, 1994), and group dynamics (Arrow, McGrath, & Berdahl, 2000; Guastello, 2000). Yet this special issue represents a coordinated and highly visible push for the use of NDS within a popular mainstream journal and by researchers affiliated the Oregon Social Learning Center (OSLC), one of the most respected programs in the field. For over 30 years, the OSLC has examined multivariate change over time using linear methods and stopped just short of NDS. They are no longer stopping short.

There are nine articles in the issue – an introduction, two reactions, and six empirical studies. Two studies use NDS methodology and four use linear techniques aimed at identifying non-linear processes. Dishion & Snyder's (2004) introduction presents a modeling taxonomy and frames the goal of the special issue as moving from global ratings to dynamic systems analyses.

This goal was accomplished by two (Hollenstein, Granic, Stoolmiller & Snyder, 2004; Dishion, Nelson, Winter, & Bullock, 2004) of the six empirical articles in the issue, whereas the others moved in the desired direction, using more traditional (aggregate) measures like rates per minute for interactive behaviors over time (Prichard, Schrepferman, Patrick, & Stoolmiller, 2004; Stormshak, Comeau, & Shepard, 2004), global observation-based ratings of interactive behavior (Deater-Deckard, Atzaba-Poria, & Pike, 2004), and the examination of multivariate interaction effects across relational contexts and time based on self-report measures (Patterson, DeGarmo, & Forgatch, 2004). Despite their use of linear methodologies and aggregated measures, these four studies advance the knowledge-base in developmental psychopathology, are methodologically sophisticated, and provide some interesting non-linear interpretations of results.

The two truly NDS studies in the issue (Hollenstein et al., 2004; Dishion, et al., 2004) use state-space grids (SSGs; Lewis, Lamey, & Doublas, 1999) to measure interactive complexity and rigidity. SSGs are relatively simple NDS tools in which interactive behaviors are coded for each member of a dyad and then tracked in real time on a matrix comprising each member's codes. For example, Hollenstein et al. (2004) chart motion across 16 possible states (4 x 4 matrix) during two-hour parent-child interactions using the four categories of positive engagement, neutral, negative disengagement, and negative engagement. Rigidity-flexibility is defined as the number of states exhibited by the dyad, the number of transitions among cells, and mean length of time spent in cells. Defined as such, rigidity predicted externalizing (disruptive) behaviors in fall and spring of kindergarten and increasing problems into first grade. Rigidity was also associated with concurrent levels of internalizing problems (i.e., depression) in fall of kindergarten, and into first grade for the most extreme internalizing children.

The SSGs constructed in the second study (Dishion et al., 2004) are based on four codes obtained during peer friendship interactions - negative engagement, directive behaviors, positive engagement, and converse behavior (neutral talk). Using information entropy (Attneave, 1959; Shannon & Weaver, 1949) to measure complexity in their grids, high entropy conversations predicted concurrent levels of antisocial behavior at age 14 (time 1); while *low* entropy (rigidity) interacted with high levels of deviant discussion content to predict continued antisocial behavior into adulthood (age 24; time 4 in the study). They interpreted their results in terms of attractors, suggesting that high levels of information entropy at age 14 is reflecting a delay in social regulation skills and thus a shallow interpersonal attractor for dyadic peer interactions; while a 'deep' attractor around deviant content produces a stable trajectory toward adult antisocial traits.

SSGs are visually appealing, easily interpreted, and as discussed in the issue, they allow one to examine both the content and the process of conversations. On the other hand, information entropy is somewhat limited in its ability to identify time-dependent patterning (i.e., compared to measures like Lyapunov or fractal dimension) because it is based on the weighted average of conditional transition probabilities across the entire matrix. In addition, the grids as currently used are limited to the study of dyads, to the study of transitions among two states at a time (no longer patterns of recurrence), and are limited by the coding schemes employed, which define the state-space. Nevertheless, their use will surely continue and evolve based on the utility demonstrated thus far.

The issue concludes with two critique articles that provide expanded interpretations of the empirical results. Lewis (2004) delivers a detailed and refreshingly objective (he does not pull punches) critique of each article from an NDS point of view; and readers familiar with NDS concepts might want to read this critique article first. He adds depth to the interpretations of the empirical results using self-organization and related theoretical concepts that are absent from the articles themselves. Finally, Howe (2004) completes the issue with an expanded discussion of patterned change over time and levels of analysis.

As Lewis (2004) suggests, this special issue is a bridge over the linear-non-linear divide within developmental child psychopathology research. After reading the issue it is

clear that linear side remains a collective habit – particularly in methodology, even when a team of researchers attempts to move toward the nonlinear. However, each of the studies in this issue is very well constructed, interesting, and helpful for advancing the use of NDS in clinical psychology. The bridge created herein should generate a productive increase in the use of NDS principles in child psychopathology, and more broadly in related disciplines.

References

Arrow, H., McGrath, J.E., & Berdahl, J.L. (2000). *Small groups as complex systems: Formation, coordination, development, and adaptation.* Thousand Oaks, CA: Sage.

Attneave, F. (1959). *Applications of information theory to psychology: A summary of basic concepts, methods, and results.* New York: Hult, Rinehart, and Winston.

Deater-Deckard, K., Atzaba-Poria, N., & Pike, A. (2004). Mother-and father-child mutuality in Anglo and Indian British Families: A link with lower externalizing problems. *Journal of Abnormal Child Psychology, 332 (6),* 609-620.

Dishion, T. J., & Snyder, J. (2004). An introduction to the special issue on advances in process and dynamic system analysis of social interaction and the development of antisocial behavior. *Journal of Abnormal Child Psychology, 32 (6),* 575-578.

Dishion, T.J., Nelson, S.E., Winter, C.E., & Bullock, B.M. (2004). Adolescent friendship as a dynamic system: Entropy and deviance in the etiology and course of male antisocial behavior. *Journal of Abnormal Child Psychology, 32 (6),* 61-663.

Gottman, J.M., Murray, J.D., Swanson, C.C., Tyson, R., Swanson, K.R. (2002). *The mathematics of marriage: Dynamic nonlinear models.* Cambridge, MA: MIT Press.

Granic, I., Hollenstein, T., Dishion, T.J., & Patterson, G.R. (2003). Longitudinal analysis of flexibility and reorganization in early adolescence: A dynamic systems study of family interactions. *Developmental Psychology, 39 (3),* 606-617.

Guastello, S.J. (2000). Symbolic dynamic patterns of written exchanges: Hierarchical structures in an electronic problem-solving group. *Nonlinear Dynamics, Psychology, and Life Sciences, 4,* 169-189.

Hollenstein, T., Granic, I., Stoolmiller, M. & Snyder, J. (2004). Rigidity in parent-child interactions and the development of externalizing and internalizing behavior in early childhood. *Journal of Abnormal Child Psychology, 32 (6)* 595-607.

Howe, G.W. (2004). Stydying the dynamics of problem behavior across multiple time scales: Prospects and challenges. *Journal of Abnormal Child Psychology, 32 (6),* 673-678

Lewis, M.D. (2004). Trouble ahead: Predicting antisocial trajectories with dynamic systems concepts and methods. *Journal of Abnormal Child Psychology, 32 (6),* 565-571.

Lewis, M.D., Lamey, A.V., & Douglas, L. (1999). A new dynamic systems method for the analysis of early socioemotional development. *Developmental Science, 2,* 458-476.

Patterson, G.R., DeGarmo, D., & Forgatch, M.S. (2004). *Systematic changes in families following prevention trials. Journal of Abnormal Child Psychology, 32 (6),* 621-633.

Pincus, D. (2001). A framework and methodology for the study of non-linear, self-organizing family dynamics. *Nonlinear Dynamics, Psychology and Life Sciences, 5,* 139-174.

Shannon, C.E., & Weaver, W. (1949). *The mathematical theory of communication.* Urbana, IL: University of Illinois Press.

Snyder, J., Prichard, J., Schrepferman, L., Patrick, M.R., & Stoolmiller, M. (2004). Child impulsiveness-inattention, early peer experiences, and the development of early onset conduct problems. *Journal of Abnormal Child Psychology, 32 (6),* 579-594.

Stormshak, E.A., Comeau, C.A., & Shepard, S.A. (2004). The relative contribution of sibling deviance and peer deviance in the prediction of substance use across middle childhood. *Journal of Abnormal Child Psychology, 32 (6),* 635-649.

Thelen, E., & Smith, L.B. (1994). A dynamic systems approach to the development of cognition and action. Cambridge. MA: MIT Press/Bradford.

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Ed Note: Have you read a good article recently? We are looking for reviews of articles which may be of interest to our members. Please contact the editor at rjporter@mindspring.com

Richard Golden writes to remind us that **R. Duncan Luce** is a National Medal of Science Recipient The Medal is the Nation's highest honor in science and technology in the area of Social and Behavioral Sciences: The 2003 National Medal of Science. Professor Luce received his award at a White House Ceremony on March 14, 2005.

Members **Pat Lipscomb** M.D., PhD **and Robert Galatzer-Levy** M.S., M.D. will be part of a panel, "Non-linear dynamics and psychoanalysis" at the 44th Congress of the International Psychoanalytic Association which will be in Rio de Janeiro, July 28-31, 2005. Robert is program chair of the

Congress. His paper "Chaotic possibilities: Toward a new model of development" appears in The International Journal of Psychoanalysis 85:(2) 419-441 (2004**).** Email**:** gala@uchicago.edu

Prof. Dr. **Alexander S. Komarov** Head, Laboratory of Ecosystems Modelling Institute of Physicochemical and Biological Problems in Soil Science of Russian Academy of Sciences writes: On behalf of the European Branch of International Society of Ecological Modelling (ISEM) and Organizing Committee we would like to invite you to participate in the 5th European Conference on Ecological Modelling (ECEM5) during 19-23 September 2005 in Pushchino, Moscow Region, Russia. As with previous 4th European Conference on Ecological Modelling, which was held in Bled, Slovenia in September 2004, this conference will emphasize the newest developments throughout the various topics of ecological modeling and will include all aspects of basic and applied research in ecological modelling. I would like to ask all SCTPLS members to consider participating in this Conference.

WHO'S WHO IN THE SOCIETY

President (2003-2005) 2004-2005
Holly Arrow, harrow@darkwing.uoregon.edu
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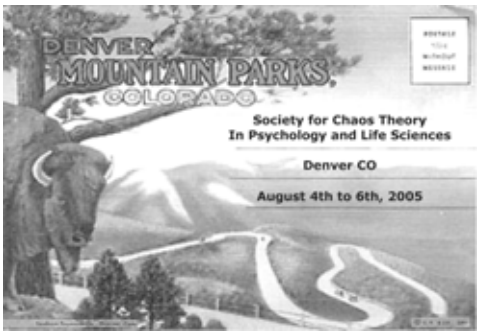

The Emergence of a New Journal -- *Emergence: Complexity and Organization* (*E:CO*)

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Although the increasing interest in complex systems research in regard to organizational settings has led to a growing recognition that real world systems can't be completely designed, controlled, or predicted, leaders in business, government, healthcare, and other institutions have not necessarily kept apace with the many new developments coming out of the sciences of complex systems. On the contrary, it seems that when organizations do indeed succeed, it's frequently been *in spite of* not *because of* the way they've been led, organized, and structured. The majority of organizations are still being managed as if they were simple, linear, equilibrium-seeking, and isolated systems, whereas complexity research has decidedly demonstrated that thriving organizations are better understood as complex, nonlinear, far-from-equilibrium, and in vital contact with multiple environments.

Traditionally, we have seen the world in terms of a set of interacting agents or components, and the act of understanding has been associated with the identification and "calibration" of these. But the new view of the complexity sciences tells us that we live in an evolving and changing world in which any such structure is already the past, and what instead matters most may be the "perturbations" on the edge of the current structure which have a potential for a kind of structural instability that can lead to qualitative change. Individuals, groups and organizations are all participating in a permanent, imperfect learning process in which they, their interactions and the meanings they ascribe to them are all changing over time.

What we are interested in our new journal *Emergence: Complexity and Organization* (*E:CO*) is how we can understand and live with this creative evolution. *E:CO* is being offered as an international and interdisciplinary conversation about human organizations as complex systems and the implications of complexity science for these organizations. *E:CO* will be encouraging multidisciplinary contributions from all sectors of social and natural sciences and practice. Although peer-reviewed articles will be at the heart of our content, with an emphasis on communicating across boundaries, *E:CO* will also contain content in other formats including, e.g., reports, pertinent news on complexity and its applications in organizations, book reviews, opinion pieces, and so forth. The overall objective will be to provide information, knowledge, insights, and methods to enable organizations to become more dynamic, more adaptive, and more fostering of the emergence of innovative ways of thinking, responding, and growing.

The first, double issue which is available for free online (see web url below) contains theoretical and practition-er articles on complexity and cognition, the "landscape" of

complexity tools and practices, complexity and philosophy, complexity and change management, complexity in sports management, and complexity based drivers for resource and capability focused organizations. We also have a section on Complexity and Philosophy and one on Classical Papers where we reprint classics in the field going back to the early days of cybernetics and general systems theory which can be quite informative about current complexity ideas. The Classical Papers section of the first issue contains papers by the brilliant neuroscientist and mathematician Ross Ashby and the systems thinker Kenneth Boulding.

E:CO's niche will specifically be at the intersection of three gaps:

1.• The distance between academic theory and professional practice;

2.• The space between the mathematics and the metaphors of complexity thinking;

3.• The disparity between formal idealizations and actual human organizations.

Furthermore, in recognition of the fact that complexity is a function of networked, global interdependence, E:CO will remain vigilant in pursuing a wide diversity of inclusive perspectives that embrace not just so-called first world but also developing world issues, insights, and challenges. In this regard, the first issue has a paper from Cuba, and the second issue has two articles from Brazil.

Even as complexity is changing the way we must think about organizations, it is at the same time inspiring a rethinking of fundamental philosophical assumptions resting on outdated models of how systems function. In response, *E:CO* intends to also be a vital forum for a fundamental rethinking of the metaphysics of complexity while at the same recognizing that new methods, constructs, formalisms are not ends in themselves but tools to the furtherance of not only theoretical knowledge, but practical applications as well.

Since the editors of *Emergence: Complexity, and Organization* are fully aware that we really are only at the beginning of this fascinating journey, we are throwing down the gauntlet and challenging our audience of scholars, researchers, theorists, thinkers, and practitioners to surprise us with your unexpected new takes on the relation of complexity to organizations, thrill us with your surprising insights, the novel patterns you discern, the innovative applications you propose. Stretch our minds, expand our imaginations, and inspire us. But do it with insight, imagination, intelligence, and rigor.

Whereas in the past, it was true that the social sciences borrowed many of their constructs, methods, and models from the "hard" or natural sciences, complexity theory is offering the possibility of a reverse directionality of influence. This is similar to what happened in the nineteenth century when new statistical techniques were first developed in the social systems for studying aggregates and only later incorporated in the physical sciences. The fact is that organizations are a particularly apt place to study the dynamics of complexity since they abound in networks of connectivities, scaling phenomena, self-organization, and the consistent emergence of new structures with new properties. Organizations are also directly accessible and observable without the need for special devices observational technologies. As a result, *E:CO* will be emphasizing how the study of organizations themselves can push the frontiers of complexity theory.

Finally, as a forum for the insights emerging from the complexity sciences, *E:CO* will itself be an emerging process – its form, substance, and content will continue to emerge and adapt according to both our readers' concerns and transformations in the environment. We look forward with anticipation to the unexpected emergences within the theory of complexity. There is a great deal of work that needs to be done and *E:CO* has arrived to be one of the resources for getting the job done!

The first double issue of *Emergence: Complexity and Organization* is available online for free at www.emergence.org. Subscription prices for quarterly issues per year are: Students: $50. Individuals: $100. Institutions: $300. Subscription forms (including library forms) are also available at the above listed website.

Media Committee Plan Approved

SCTPLS Executive Committee approved a plan for media communications on 13 January 2005. The plan was developed in conjunction with the SCTPLS Media Committee (Mark Filippi, Daniel Miller, and George Muhs). The Media representative was requested by the Membership during its annual Business Meeting at the SCTPLS conference that took place in Milwaukee, July 2004.

According to the plan, SCTPLS will set up a web page that will contain the Society's public relations messages of varying sorts, where the material will be written in a format that is most likely to be picked up by the RSS-type news bots. News bots are used by newspaper and magazine reporters as well as other members of the general public who have an interest in a steady line of news about topics they find most interesting. The news/media page is essentially a news vehicle intended for readers from outside the Society. At the time this Newsletter went to press, our Web Manager, Terrill Frantz, has set up the mechanics for an RSS feed.

The material appearing on the news/media page will consist of news of the Society's activities, news of members' accomplishments, and some op-ed pieces that give perspectives on current events and popular interests that are informed by nonlinear dynamics. Examples of media content could include (1) News of SCTPLS conferences and their particular features; this might be a short piece that is supplemented by a link to the Society's pages for the current conference. (2) Dr. X has received a big promotion to the head of Serious Research Lab; projects of this lab include genetic analysis, transmission of viri on the web. (3) Dr. Y comments on how complexity theory concepts would lead to a more efficient delivery of help services to tsunami victims.

The Media Committee will have the primary responsibility for writing and preparing material for the news/media page. It will draw from materials in other SCTPLS sources such as the Newsletter and NDPLS, and related news sources.

(continued p. 19)

Society for Chaos Theory in Psychology & Life Sciences
Registration and Membership for 2005 Annual International Conference and Workshops

To ensure proper credit, please complete the following and return with your payment. Please print clearly. Complete address section only if (a) you are a new member (b) you are registering as a non-member or (c) you are currently a member but your address has changed. Thanks!

Name _____

Address _____

City/State/Province/Zip/Postal Code
_____

Country _____ E-mail
_____

Students: What is your institution and program of study?
_____

REMEMBER YOU CAN ALSO

REGISTER AND PAY ONLINE
www.societyforchaostheory.org

Please check your registration choices on the form below. If you are paying by check, the check must be payable in US Dollars, drawn on a US Bank, to: Society for Chaos Theory in Psychology & Life Sciences (or SCTPLS). Return this form with your payment to **SCTPLS P. O. Box 484, Pewaukee, WI 53072 USA.**
FAX: . E-mail pincus@chapman.edu or **register@societyforchaostheory.org**

1. CONFERENCE REGISTRATION (includes banquet, Sat. July 17) – Before 1 July, 2005

_____$185 Regular members
_____$135 Student members
_____$260 Non-members (You can join now and receive membership discounts)
_____$ 25 Additional starting 15 July, 2005

2. WORKSHOPS – Regular Members: 2 workshops for $200.00 !

Power Laws in Organizations
(B. McKelvey, 8:30AM –12:30 PM)
_____$125 Regular
_____$ 75 Students

Combinatorial Dynamics 1: Basic Structures
(W. Sulis, 8:30AM – 12:30 PM)
_____$125 Regular
_____$ 75 Students

Testing Hypotheses for Nonlinear Dynamics
(S. Guastello, 1:30PM – 5:30 PM).
_____$125 Regular
_____$ 75 Students

Combinatorial Dynamics 2: Games & Strategies
(W. Sulis, 1:30PM – 5:30 PM)
_____$125 Regular
_____$ 75 Students

_____***SUBTOTAL REGISTRATION & WORKSHOPS***

3. LODGING AT UNIVERSITY of DENVER.
University lodging must be booked through SCTPLS. DU offers suite-style rooms with single or double occupancy options only. Prices quoted below are per lodging unit for a single lodger, or for 2 lodgers in a double occupancy option. Reservation and payment are due by **5 July, 2005**. After this date we cannot guarantee availability. Anyone who selects double occupancy must find their own roommate, and the full cost will be billed to the person submitting the request on this form.

- **Check type of accommodation required:**

_____Single Occupancy. 3-night package $190, additional nights $65 each. Includes breakfast.
_____Double Occupancy. 3-night package $250, additional nights $60 each. Includes breakfast.

- **Check 3-night package. Also check early arrival or late departure, as desired.**

_____Early arrival Wed. 3 August
_____3-night package. Arrive Thurs. 4 Aug., depart Sun. 7 Aug. Package cannot be subdivided.
_____Late departure Mon. 8 Aug.
_____Late departure Tues. 9 Aug.

- **Parking Permits**

_____ Overnight parking with lodging: $5/day X all lodging days selected above. See next page for details.
_____Parking for commuters. $15 for 3 days of the conference. See next page for details.

_____***SUBTOTAL LODGING AND PARKING***

4. MEMBERSHIP—New and Renewals

_____$75 **2004-2005 Renewals of Regular membership** include full Vol. 9 of NDPLS, Membership thru 31-August-05, Newsletters, and annual poster. **NEW memberships** start now and run thru 31-Aug-06.

_____$140 **Two-year membership 2004-06. Renewals** include full Vols. 9 and 10 of NDPLS, Membership thru 31-August-06, Newsletters, and annual poster. **NEW memberships** start now and run thru 31-Aug-07.

_____$60 **2004-2005 Student membership. Renewals** include full Vol. 9 of NDPLS, Membership thru 31-August-05, Newsletters, and annual poster. **NEW memberships** start now and run thru 31-Aug-06.

_____$100 Two-year student **membership 2004-06. Renewals** include full Vols. 8 and 9 of NDPLS, Membership thru 31-August-05, Newsletters, and annual poster. **NEW memberships** start now and run thru 31-Aug-06.

5. VOLUNTARY CONTRIBUTIONS

Student Scholarship Fund

_____ $100
_____ Other Amount

International Hardship Fund

_____ $100
_____ Other Amount

6. **PLEASE TOTAL YOUR SELECTIONS** for Conference and Workshop Registration, Lodging, Membership, and Voluntary Contributions:

_____ **Σ Above**

7. PAYMENT TYPE

_____ Check (in USD drawn on a US bank)

_____ American Express _____ Discover

_____Mastercard _____ Visa

Card # _____

Exp date _____

Signature _____

PARKING DETAILS

Parking passes for lodgers is located underneath Nelson Residence Hall and will be handed out at the front desk of for $5.00 per day for those who reserved them. Commuter parking is located in a non-covered parking lot available near Centennial Towers. Stop by the desk at Nelson to pick up your passes. There is additional short-term metered parking around the university if guests choose not to purchase a parking pass. Street parking around the university is limited to one hour parking and it is strictly patrolled by the City of Denver.

SUITES

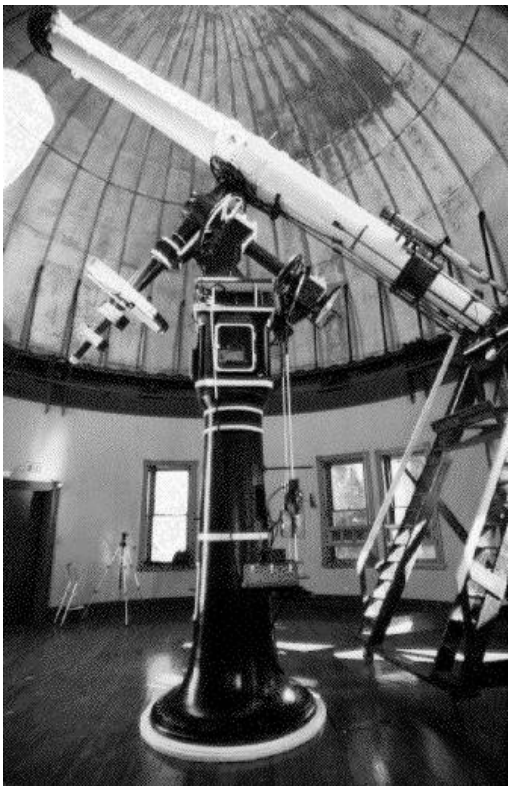
A suite contains 4 bedrooms with separate locks and a common kitchen, bath, and lounging area. For single accommodations, we will be using 2 bedrooms in each suite, so that 2 people will share a bath and common area. For double accommodations, 4 people will be sharing a bath and common area.

OTHER ROOM AMMENITIES

The following items may be rented at the front desk of each residence hall: Phones: $1/day; Fans:$3/day; TVs: $5/day. You should make your own arrangements for these items when you arrive.

PLANETARIUM VISIT

Our visit to the Chamberlain Planetarium is scheduled after the banquet and guest speaker on Friday, 5 August.

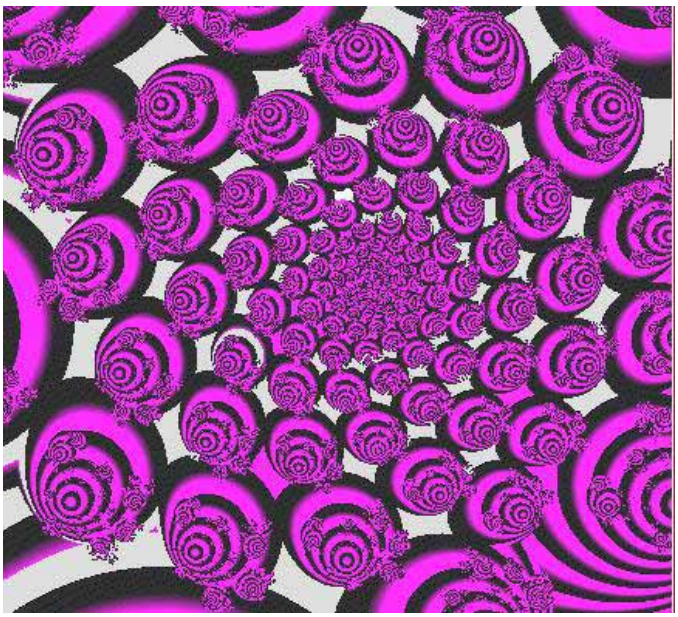


(Media, Continued from p. 16).

The posted news stories will contain links for contacting pertinent parties in the news items if possible. The news/media page will not contain an index of members, interests, or addresses, however. Rather, SCTPLS does invite its members to link their own web sites to the "links" section of SCTPLS web site, however. A call for URLs went out to the members in late January, and URL updates are now possible through the membership renewal form that is located on the SCTPLS web site.

A large portion of incoming communications will be directed to the individuals whose links appear in the news entries. All other inquiries will go a single person from the Media Committee known as the Media Officer. The Media Officer should first determine which type of inquiry is taking place, whether the answer to the questions posed are known, can be answered by the regular web site, or should be answered by pertinent SCTPLS officers or committee chairs. Mark Filippi will be our first Media Officer.

The Media project does not involve bulk e-mail. SCTPLS has maintained a listserver for Announcements for the past year, thanks to the efforts of Mary Ann Metzger. Prior to the Announcements listserver, Stephen Guastello and subsequent Society presidents used lists that they personally maintained for distributing SCTPLS messages. Neither the Announcements listserver nor the previous methods reached news media in any systematic fashion.



Above: Fractal Roses by J. C. Sprott !

CHAOS IS A REQUIRED COURSE AT MARQUETTE

Chaos and complexity might be finding its way into the mainstream academic curriculum sometime soon. Marquette University revised its core curriculum two years ago for incoming undergraduates. The revision includes a "senior experience course" requirement for students whose majors fall under the purview of the Klinger-Way College of Arts & Sciences. Each year there will be a different theme, and several courses on the theme would be offered throughout the college. The first year of the senior experience course will be next year 2005-06, and the theme that the college administration chose was "Chaos and Complexity: The Quest for Meaning." There will be six such courses offered. Stephen Guastello will be teaching a seminar entitled, "Chaos, Complexity, and Psychology." Michael Gillespie, who gave a presentation on *Chaos in Hollywood Film* at the last SCTPLS conference in Milwaukee, will be giving another. The other four course offerings have not been announced yet.

At the graduate level, MU offers an Interdisciplinary Ph.D. program. It has a few oddities compared to other Ph.D. programs, one of which is that the incoming students need to submit a brief paper on a probably dissertation theme as part of their application for admission. The number of students who have expressed interest in incorporating nonlinear dynamics into their plans has increased substantially in the past couple years. Of course the quantities are still small, but three such inquiries arrived in the past month. MU passed one interdisciplinary dynamical Ph.D. dissertation and one in psychology during the past year. There are more dynamical Ph.Ds of each type on deck now.

Meanwhile, SCTPLS plans to overhaul the page of its web site currently known as "Tutorials." The Chair of the Publications Committee has asked the various committees for their input, and the job is now partially in the hands of MU seminar students who are enrolled in a first-run version of the seminar, "Chaos, Complexity, and Psychology" this spring. A reasonable platform (as opposed to a finished product) should be loaded up for viewing relatively soon.