Society for Chaos Theory in Psychology & Life Sciences

N E W S L E T T E R

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SCTPLS Annual Conference Keynotes Johns Hopkins University, Baltimore, MD, August 4-6, 2006

Finding Order in the Flow of Human Experience: The Re-Emergence of Dynamical Social Psychology

Robin R. Vallacher
Florida Atlantic University

Abstract Human experience qualifies as a complex system, in that any aspect of intrapersonal or interpersonal functioning can be analyzed with respect to myriad factors. Because these factors rarely operate as main effects but rather interact with one another over time to promote an ever-changing trajectory of experience, personal and interpersonal processes are open to investigation as nonlinear dynamical systems. The earliest formulations of social psychology were remarkably prescient in this regard. Such pioneers as William James, C. H. Cooley, George Herbert Mead, Kurt Lewin, and Solomon Asch all emphasized the multiplicity of interacting forces operating in individual minds and in social groups, the potential for sustained patterns of change resulting from such complexity, and the tendency for individuals and groups to strive for mental and interpersonal coherence. Despite this explicit focus on dynamics at the field's inception, social psychology for much of the 20th century typically employed paradigms better suited to capture the static aspects of experience. This state of affairs has changed in recent years with novel adaptations of nonlinear dynamical systems to a host of personal and social processes at different levels of social reality. Though still in its infancy, dynamical social psychology shows signs of emerging as a major paradigm, with the promise of establishing coherence for a field that is currently highly fragmented.

Robin Vallacher is a professor of Psychology, Florida Atlantic University, and a research affiliate at the Center for Complex Systems, Warsaw University. He has been a visiting scholar at University of Bern, Switzerland, and Max-Planck-Institute for Psychological Research in Munich. Dr. Vallacher has investigated a wide variety of topics, from principles of social cognition, action identification, and self-concept, to issues in social justice, social change, and international conflict. His current work employs a dynamical systems framework to identify the invariant properties underlying these phenomena. Using experimentation and computer simulations, he and his colleagues are investigating the dynamic underpinnings of self-regulation, social judgment, close relations, inter-group conflict, and the emergence of personality from social interaction. Dr. Vallacher has published five books, including two with Andrzej Nowak that develop the implications of dynamical systems for social psychology.

Robin R. Vallacher

Information Flow and Symmetry Breaking in Interpersonal Coordination

Steven M. Boker
University of Notre Dame

Abstract The semantic content of conversation is accompanied by coordinated prosody, head movement, eye movements, eyebrow movement, smiles, and other facial changes. Coordination between conversants' movements and/or facial expressions can be observed when an action generated by one individual is predictive of a symmetric movement by another. Both spatial and spatiotemporal symmetry is commonly observed in conversation and may be linked to mirror neuron systems that organize embodied coordination into a perception--action loop. Overt expressions of symmetry thus are likely to be indicative of mutually shared inner states. But the greater the symmetry between two individuals, the greater the redundancy in their embodied states.
The greater the redundancy, the less information is transferred in a nonverbal communications channel. Therefore, symmetry breaking must also be a component of coordination in

Steven M. Boker

conversation. High degrees of nonstationarity in dyadic coordination have been observed in a recent set of motion tracking experiments. Current methods for estimation of nonstationarity in the association between variables are discussed and the results of application of these methods to motion tracked dyadic conversations are presented. These results suggest that the ongoing mutual estimation of affect that occurs during human interaction may be framed as a dynamical systems model, and that this step may help us better understand emotion regulation.

Steven M. Boker is associate professor of Quantitative Psychology at the University of Notre Dame. His research interests include the application of dynamical systems analytic techniques to psychological and physiological data. His contributions include methods for examining change in multivariate mixed cross-sectional and longitudinal data include Statistical Vector Fields, Windowed Cross- Correlation with Peak Picking, Differential Structural Equation Modeling, and the Latent Differential Equations method for fitting differential equations models to multivariate multiple occasion data. Dr. Boker's lab uses motion capture technology for experiments in interpersonal coordination and perception-action coupling during conversation, dance, and imitation learning.

Scholarship Benefits for Students Members at the Annual SCTPLS Conference

In an effort to encourage students to pursue research in nonlinear dynamics, SCTPLS is willing to waive the conference registration fee for student members who are first authors on a paper that has been accepted for presentation at our annual conference. Students who are active members as of June 1, 2006 can qualify for this benefit. A very brief application form is required, which will be accessible through the conference registration form on the conference web site (form will be available shortly).

Members who would like to contribute to this fund for student researchers can make their contribution through the SCTPLS membership form: www.societyforchaostheory.org/membership.html or through the conference registration form on the web www.societyforchaostheory.org/conf2006 (SJG)

SCTPLS Tutorial Page - Call for Contributions

In our continuing efforts to get the message out and assist scholars who have an interest in nonlinear dynamics, we are in the process of upgrading our webpage to include several new tutorials about chaos theory, nonlinear dynamics, fractals complexity and agent-based modeling. A number of good tutorials have been up for several years now.

It is our mission as a society to play a leadership role in the field of nonlinear dynamics and the tutorials page is potentially one of our most effective means of doing so: It is the place where we help interested scholars get started on NDS analysis and where we help introduce scholars and practitioners to the nonlinear dynamical way of thinking.

If you would like to create a tutorial about some aspect of nonlinear dynamics, e.g., basic theory, overview of application areas, methodology, instructions about how to use particular software, or have one ready for consideration, feel free to contact us at mkoopmans@aol.com.

We welcome contributions in any form or medium including text, powerpoint slides, video, taped lecture, or any other forms or combinations of media. To see some examples of our current tutorials, visit http://www.societyforchaostheory.org/tutorials.html. (MK)

NEW Chaos and Complexity Resources for Students and Teachers

The Education Committee, chaired by Jayne Fleener, has announced the unveiling of SCTPLS' new web area, "Chaos and Complexity Resources for Students and Teachers." The text that starts with the first page provides the reader with concise descriptions of the concepts underlying Nonlinear Dynamical Systems Theory and the many avenues down which these studies have taken us so far. This guided tour that starts with the basics and allows you to branch off and explore many of the ideas in further depth in additional tutorials and readings.

Resources can be reached at the address: www.societyforchaostheory.org/tutorials/ or by selecting "Tutorials" from the banner that appears on the home page and elsewhere on the SCTPLS site. The major divisions of the initial tour are: (1) What is Chaos, Chaos Theory, and Nonlinear Dynamical Systems Theory? A menu of tutorials and video on topics in basic dynamics is included. (2) What is Catastrophe Theory? A tutorial with interactive applets is included. (3) What is Complexity Theory? This section includes tutorials and interactive resources in complexity theory and agent-based modeling. (4) In Psychology, Life Sciences, Economics and Policy Sciences? This is an overview of the applications of nonlinear dynamics in many areas. (5) What to read? This section provides book lists and literature guides covering all the areas of nonlinear dynamics.

The committee regards Resources as a work in progress. The committee invites new contributions to existing sections and to any new sections. New sections that are now being assembled include: (6) How do I analyze data from nonlinear phenomena? (7) Are there data sets I can use? The committee will probably build on the Data Library and Analysis Project that was started in 2001. (8) Any advice for a graduate student who is looking for a dissertation? A Call for more contributions appears elsewhere in this Newsletter. (SJG)

Society for Chaos Theory in Psychology & Life Sciences

Valuing Forests: A Selective Survey

Mohammed H.I. Dore
Brock University


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Member in the News

Richard P. Taylor Casts Doubt on Authenticity of Pollock Paintings Based on Fractal Analysis

Those few remaining individuals who have doubts about the utility of fractal analysis should consider the following. Dr. Richard P. Taylor, Professor of Physics an the University of Oregon conducted a fractal analysis of six paintings out of a batch of 24 that were only recently found, and that were attributed to Jackson Pollock, the influential American painter best known for his 'drip' paintings. Taylor suggests, based on a fractal analysis of the drip patterns in those paintings that they may not be authentic. The findings of his work were published recently in Nature, and articles about these findings also appeared in national newspapers, including the February 9 issue of the New York Times.

Richard Taylor has previously analyzed several Pollock paintings whose authenticity is beyond dispute using the box-counting method, and he reported his findings on that analysis at the SCTPLS conference in Boston in 2003 in a presentation that surprised many in the audience by its high level of specificity and quantitative preciseness with which it approached what many would agree is highly elusive visual material. An article, in part based on this presentation, appeared in the January issue of NDPLS, Volume 9. Perhaps Taylor's work helps us better understand why we find these paintings so remarkably beautiful, but his analysis reveals in any event that behind Pollock's seemingly random drip patterns, there is an underlying order.

Taylor et al.'s NLDPLS article indicates a progression in Pollock's work from less to greater complexity with the most complex patterns produced during his latest period (roughly 1947 to 1954). The disputed paintings do not conform to this trend and display patterns that deviate from the ones one would expect in Pollock's work. Moreover, Taylor concludes that the paintings also significantly differ from each other suggesting that different painters may have produced them.

Like any analysis, fractal analysis has its limitations and Taylor is duly careful in the appreciation of the ramifications of his analysis; he is quoted as saying in the Times that a final determination of the authenticity of these paintings should be based on a confluence of evidence from different sources.

Does the work of Pollock uniquely qualify for this type of analysis, or does the work of other abstract painters (e.g., Mondriaan, Braque, Motherwell) lends itself equally well to fractal analysis? If so, can it be used there toward the same ends? And how about more representational painters such as Rembrandt, Turner and Georgia O' Keefe? We emailed him these questions. Dr. Taylor's response follows:

I think that fractal analysis can be potentially useful for a broad range of artists. For Pollock, we have used the analysis to chart the fractal scaling behavior of his patterns. For abstract artists who produced non-fractal patterns, I think that the fractal analysis might still well be used to chart signature deviations from fractal behavior. For non-abstract artists, I think the power of fractal analysis will lie in assessing the brushstrokes themselves rather than the overall composition.

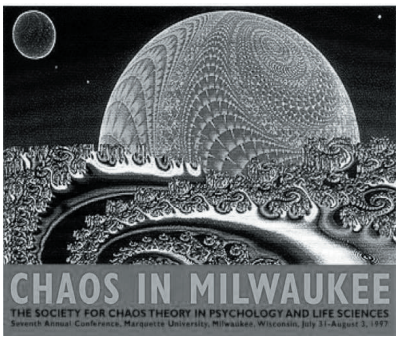
Of course, there are many types of fractal nalysis and, more generally, many ways of analysing complex patterns. If my work encourages others to use different pattern analysis techniques on art works I'll be delighted. (MK)

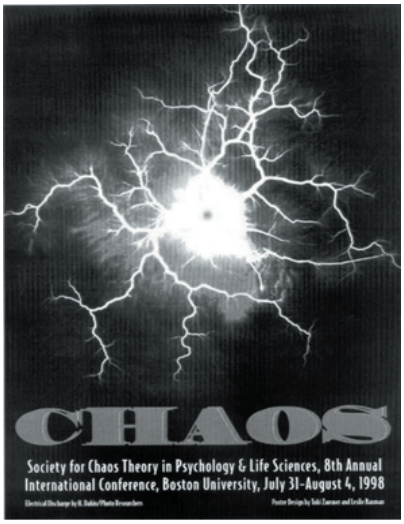
Other Member News

Bruce West had a book accepted by World Scientific and it should be out this Spring. It is titled "Where Medicine Went Wrong; rediscovering the road to complexity". The thesis of the book is that physicians made a fundamental error when they accepted the Gaussian distribution into medicine, with its corresponding reliance on the average value as the most important representation of a data set.

In this non-mathematical book, using the results of two decades of research, Dr. West argues that the inverse power law is the more appropriate distribution to characterize physiological phenomena such as heart beat intervals, breathing intervals, stride intervals and so on. Consequently the average quantities such as heart rate, breathing rate, stride rate and so on, are like the leaches of the nineteenth century and should be replaced by the scaling indices in the appropriate inverse power laws. The scaling indices quantify the fluctuations in the cardiovascular, respiratory and motor control systems and these indices and not the average values that are the better indicators of health.

Historically disease has been interpreted as the loss of regularity in medicine and this interpretation is behind homeostasis. However in the new perspective, with the importance of variability displacing the average value, it becomes clear that disease is the loss of complexity and not the loss of regularity. Furthermore, this complexity is often manifest in the fluctuations that homeostasis would argue ought to be suppressed.





Tobi Zausner is Featured Artist for NDPLS 2007

The NDPLS Editorial Board announced that Tobi Zausner will be the featured artist on the NDPLS covers for 2007. Dr. Zausner's work was arranged by Dr. Richard P. Taylor, the journal's art editor. Although all four cover art works have been identified by the artist and editors, only one has been disclosed at this time: "Chaos to a Dancing Star," long-time members of SCTPLS might remember from a 1995 issue of the Newsletter.

Some SCTPLS members will remember Tobi Zausner's presentations at several of our annual conferences where chaos and creativity were explored. Others will remember her contributions, "The Creative Chaos: Speculations on the Connection Between Nonlinear Dynamics and the Creative Process" and "The Iconography of Chaos in a Renaissance Painting," which appeared in Sulis & Combs' edited collection, Nonlinear Dynamics in Human Behavior (1996 World Scientific).

Tobi is not a stranger to journal covers. Her piece, "Advice to the Imperfect" appeared on the cover of the March 1998 issue of the American Psychologist, which is perhaps the most widely distributed psychology journal in the world. AP, which is published by the American Psychological Association, features a new artist and picture with some psychological significance in each of its nine issues per year. A grayscale rendering of Tobi's "Advice" appears on this page.

She tells the Newsletter a bit about "Advice:" This painting addresses three aspects of chaos: the nonlinearity of water, the chaotic nature of the unconscious, and the chaos of paradox. As the woman swims from a confined area into openness, the water expands and flows. In Jungian psychology, water symbolizes the unconscious, a place of chaos and creativity. Holding two umbrellas is like acknowledging both sides of a dichotomy. By simultaneously recognizing different points of view we embrace paradox. And in the heart of every paradox is an experience of chaos. It comes from the nonlinear tension of opposites, which can generate a fusion bringing insights, breakthroughs and change.

Origins of the Annual SCTPLS Poster

SCTPLS send its members a decorative poster each January as a token of our appreciation for new members and membership renewals. Tobi Zausner inadvertantly started the tradition in 1998 when the Executive Committee asked Tobi if she could design a poster for the 7th Annual International Conference which was to be held in Milwaukee in 1997. Tobi and her colleague Leslie Bauman produced the poster "Chaos in Milwaukee" which was based on an image "Fractal Planets" by Gregory Sams. So many of the members who attended that conference requested copies of the poster that the Executive Committee figured it would be easier just to send one to everyone, and so they did in January 1998.

The next year, the Executive Committee asked Tobi if she could make a poster for the 8th Annual International Conference which was to be held in Boston in 1998. Zausner and Bauman produced the poster "Electromagnetic Discharge" which was based on an image by H. Dakin. The requests for copies were voluminous once again, and the poster Executive Committee sent one to all members on record in January 1999. Grayscale miniatures of these two classics appear elsewhere on this page.

The third poster for the 1999 conference in Berkeley featured "Rising," an artwork by Bill Ferris MD. Ferris' work was discovered by Bob Porter, who was SCTPLS President at the time. That year we ran into a problem with the conference facility which asked us not to post posters in the conference area. The poster lasted long enough, however, to gather yet another round of requests, so once again the poster was distributed in January, 2000.

The next year we received an early advisement from the conference facility about not posting posters, so we skipped the phase of putting it up and taking it down, and proceeded instead to plan a poster for every January afterwards. Kevin Dooley designed the 2001 poster issue, "Work With the Boundaries." Kevin also designed the 2002 poster which commemorated the 12th annual conference that was scheduled for Portland that year. The 2002 poster featured repeated images of a salmon, a specialty of the house everywhere in Portland, that was drawn by an elementary school student from Portland named Sophie.

The 2003 poster featured a crop circle, allegedly made by an unidentified flying object from outer space, that took the shape of a Koch curve. This image, which was procured by Mary Ann Metzger, was too tempting to resist. The story of Mary Ann's trip to Roswell, New Mexico appeared in the July 2001 issue of the Newsletter.

The 2004 poster featured a fractal image from J. C. Sprott's Fractal of the Day collection. Sprott was the featured NDPLS artist that year, which was the first year of art covers for our journal. Another one of Clint Sprott's fractals served as the backdrop image for the 2005 poster, "Tired of Normal Science?" which was otherwise designed as a collective effort by Stephen Guastello and the SCTPLS Membership Committee. The 2005 poster was part of an SCTPLS advertising promotion that year. And most recently, the image for the 2006 poster, "The Cutting Edge" was made by Gert Van Tonder, who is the NDPLS cover artist for 2006.

14th Annual Winter Chaos Conference
February 3-5, 2006, University of Pittsburgh
Frederick D. Abraham
Blueberry Brain Institute

The Winter Conference has established a tradition of informality both in style and substance. It is open to metaphoric as well as formal explorations of systems/holistic thinking to science, society, and philosophy, not necessarily in that disorder. It features open and friendly discussion, made possible by its small size and an extraordinary resonance among its members. Virtually every participant is multidisciplinary despite whatever professional foci there might be in his or her life. Any attempt to categorize the presentations immediately defeats itself. For example, there were those that focused on philosophical, mathematical, and scientific issues (Jerry Chandler, Bard Ermentrout*, Tom Malloy, Bob Porter, Roulette Smith*) and those that focused on applications, mostly educational, but also organizational, clinical, and philanthropic (Bob Faux*, Mark Filippi, Doris Fromberg, Martin Gardiner, Matthijs Koopmans, George Muhs, Daniel Miller*, Andy Munoz*, Charles Nelson, Carlos Torre, Karen Vander Ven). But where do you put spirituality, which was highlighted in several discussions? (* indicates newcomers this year.)

Karen's presentation updating Erikson's developmental stages involved the possibility of a mapping the Fibonocci series or the Feigenbaum ratio onto it, which led to the issue of understanding the dynamical generation of such self-organizing processes. But it also has direct applications to her work in teaching and organization of teaching and other life-time developmental applications Roulette's revisionary ideas challenging the limitations of the central dogma of neo-Darwinian evolution and probing the role of junk DNA on long-term memory and immunology, was very technical in its biochemistry, but also very broad in its implications for education and life, and for the control of slow viral diseases. There were applications of the importance of play, toys, and improvisation in learning and teaching (Robert Faux and Doris). Relevant to recent discussions on CHAOPSYC regarding the teaching of dynamical concepts in the schools, dynamics guru, Bard Ermentrout showed both physical models and his computer simulations available for such use.

Some presentations focused on the philosophy and methodology of nonlinear science. Bob Porter highlighted Gibson's and Turvey's ecological psychology in his discussion of the similarity and differences of nonlinear and linear research. Tom spoke eloquently on Batesonian metaphoric logic. Jerry presented a non-axial (categorical, non-continuous) mathematics regarding the need for new logic and new expressions for communicating ideas in science. These all highlighted that which bound us all together, ideas of the dynamical liberalization of science, education, and life.

Martin summarizes research on music and art programs in early education: "My goal was to review my own and other evidence connecting musical to broader skill learning, a connection that evidence implies can be especially useful to helping build both musical and other academic skills in impoverished students, and then to present some further development of theory to account for and help develop applications concerning this connection."

Dan Miller speaks of his mind, body, spiritual, system using his "favorite theme: consciousness and homeodynamics [in contrast to homeostasis] with their dynamics and implications for science, mental and physical health." Tom Malloy beat the coming emphasis on Bateson this year (ISSS and SCTPLS conferences this summer), with a very insightful commentary: [My talk], "The Logic of Logic and the Logic of Dreams, discussed a fundamental distinction in Gregory Bateson's epistemology: The difference between the formal logic of mathematical models and the relational-metaphoric logic by which mathematical models are mapped to scientific data. [I] made the point that it is essential in scientific discussions to know, at each point in a discussion, which of these two logics is being discussed; yet this distinction is often ignored to the detriment of the discussion."

Carlos, on the "Ecology of Education" states: The concept of "ecology" serves as an organic model (and metaphor) for studying and explaining complex educational processes as well as for predicting possible trajectories and outcomes of these processes. Underlying this ecological approach is the assertion that human nature is amiss with life in schools because these are, often, artificial environments that run counter to our genetic make up. Findings in History; Psychology; Anthropology; Biology; Ecology; and other disciplines corroborate that our biological heritage is essentially that of pre-agricultural, pre-industrial revolution humans who lived in small, interdependent, egalitarian bands/clans. Consequently, we do poorly in large formal bureaucratic hierarchies with one-way impersonal communication, information and decision-making denied the majority, and cogs-like behavior so common to schools and school systems. The Nonlinear Sciences, however, can help us perceive education in more organic ways conducive to transforming education into a more pertinent process that better

addresses our biological need to: work in small, band-like collaborative groups; be respect and acknowledgement; feel trustworthy and that we can count on others, know what's going on, have a say in important decisions, and influence over our own learning process; belong and feel part of something useful and significant; etc. Matthijs has beautifully summarized the importance of the wedding of theory and praxis at our conference this way: "As for me, I am wondering more than I used to about the question how consequential our work is, consequential for scholars, practitioners, social policy and the well-being of our community at large.

"From that vantage point, Winter Chaos 2006 was a productive weekend. Martin Gardiner's work . . has important implications for curriculum development in schools serving poor children, and the potential of Roulette William Smith's reconceptualization of what we call AIDS is potentially dramatic. . . There was also some great solid nonlinear dynamical systems stuff, such as Bard Ermentrout's presentation, Bob Porter's crash course on the dynamical underpinnings of the field and George Muhs' presentation on the nonlinear basis of neurobehavioral processes. Also of interest, [was] work that comes from practitioners, such as Daniel Miller's work on unconsciousness, and Mark Filippi's [holistic bodywork]. It was also nice that there were so many papers on education this time including Bob Faux and Charles Nelson on classroom interaction and Doris Fromberg on children's play. Carlos Torre's presentation demonstrated, . . .how scholarship can serve as a means of socio-political engagement and to express concern about how human civilization can divert itself from its own best interests in the pursuit of short term gains. Lots of good material, in other words, that deserves further discussion and contemplation."

Matthijs has modestly omitted that his own work in philanthropy, in assisting organizations devoted to disadvantaged youth, as an important example of nonlinear concepts applied to social issues. His comments also remind us that one of the first annual awards of the Society for Chaos Theory in Psychology and the Life Sciences was awarded for social significance. It was awarded to Carlos as a goal for others to emulate, and from what Matthijs is saying here, there are now many in the nonlinear community making such contributions. We should probably create a John Dewey award for all of our members who have contributed so much to advance education.

Mark Filippi, our resident comedic genius turned eloquently serious, sermonizes further about the nature and significance of our efforts: He suggest that the substance and style of our approach ". . . transcends what exists right now in academia, in practice, in society and in the hearts and minds of most of living and breathing humanity. In short, it threatens to remove the artificial and vestigial membrane that forced all those elements to operate at the exclusion of each other. Our group that met in Pittsburgh is . . . what Bob called it; a dis-organization and I mean that in the best sense of the word.

"Our dis-array of un-disciplined speakers meet to cross the very boundaries some find so essential [for] gaining professional and therefore worldwide respect. The sad fact is that more groups like ours need to exist if the spirit of this work will continue to develop and dis-rupt the status quo. Our role right now is to complete the job and ensure that no model, no concept, no axiom can consider itself safe and secure. The funny part about being the very propagators of unpredictability is that we cannot let the dust settle. . . maybe we need to accept the awesome responsibility this knowledge carries and bring it directly to the people."

Robert Faux, our resident jazz musician, extracts from improvisation to better teaching. He seconds Mark's comments:

"I can't help but feel this group and others like it, be they focused on chaos or whatever, are fighting a noble battle against the continuing narrowing of our intellectual lives. As you know as an academic, specialization is the key; never look beyond your specialty, focus as intently as you can on the minutiae. Folly. Pity. This group is intellectually alive. Where does one hear William James' quoted or have poetry recited during a talk, much less music played?"

As a disclaimer, while the Winter Conference started as an attempt to foster regional forums/ conferences within the Society, it has become independent of it.

Visit our website at: blueberry-brain.org, and then go to winter conference/snowflake forum. Thanks to Karen for being hostess with great energy and attention to detail and for financial assistance. Thanks also to Carl Johnson, Chair of the Department of Psychology in Education for his opening address. And thanks to the Department and the University for their support. Next Year Carlos Torre is hosting the conference in Puerto Rico.

> Dick: They are all in order and march toward us.
> Cade: But then are we in order when we are most out of order. (Henry VI, IV,2), Scene 2, thanks to Frank Mosca for the quote).

Stories, Sparks, and Explanatory Power: Report from the Membership Committee

Sara Ross

Your Membership Committee is starting its strategic planning process with our ears to the ground…the sturdy ground comprised of your very diverse experiences, fellow members.

A first goal we have is to find out from you, our in-house experts, about the different kinds of attractors that have sprinkled your life trajectory as you came to the study and application of nonlinear dynamics. This request reflects the assumption that as a body of members, we reflect a great many different "ways in." If we can learn about these attractors from you, our diverse membership, we can use the information to help us design effective methods to attract others to the Society and this incredible, interdisciplinary field.

We would like your input.

Here is what we would like to learn about at this stage (oh, yes, there will be more!).

- If you are willing to take a walk down memory lane, we would like to learn the story of your very first a-ha! or reason for interest, that launched your trajectory toward this field. How old were you then? What was the setting, catalyst, opportunity that afforded you this first tingle of attraction?
- We'd like to learn how you acted upon that initial interest, for example, what happened next? Was it latent for a stretch of time (and if so, how long?). Did you start studying independently, stick your toes in the field in shallow waters, dive in via formal study, change your major, go back to school, etc.?
- As you went along on this path, what were some of the most memorable moments… like sparks of insight into conundrums you couldn't get explained any other way? Like sparks of genius you delivered that lit your students' fires? Like sparks of success in communicating something complex to colleagues or clients, and they finally "got it" only when you used the math or metaphors of the field?
- We'd like to learn some real-life stories of how you have benefited from the explanatory power of nonlinear dynamics – personally, academically, professionally. What are some concrete examples of what makes nonlinear dynamics compelling and relevant, from your perspective? What more do you wish you had at your disposal, at this stage?
- Finally, what can you tell us about your attraction to join the Society, and your experiences in it, that might be instructive for us to know, for attracting others to do likewise?

Whether you use a few short bullet points, or paragraphs, we hope you will share whatever you can along these lines. Whether you jot it down, one item at a time, in spare moments, or really get into it and cover each of these points in one sitting, we look forward to your first-hand experience to guide how we develop a member recruitment strategy.

Now, here's a bifurcation point…two ways to send this to the Membership Committee. We sure would like to foster our sense and experience of being a membership body, in the course of all this. It would be great if you posted your responses on our (almost) brand new Society membership forum: CHAOFORUM. (If you have not gotten set up on yet, please do!) I plan to post my own responses there. I have a hunch that we have some mighty interesting things to share with one another. They might prove useful to many of us in who-knows-how-many other settings! If that is not your choice, please email your response to Sara Ross (Memcom's chair) at sara.ross@global-arina.org.

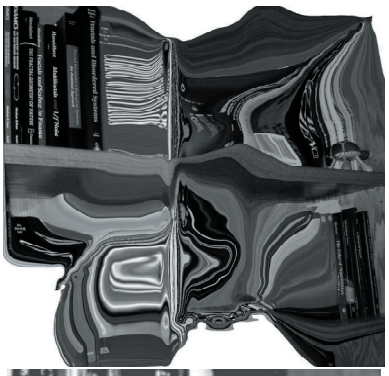
With thanks, and looking forward!

2005 Symposia on Leadership and Complexity

Top scholars in the fields of complexity science and leadership theory met in two separate symposia in 2005—the first hosted by the Center for Creative Leadership and the second by George Washington University. The purpose of these symposia was to discuss how complexity theory can inform the field of leadership. The symposia focused on finding ways to bridge these two disciplines and to begin to redefine how we perceive the leadership function in organizations.

Russ Marion, co-sponsor from Clemson University, stated that "our intent in organizing these symposia was to explore the implications of complexity theory for leadership, to introduce leadership scholars to complexity (and vice versa), and to create interdisciplinary research collaborations on this topic." According to Marion, several significant projects have emerged from these endeavors. First, The Leadership Quarterly is publishing a special issue on complexity and leadership that will appear in February 2007. Second, a book on Leadership and Complexity will be published in the Leadership Horizons series (Information Age Publishers) edited by Mary Uhl-Bien (University of Central Florida), Russ Marion, and Paul Hanges (University of Maryland). Third, Benyamin Lichtenstein from the University of Massachusetts led an interdisciplinary team of participants in proposing a symposium on "Leadership in Emergent Events: Exploring the Interactive Process of Leading in Complex Situations" that will be held at the National Academy of Management meeting in Atlanta in August, 2006. Finally, Doug Orton (Michigan Technical University) organized a team of participants who will conduct a Professional Development Workshop at the Academy on complexity, leadership, and national security at the Academy of Management meeting in Atlanta. In addition to these events, there are a significant number of scholarly papers being developed on the subject, all a direct result of the efforts in these two symposia, and doctoral courses being developed, including a complexity and systems dynamics course at Texas Tech coordinated by Jerry Hunt (Texas Tech University).

The symposium at the Center for Creative Leadership (CCL) in Greensboro, NC, was sponsored by the CCL (Ellen Van Velsor), Clemson University (Russ Marion), the University of Central Florida (Mary Uhl-Bien), and Texas Tech University (Jerry Hunt). The symposium held at George Washington University (GWU) was sponsored by GWU (Margaret Gorman), Clemson, UCF, and the University of Maryland (Paul Hanges).



Nonlinear Dynamical Bookshelf

Compiled by Stephen Guastello
from material that was sent to the Newsletter, posted to Chaopsyc, scarfed from catalogs, or otherwise crawled into his hand.

Ausloos, M., & Dirickx, M. (Eds. 2005). The logistic map and the route to chaos: From the beginnings to modern applications. Berlin: Springer. ISBN 3-540-28366-8. The book traces developments from the pioneering work of Verhulst up to today. – RAMG.

Chen S-H., Jain, L., & Tai, C-C. (Eds., 2006). Computational economics: A perspective from computational intelligence. Shu-Heng Chen, Lakhmi Jain, & Chung-Ching Tai, Hershey, PA: Idea Press. Features a chapter by Lawless, W. F., Bergman, M., & Feltovich, N. (2006a), "A physics of organizational uncertainty. Perturbations, measurement and computational agents."

Tel T., & Gruiz, M. (2005). Chaotic dynamics. New York and Cambridge UK: Cambridge University Press. Pb. ISBN 0 521 54783 0. It is profusely illustrated and the information I have says that 'Chaos occurs in a variety of scientific disciplines, and proves to be the rule, not the exception.' It is nice to be told what we knew already. The book is intended for undergraduates and the mathematics are kept simple. –RAMG.

West, B. J. (2006). Where medicine went wrong: Rediscovering the road to complexity. Singapore: World Scientific. The thesis of the book is that physicians made a fundamental error when they accepted the Gaussian distribution into medicine, with its corresponding reliance on the average value as the most important representation of a data set. Publication is scheduled for this spring. See article by B. J. West elsewhere in this issue.

Special thanks go to Robert Gregson (RAMG) for his attentive scarfing and posting of new book information. (SJG)

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Feature article…

VALUING FORESTS: A SELECTIVE SURVEY

Mohammed H.I. Dore, Professor of Economics, Brock University

Abstract: This paper is a selective survey of one aspect of valuing a forest, namely its scarcity value, considering that forests are renewable only over very long time periods. The scarcity value is logically derived from a dynamic nonlinear optimization model and the emerging co-state variable is interpreted as that scarcity value. It is then empirically estimated using ARIMA methods and is shown to be non-monotonic.

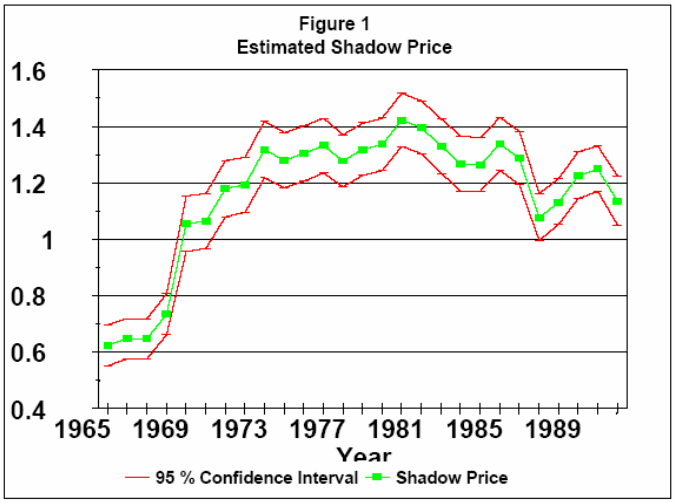
Keywords: Valuing forests; carbon sequestration; scarcity value; ARIMA.

This paper surveys one aspect of valuing forests as an exhaustible resource. In economics, an exhaustible resource is said to have a "scarcity value" or a "scarcity rent" over and above its market price. A forest is of course renewable but as the period required to renew a forest is long (a hundred years or more), it is also said to have a scarcity rent. What determines the scarcity rent? Clearly some sort of logical framework is required from which such a scarcity rent can be *derived.* In the standard Hotelling model of exhaustible resources, it is argued that the scarcity rent rises monotonically over time at the social rate of discount. In contrast, both Heal (1976) and Hanson (1980), using very different cost functions, show that the scarcity rent must decline monotonically to zero, as the resource approaches exhaustion.

On the other hand Solow and Wan (1976) analyse conditions under which resource extraction costs rise with the depletion of higher grade deposits and extraction turns to lower and lower grade ores. They argue that along the optimal path the scarcity rent or the "shadow price" of a resource rises at the real rate of interest, but that the difference between price and marginal extraction cost, which they call 'degradation cost', declines monotonically over time to zero.

The divergence of views is replicated in the empirical studies too. For instance, Barnett and Morse (1963), Barnett (1979) and Johnson et. al. (1980) all find that unit extraction costs in real terms have declined, so that these resources are in some sense becoming less scarce. Nordhaus (1974) also found that real prices of 11 major minerals fell over the period 1900 to 1970. In contrast, Smith (1979), Slade (1982), and Hall and Hall (1984) all find that real prices of natural resources are rising. If we turn to renewable resources such as fish and forestry, it is not at all clear whether scarcity rent is deemed appropriate at all. The forestry literature is mainly concerned with optimal harvesting, although a number of forest ecologists have argued that forests are fast 'disappearing', so that the remaining forests are becoming scarce. At a time of global climate change, when global anthropogenic carbon emissions are a major concern, the ecological role of forests in providing "environmental services" has received considerable attention (Dore & Johnston, 2000; Ramirez, 2000; Ammour et al, 2000, Dore et al 2001; Segura 2000; Fearnside, 2001). These environmental services include the role of forests in the functioning of the hydrological cycle, in preventing soil erosion, and so on. In all these papers, it is recognized that forests are a carbon sink and cutting them down increases carbon emissions.

In a recent paper, Bishop (1999) surveys methods of valuing forests, in which there is a long list of concepts that reflect the value of forests, but the scarcity aspect is only thrown in as an afterthought, called "existence value," "intrinsic value" or "bequest value." Furthermore these afterthoughts are typically *ad hoc,* and are not derived consistently from a model. It is the purpose of this survey to draw attention to a dynamic (i.e. time-varying) method of deriving a scarcity rent which is then estimated using ARIMA methods. The model is nonlinear dynamic optimization that uses Pontryagin's Maximum Principle and its properties. The co-state variable (with respect to the forestry constraint) in the optimization model can be interpreted as the derived scarcity value, or "shadow price." With a few added assumptions, this scarcity value can then be numerically estimated. The estimated value is shown to be fundamentally non-monotonic and nonlinear, consistent with the more general model of Farzin (1992).



1. The Model

Let a social planner maximize a social welfare functional *W*, where *W* is a functional of natural capital stock ***x****(t)*, a set of control variables ***u****(t)*, where ***u****(t)* are policies such as harvesting forests, investing in conservation or other policies that improve ***x****,* and time *t*.

Hence let

$$W = \max_{u(t)} \int_0^T [w(x(t),u(t),t)]dt \qquad (1)$$

where W is quasi-concave in the arguments, and *V* stands for value-added.

The vector ***x****(t)* is the state at time *t* of the natural capital stock made up of forests, and the time path of **x** , is governed by:

$$\dot{x} = f(x(t),u(t),t) \qquad (2)$$

With standard convexity assumptions, it can be shown that the optimized value of *W* exists and can be denoted *W**. This in turn implies that there exist co-state variables $\gamma(t)$, which are positive numbers.

From the Maximum Principle, it follows that:

$$\frac{\partial W^*}{\partial x^*} = \gamma^*(t), \qquad \forall \ t_0 \le t < T \tag{3}$$

As usually interpreted, the co-state variable (to a convex problem) measures the sensitivity of the optimized value of the objective function to a slight relaxation in the constraint (for a proof of this proposition, see Léonard, 1987).

Define the reciprocal of □(t) to be □(t). It follows that the latter are also positive numbers. Writing Eq. 3 in discrete time, we have:

$$\Delta x = \lambda(t)\Delta W \tag{4}$$

ΔW is value-added in each time period, and $\lambda(t)$ is the scarcity rent of forests.

It follows that the right hand side of Eq. 4 has the dimension of value (the "value" of value-added weighted by the reciprocal of the co-state variable). It is Eq. 4 that is estimated using econometric techniques.

The co-state variable from the constraint can be interpreted an index of the scarcity of forests. Now forests absorb carbon emissions which are generated by all production activities that burn fossil fuels. In fact forests may be seen as joint social capital required in the production of output and value-added (or GDP). This social capital has "excess" capacity if emissions of carbon are less than the carbon sequestered by forests per year. The carbon sequestered is called *uptake*. When uptake exceeds emissions there is excess capacity, and some forested areas can be cut down for alternative uses. However, when emissions exceed uptake, forests become "scarce" and the index of scarcity must be greater than one. As stated before, it is Eq. 4 that must be estimated.

2. Estimation using ARIMA Methods

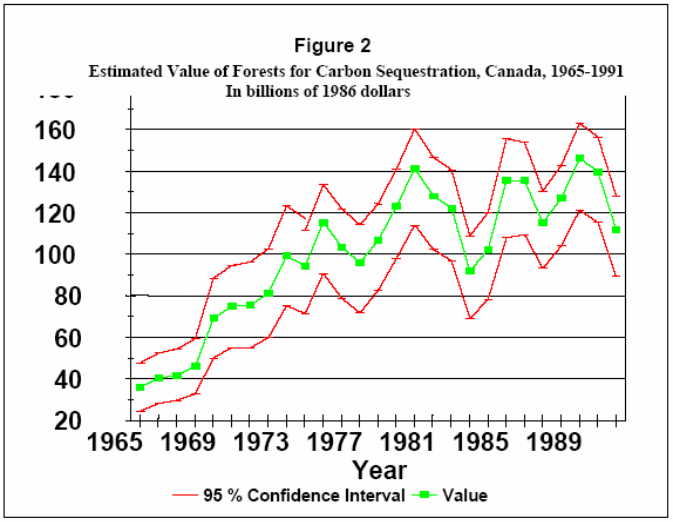
An ARIMA (1, 1, 0) Model was then fitted to annual data on Canadian Carbon Emissions from 1965 to 1991. (Higher order autoregressive terms were found to be statistically insignificant).

The fitted model is: $E'_t = 0.4606\ E'_{t-1}$,where $E'_t = (1\text{-}B)\ E_t$, (B is the standard "time shift" parameter), or $(1 - 0.4606B)(1\text{-}B)E_t = a_t$, where a_t is the white noise error term; s.e.= 0.1660; t = (2.7744); df = 28; RMSE = 3.7192.

3. Value Added in Manufacturing

An ARIMA (1, 2, 0) Model was then fitted to annual data on Value-Added in Canadian Manufacturing for the same time period, namely 1965 to 1991.

The fitted model is: $VA'_t = -0.4254\ VA'_{t-1}$; where $VA'_t = (1\text{-}B)^2\ VA_t$ or $(1+0.4254B)(1\text{-}B)^2\ VA_t = a_t$ where a_t is the white noise error term; s.e.= 0.1756; t = (-2.4224); df = 27; RMSE = 6.3613.



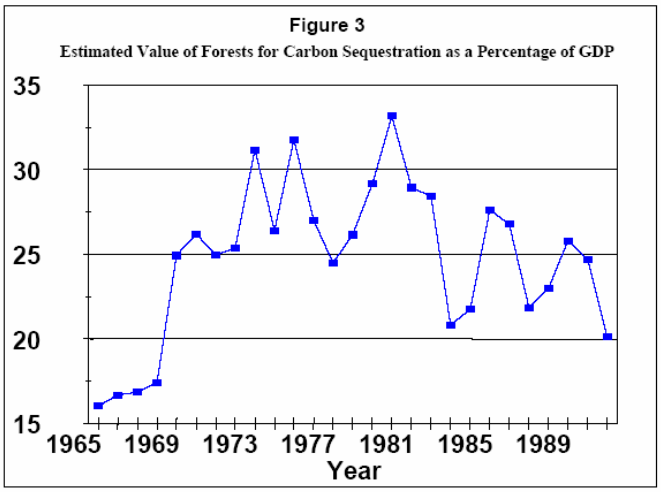
4. Value of the Forests and Conclusions

The best way to see the results of ARIMA modelling carried out above is to look at the graphs. Figure 1 gives the estimated shadow price with the 95 percent confidence intervals. Figure 2 gives value of the forests, again with the confidence intervals. The vector ***x(t)*** is the state at time *t* of the natural capital stock made up of forests, and the time path of **x** , is governed by Eq. 2. With standard convexity assumptions, it can be shown that the optimized value of *W* exists and can be denoted W* . This in turn implies that there exist costate variables **(**(t), which are positive numbers.

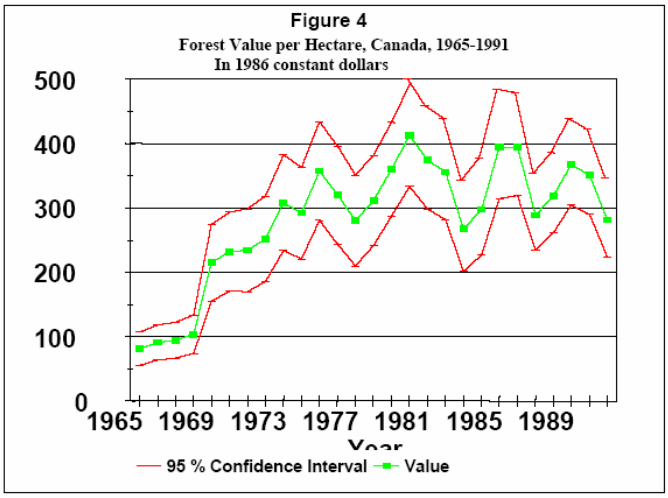
Figure 3 gives the value of the forests as a proportion of GDP, and Figure 4 gives the value of the forests per hectare in 1986 constant dollars.

This paper surveys an attempt to estimate the social value of forests that sequester carbon in the biomass of the forests, carbon that is a by-product of the burning of fossil fuels in the production of industrial output. When emissions are just equal to sequestration, at that time, the value of the forests is just equal to the value added made possible by forests as social (overhead) capital. Consequently at that time value added is valued at par, i.e. the scarcity index is unity. However, as soon as carbon emissions exceed carbon sequestration, the marginal social value of manufacturing production (i.e. the value-added, as in GDP) is less than its constant dollar value, because of the externality. Reciprocally the value of the forests is higher than the constant dollar value of value-added. In this formulation the shadow price is a cardinal index of the relative scarcity of the forests, which are really a joint input in the production process that uses carbon-emitting fossil fuels.

The econometric estimates of the scarcity rent of the forests and the resulting Marginal Social Opportunity Cost value of forests per hectare are obtained by an ARIMA model. The estimated shadow price of the forests (in 1990) is a premium of the order of 20 percent. The corresponding MSOC value of a hectare of forest is



between $290 to $412 in 1986 constant dollars (for details, see Dore & Johnston, 2000). Note that the ARIMA method captures the nonlinear nature of the scarcity rent of forests, for carbon sequestration.



REFERENCES

Ammour, T. et al. 2000. Economic Valuation of Mangrove Ecosystems and Sub-tropical Forests in Central America. In Mohammed H. I. Dore and Ruben Guevara (editors), 2000, *Sustainable Forest Management and Global Climate Change*, Cheltenham, UK: Edward Elgar.

Barnett, H. J. (1976). *'Scarcity and Growth Revisited.'* In Smith (1979), pp. 163-217.

Barnett, H. J and Morse, C. (1963). *Scarcity and Growth: The Economics of Natural Resource Availability.* Baltimore: Johns Hopkins University Press (for Resources for the Future).

Bishop, J.T. (ed.) 1999. *Valuing Forests: A Review of Methods and Applications in Developing Countries*. International Institute for Environment and Development: London. Available at: http://siteresources.worldbank.org/INTEEI/214574-1110798478534/20486370/ValuingForestsAReviewOfMethodsAndApplicationsInDevelopingCountriesJuly1999.pdf

Dore M.H. I, and Johnston, M. 2000. The Carbon Cycle and the Value of Forests as a Carbon Sink: a Boreal Case Study. In Mohammed H. I. Dore and Ruben Guevara (editors), 2000, *Sustainable Forest Management and Global Climate Change*, Cheltenham, UK: Edward Elgar.

Dore, M.H. I. and Guevara, R.(editors) 2001. *Sustainable Forest Management and Global Climate Change*, Cheltenham, UK: Edward Elgar.

Farzin, Y.H. 1992. The time path of scarcity rent in the theory of exhaustible resources, *The Economic Journal*, Vol 102 (July): 813-830.

Fearnside, P.M. 2001. Effects on Land Use and Forest Management on the Carbon Cycle in the Brazilian Amazon. In Mohammed H.I. Dore, (editor), *Climate Change and Forest Management in the Western Hemisphere.* New York, NY: Food Product Press, a Division of the The Haworth Press.

Fisher, A. C. (1979). *'Measures of Natural Resource Scarcity.'* In Smith (1979b), pp. 249-75.

Hall, D. C., and Hall, J. V., 1984. Concepts and measures of natural resource scarcity with a summary of recent trends, *Journal of Environmental Economics and Management*, Vol II: 363-379.

Hanson, D. A. (1980). 'Increasing extraction costs and resources prices: some further results.' *Bell Journal of Economics*, vol 11 (Spring), pp. 335-42.

Heal, G. M. (1976). The relationship between price and extraction cost for a resource with a backstop technology.' *Bell Journal of Economics*, vol. 7 (Autumn), pp. 371-8.

Johnston, M. H., Bell, F. W. and Bennett, J. T. (1980). 'Natural resource scarcity: empirical evidence and public policy.' *Journal of Environmental Economics and Management*, vol. 7 (September), pp. 256-71.

Léonard, D. 1987. Co-state variables correctly value stocks at each instant: a proof, *Journal of Economic Dynamics and Control*, Vol 11: 117-122.

Marland, G., R.J. Andres, and T.A. Boden. (1994). 'Global, regional and national CO_2 emissions.' pp. 505-584. In T.A. Boden, D.P. Kaiser, R.J. Sepanski, and F.W. Stoss (eds). *Trends '93: A Compendium of Data on Global Climate Change*. ORNL/CDIAC-65. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge Tenn., U.S.A.

Kurz, W.A., Apps, M.J., et al. (1992). *The Carbon Budget of the Canadian Forest Sector: Phase1.* ENFOR Information Report NOR-X-326 (Edmonton: Forestry Canada, Northwest Region). [Source of data]

Nordhaus, W.D. 1974. □Resources as a constraint on growth,□ *American Economic Review,* Vol 64, (May): 22-26.

Ramirez, O. A. 2000. The carbon Cycle and the Value of Forests as a carbon Sink: a Tropical Case Study. In Mohammed H. I. Dore and Ruben Guevara (editors), 2000, *Sustainable Forest Management and Global Climate Change*, Cheltenham, UK: Edward Elgar.

Segura, O. 2000. Forest Policy in Costa Rica. In Mohammed H. I. Dore and Ruben Guevara (editors), 2000, *Sustainable Forest Management and Global Climate Change*, Cheltenham, UK: Edward Elgar.

Slade, M. E. (1982). 'Trends in natural-resource commodity prices: and analysis of the time domain.' *Journal of Environmental Economics and Management*, vol. 9 (June), pp. 122-37.

Smith, V. K. (1979). *Scarcity and Growth Reconsidered*. Baltimore: Johns Hopkins University Press (for Resources for the Future).

Solow, R. M. and Wan, F. Y. (1976). 'Extraction costs in the theory of exhaustible resources.' *Bell Journal of Economics*, vol. 7 (Autumn), pp. 359-70.