SOCIETY FOR CHAOS THEORY IN PSYCHOLOGY AND THE LIFE SCIENCES

29 HAYES ROAD, AMITY HARBOR, NY 11701 USA

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Announcing...

NEW PRESIDENT ELECTED: STEPHEN J. GUASTELLO, Ph.D., Associate Professor, Industrial Psychology and Human Factors Engineering, Marquette University

This year's election was a photo-finish! Steve will be acting as President-Elect until he takes office in Aug., 1995.

CONTENTS:

Feature Article: Complexity in Time Series Modeling

Kevin Dooley, Ph.D. University of Minnesota, Department of Mechanical Engineering. kdooley@maroon.tc.umn.edu

Key to any empirical study is the task of modeling. Empirical models can be used to predict, validate "first principles," enumerate phenomena, suggest new theory, and point-out limits to knowledge. Good data modeling consists of both skill and art.

Much effort has been placed of late in developing means by which we can characterize, and in some cases predict, behavior in nonlinear dynamical systems. Numerous approaches exist: calculating the fractal dimension of an attractor; attempting to discover the underlying topology via attractor reconstruction; modeling the time series as fractal brownian motion; searching for nonlinear patterns using neural networks; prediction via piece-wise splining techniques; modeling the dynamics as one of the elementary catastrophes; extending ARIMA time series models to take into account nonlinearities, etc. (Weigend & Gershenfeld; Johnson & Dooley).

One particularly important issue facing the modeller concerns the relationship between the complexity of the data we model and the techniques we use to model them with. The most basic (and perhaps crude) representation of data complexity is the algorithmic information content, or AIC. AIC measures the compressibility of a data string. For example, the binary string "110110110110" could be compressed to "repeat '110' four times". Highly orderly strings will have low AIC, whereas completely random strings will have high AIC. While the AIC for most given data strings is uncomputable, general comments can be made (Gell-Mann).

A dynamical system with a point attractor has minimal AIC--a complete description of system behavior can be compressed into a single number. A periodic system following a limit cycle has an AIC defined by the set of points along its deterministic path--not necessarily a short description, but a finite one nevertheless. An aperiodic, yet not random (chaotic) system has yet a larger AIC, related to the magnitude of the fractal dimension of its strange attractor. As random noise is added to the system behavior, the data becomes less compressible. Data strings modeled by linear and nonlinear stochastic time series models typically have some order to them, but also large components of randomness, hence high AIC. These data strings contain a mixture of limit cycle (or strange) and random attractors. At maximum AIC lies random noise with a

(continued on page 2)

THIRD WINTER REGIONAL CONFERENCE: CALL FOR PROPOSALS

NORTHAMPTON, MASSACHUSETTES, FEBRUARY 3-5, 1995 SEE DETAILS ON PAGE 10

SECOND PART OF "Chaos Theory and Public Policy Inquiry: Theory and Methodology of Policy Process Research"

Philip S. Kronenberg Center for Public Administration and Policy Virginia Polytechnic Institute and State University [**Please note**: This is the second of a two-part article on the role and potential of chaos and complexity theories in the study of public policy.]

This two-part article is about my impressions of the study of public policy supplemented by the results of a global Internet survey I conducted in early 1994 of researchers who are studying public policy and planning using what I call the "New Sciences of Transformation"--nonlinear theories of adaptation and evolution applied to inquiry. Part One focused on study of substantive domains of public policy; this second part explores theory-building and methodology related to policy processes. I must note--with apologies--that space limitations prevent my comments from recognizing all of the interesting and important work on nonlinear dynamics that is being conducted in the public policy field.

THEORETICAL INITIATIVES AND CONCEPTS OF THE POLICY PROCESS

As a social scientist and theorist I am impressed with the substantial difficulty that one faces when trying to move from the worlds of mathematicians, physical, and life scientists to the worlds of public policy processes and large-scale human organizations. The stretch is a huge one and there are continuing dangers of inappropriate exploitation of concepts developed in the "mother" disciplines of nonlinear dynamics as we try to extend them to what is becoming the New Sciences of Transformation in social and political inquiry. Several theoretical projects strike me as being of particular interest. **(continued on page 4)**

"COMPLEXITY..." (cont.)

corresponding random attractor whereby the shortest description of a random sequence is the sequence itself.

Thus, a spectrum of AIC values, from low to high, underlie a corresponding spectrum of time series model-types that might be used for characterization (Note: the following is not meant to be exhaustive, but rather illustrative of typical issues facing the modeler). Consider a univariate series y_t. Here are different types of models that could be fit, depending on AIC:

AIC----Model-----Examples:

low----linear deterministic----linear differential, exponential, sine\cosine

medium----nonlinear differential----Lorenz weather equations, nonlinear difference, exponential time series, linear difference, ARIMA linear time series

high----random noise----Normal Dstribution

When AIC is low, modeling is likely to occur with the time/case index "t" being an independent factor (x). For example, one could fit linear [$y=a+bt$], polynomial [$y=a+bt+ct^2$], and transcendental functions [$y=a*\exp(bt)$, $y=a*\sin(bt)$] to the data. Here, models "forms" are likely to be continuous.

As AIC increases, modeling shifts to a self-referential (autoregressive) mode, where (e.g.) y_{t-k} is used to predict y_t. Model forms become discrete. For example, an AR model would have the form [$y_t=a+b*y_{t-1}$].

For very high AIC, only probabilistic modeling is possible, in the form that "y" follows a probability distribution function.

The nature of prediction also changes across AIC. At low AIC, the goal is a point prediction in time. With random noise, only distributional patterns can be predicted. At intermediate AIC values, prediction is mixed--sometimes the goal is a single point prediction, and sometimes the goal is a boundary prediction (e.g., $\text{Prob}(a<x<b)$).

Information theorists and data compressors are interested in AIC because it measures the gap between the "exact" data string and a compressed representation. Modelers, however, do not expect to recreate or compress the data string exactly. What is important is that non-random features of the data string are extracted and characterized. The model (or schema) of the data separates order from disorder.

"Effective complexity" measures the length of the model used to describe the complexity of the data. One cannot compute effective complexity in an exact manner, because model forms differ so vastly. But it would seem fair to propose that the effective complexity of a model is related to the number of parameters which define it. In that respect, there seems to be little relationship between AIC and effective modeling complexity. For example, a line has two parameters, the logistics equation has one, and a normal distribution has two, etc. Within a particular model domain, effective complexity will increase as higher order models are used to increase model fit. The concept of parsimony is equivalent to striving for minimal effective complexity.

What is more interesting is to compare the amount of "labor" that the modeler must go through in order to develop a model of a given data string--the complexity of the modeling task itself is referred to as crypticity. It has a maximum value at intermediate AIC values.

Consider the three typical tasks the modeler starts out with: 1. Create a time series plot of the data. 2. Create a histogram of the data. 3. Calculate sample statistics of the data, such as mean, standard deviation, range, etc.

If the data appears to have low AIC, a few simple, additional steps take place. A one or two-parameter line is fit, using linear regression. Residuals may be calculated and examined to determine if a polynomial model is needed, or if the raw data needs a transformation. The same situation exists if high AIC data is hypothesized: distributional parameters are estimated (for example, via moment matching), and a probability plot is generated to test for goodness of fit. These modeling tasks are of Order-1, or O1 complexity.

I will define O1, O2, and O3 as three prototypical levels of crypticity (modeling complexity), defined by the following characteristics:

(continued on page 3)

"COMPLEXITY" (cont.)

· computation time--how long does it takes the computer to estimate parameters, perform statistical tests, generate plots, etc.?

· tool availability--how commonly available are the tools; are the techniques needed available in common mainframe or PC software packages, or must new code be written?

· investigative certainty--as modeling progresses, is the modeling methodology well defined, or is the "decision tree" quite complicated, often calling for backtracking and modeler intuition; do the techniques have parameters themselves which must be adjusted?

· noise sensitivity--how robust are the techniques to random noise?

· theoretical basis--how complex is the underlying theory; how much background knowledge does it take for the modeler to carry through the modeling tasks, make appropriate decisions, and understand the implications of the model?

At low AIC values, fitting a straight line to data takes little computational time; techniques are readily available, even on hand calculators; there is little uncertainty about "what" to do; parameter estimates are wonderfully insensitive to noise (and many other abnormalities); and the theory behind it is simple--part of any introductory data analysis course at a college level, and covered in many cases in high school. Likewise, at the other end of the AIC spectrum, fitting data to a statistical distribution is of O1 complexity. It takes little computation time to compute standard statistics and draw a histogram; these tools exist in any data processing program--even probability plots are part of popular spreadsheet programs now; there can be some "art" to fitting distributions, (e.g.) if one is allowed to entertain a full range of hypotheses, but there are some good rules of thumb available; probability plots and histograms are good at detecting outliers and multiple modes, and thus are robust to "noise"; and the simpler plotting techniques and statistical calculations are part of any introductory data analysis course.

At low-to-medium AIC, where linear differential and difference equations are fit, modeling is of O2 complexity. Consider as examples the Fourier representation of a signal (a decomposition of the data into a set of sinusoidal functions) and an ARIMA time series model (a set of self-referential difference equations). Computation time (on a PC) is on the order of fractions of minutes, or minutes, as compared to seconds. Fourier and ARIMA methods are available only on "high end" PC packages, or in numerical libraries on mainframe computers. In Fourier modeling, one must be careful of aliasing effects, and if spectrum analysis is used, window parameters must be chosen; ARIMA modeling is notoriously intuitive, and typically many models must be tried before a "best" model is found. Both techniques are robust to noise. The theoretical basis for these techniques is not simple, and is typically not part of a student's study until graduate work.

If we are to buy into the notion that much "interesting" phenomena in social systems and human behavior exist at the "edge of chaos", or in a low dimensional state of chaos, then we are in for a challenge, because intermediate values of AIC require modeling of O3 complexity. Consider the estimation of attractor fractal dimension and the first Lyapunov exponent--necessary first steps to claim chaotic behavior (Peitgen, Jurgens, and Saupe). Computation time is on the order of minutes and hours depending on the algorithm chosen; some parametric modeling techniques developed for chaotic data can take several hours. Tools are not readily available. A few specialized programs have been written, but the algorithms contained in these commercial programs (e.g. original Grassberger and Procaccia correlation dimension algorithm) tend to be outdated by the time they are brought to market. State-of-the art algorithms are traded on the Internet, where one must come prepared with some programming skills in order to take full advantage of the offerings.

There are no well-accepted, time-tried methodologies for testing chaos. Investigative paths are still in large part determined by the extent of knowledge of the modeler, and the techniques they have access to. Almost all the algorithms themselves have parameters which must be defined, and only rules of thumb exist for parameter settings (e.g. Peters). Many of the algorithms are incredibly sensitive to noise, even at levels of a noise-to-signal ratio of one percent (Johnson and Dooley). The theoretical basis for these techniques is daunting--one has to be prepared to read Physica D-type journals in order to keep up with the state-of-the art. Thorough understanding of deterministic chaos and dynamical systems--a complex task in itself--is required before one can delve into the empirical modeling of such systems.

One immediate danger that is apparent is that researchers in some cases have approached the empirical modeling of complex systems with an assumption that one can get away with an "O1" or "O2" level of effort--e.g. a single method applied a single way, leading to grandiose conclusions, with no sense of testing linear or null hypotheses, or checking for alpha error, or adjusting algorithmic parameters for better fit. It is interesting to note that in almost "all" the publications in this area across the different domains, the investigators discover low dimensional chaos. Can it really be that chaos is that prevalent? Are studies which do "not" find chaos being withheld? Or could it be that the algorithms used to test for chaos have very large false alarm rates (Theiler et al.)?

Finally, it is worth noting that modeling complexity (crypticity) is more related to the "hypothesized" AIC rather than the actual. For instance, even if a data series is completely random and thus could be easily modeling with a probability density function, the modeler may expend an O3-effort looking for deterministic chaos in the system.

To summarize, systems which yield data which have a high degree of order (linear determinism) or disorder (randomness) are simple to model. Systems which have a moderate degree of order or disorder can be modeled by linear differential or difference forms. Modeling efforts here are more involved, although expertise in such cases can still be readily gained. **(continued on p. 4)**

"COMPLEXITY..." (cont.)

Systems with (intermediate values of order and disorder--at the so-called "edge of chaos"), or with low dimensional chaos--are the most difficult to model. Researchers should carefully consider the value of such modeling versus the effort extended. Algorithmic and methodological advances must be made before modeling of such systems can become more commonplace.[I wish to thank Honeywell Solid State Electronics Center and 3M Engineering Systems and Technology Laboratory for support of this research.]

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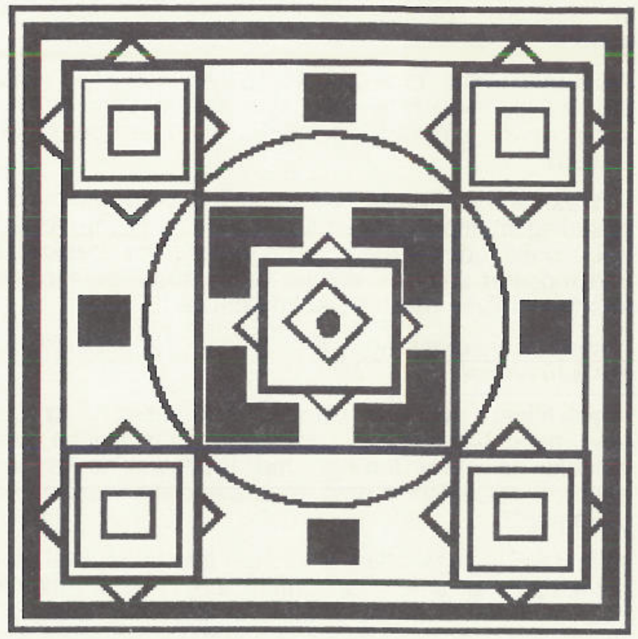

"CHAOS...AND PUBLIC POLICY..." (cont.)

1. Linkages between chaos and organizational theories (Dandridge extending nonlinear concepts into theories of entrepreneurial behavior, Guastello [1988] tying catastrophe theory and organization theory concerning the relationship between subunit size and occupational accidents; Goldstein developing a theory that ties self-organization to the management of deep organizational change; Kronenberg developing and linking his cloud metaphor to policy issue transformation [1994a] and the strategic management of public policy [1994b]; Little linking his use of the brain metaphor to reframe both our descriptive and normative theories of public administration; and Zimmerman bringing chaos theory to the study of strategic management (and Hurst and Zimmerman to the notion of an organizational "eco-cycle" involving profound organizational renewal).

2. Linking chaos theories with theory of culture (e.g., Baker in his discussion of the nonlinear dynamics among human social and cultural forms as social complexity emerges; Smith [1994b] by illuminating the cultural basis of chaos applications to policy inquiry). 3. Bringing greater sensitivity in policy theory-building by directing our attention to long-term discontinuities that apply insights from econological perspectives--such as Schumpeter's treatment of 50-year long Kondratieff waves to the even more powerful Braudel's la longue duree of several hundred year-long cycles concepts to policy theory (Boulding , Kiel and Elliott, Rosser, 1991).

4. Linking theories of environmental systems to strategic co-adaptation processes in local systems (Daneke regarding sustainable development by co-evolutionary choices in an ecology of institutions; Abeles examining agricultural communities and issues of environmental design as well as exploring the implications of nonlinear dynamics for preservation of the bio-physical environment and human culture).

5. Bridging the gap between substantive policy studies that emphasize problem-solving and system improvement, on the one hand, and the study of policy process on the other hand. This seems to me to be the key place where theory and methodology come together in an important way that can mobilize the potential of social science at a third stage of science (already being probed by the nonlinear work of the physical and life sciences) that can meld with the normative into what Loye and Eisler see as the potential of a "transformation theory." The promise of such a body of theory is to be a "chaos theory" for the social sciences. Its challenge, of course, is that it must accommodate the mixture of linear and nonlinear that we see around us in society.

METHODOLOGICAL ISSUES IN POLICY INQUIRY

The term "methodology" tends to mean techniques of measurement and analysis. That is appropriate but my use of the term here applies to the more global sphere of scholarship that tries to link metatheory and theory to the acquisition and interpretation of evidence. Let me mention several researchers who have come forward with interesting applications of methodological concepts and techniques that are innovative and promising in policy inquiry. **(continued on page 7)**

ANNOUNCEMENTS OF BOOKS BY SOCIETY MEMBERS

[Please send announcements of any books or articles you have recently written that you would like other members to know about]

L. Douglass Kiel, Managing Chaos and Complexity in Government: A New Paradigm for Managing Change, Innovation, and Organizational Renewal (San Francisco: Jossey-Bass Publishers, 1994). **Please note:** there will be a review of Dr. Kieil's book in the next issue of the Newsletter.

NEW AREA CONTACT PERSON: PSYCHOSOMATIC MEDICINE

Dr. Franco Orsucci, MD

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Tel & fax: 396/ 44.24.99.06

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Dr. Orsucci is Chief of a Psychosomatic Medicine Unit in Rome, a member of the International College of Psychosomatic Medicine, and is involved in research on chaotic dynamics in psychosomatics, cardiology, and psychopathology.

NEWS FROM OUR ITALIAN AFFILIATE:

Dr. Elena Liotta informs us of the following items that were discussed at recent meetings:

--use of Chaos Theory in metereology

--research project on chaos in the internal structure of dreams

--relation of Chaos Theory to Lacan's topology

* Congress at the Goethe Institute, Nov. 16-18 (more on that in future issue)

SPRING REGIONAL CONFERENCE--- THE SELF-ORGANIZING PSYCHE: NONLINEAR CONTRIBUTIONS TO PSYCHOANALYTIC THEORY

Early May, 1995; Spring Lake, New Jersey

Contact:

Alan Stein, 200 West 70th Street, Suite 9K, NY, NY 10023; phone: (914) 424-4416;

or Jeffrey Goldstein, 29 Hayes Road, Amity Harbor, NY 11701; phone: (516) 789-4145; email: goldstein@sable.adelphi.edu

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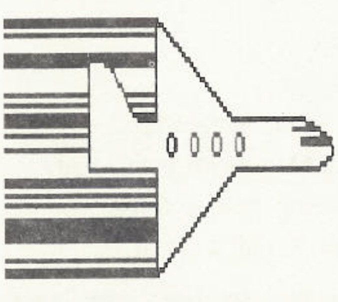

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CALENDAR

Third Winter Regional Conference--The Society for Chaos Theory in Psychology and the Life Sciences

February 3-5, 1995; Northamptom, Massachusettes

See page 10 of this newsletter for details.

Special Session in Ergodic Theory (at AMS Meeting)

March 4-5, 1995; Hartford, Connecticut

Contact: Cesar Silva, Mathematics Department, Williams College, Williamstown, MA 01267; email: csilva@williams.edu

Society for Nonlinear Dynamics and Econometrics

March 17-19, 1995; NY, NY

Meeting in conjunction with the Eastern Economics Association

Call for papers: Contact Ted Jaditz, Bureau of Labor Statistics, Room 3105, 2 Massachusettes Avenue., NE, Washington, DC 20212; email: (Internet) jaditz@oplc.psb.bls.gov (Bitnet) xt3@nihcu
Registration forms: Eastern Economics Association, Bryant College, Smithfield, RI 02917; phone (401) 232-6470; fax: (401) 232-6720

The Self-organizing Psyche: Nonlinear Contributions to Psychoanaltyic Theory (co-sponsored by The Society for Chaos Theory in Psychology and the Life Sciences)

Early May, 1995; Spring Lake, New Jersey

Contact: Alan Stein, 200 West 70th Street, Suite 9K, NY, NY 10023; phone: (914) 424-4416; or Jeffrey Goldstein, 29 Hayes Road, Amity Harbor, NY 11701; phone: (516) 789-4145; email: goldstein@sable.adelphi.edu

Third European Artificial Life Conference

June 4-6, 1995; Granada, Spain

Contact: Juan J. Merdo, Dept Electronica, Facultad de Ciencias, Campus Functenueva, 19071 Granada, Spain; phone: 34-58-243162; email: ccal@casip.ugr.es

AMS Summer Workshop in Smooth Dynamical Systems and Dimension Theory

June 25-29, 1995; University of Washington, Seattle

CALL FOR PAPER SUBMISSIONS: CHAOS IN EEG'S AND ERP'S

The International Journal of Psychophysiology is devoting an issue (7-9 contributions) on the application of various methods of chaos theory to the analysis of EEG'S and ERP"S.

Contact:

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HYPERTEXT BIBLIOGRAPHY OF MEASURES OF COMPLEXITY

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"CHAOS...AND PUBLIC POLICY..." (cont.)

1. Unit of analysis determination in the identification of the focal unit of analysis and the context in which it is embedded ('t Veld et. al. and other researchers on social autopoiesis; Baker--an anthropologist--and his idea of "centriphery" as a way to conceptualize human centering and peripheralizing in a nonlinear, holistic way; Goerner and the replacement of the separateness of power domination by nonlinear interdependence with its attendant implications for our notions of causality and human empowerment).

2. Concern with the appropriate use of analytical tools to study nonlinear systems. Gregersen and Sailer provide a sweeping assessment which--among other points--challenges the continued reliance on cross-sectional studies and the use of standard statistical techniques which will routinely produce poor analytical results when chaotic systems are being examined. This is reinforced by Michaels' argument for the development of a new, nonlinear statistics. Guastello [1993] exploits polynomial regression analysis to do comparative analysis of the predictive power of nonlinear vs. linear interpretations. Koehler employs percolation fractal concepts as a methodology to manage macro-and micro-structuring processes in Emergency Medical Services disaster responses. Priesmeyer applies logistic regression to demonstrate nonlinear modeling to forecast social phenomena like crime rates, substance abuse, and infant mortality,

3. There is the problem of a lack of adequate time series data to test dynamic nonlinear models. This accounts for the heavy use of simulation [[Nijkamp and Reggiani, Gregersen and Sailer]. But this shortfall of relevant empirical data may mean that the reliance on simulations may drive out the skepticism that should accompany the high stakes of making important public decisions based on unevenly-tested models. Another strategy may be to get more serious about our reliance on long-term events data, guided by the example of the "Cliometricians" and "new" economic historians [Atack and Passell].

4. Issues about the underlying paradigmatic, ontological, and epistemological premises of chaos and complexity ideas applied to social and policy processes. Among these are: Huston and his challenge to the mainstream paradigm of political science--especially the anthropocentric model--and his advocacy of a new sociopolitical evolutionary systems paradigm; Aam in his notion of "perspectivism" argues that multiple perspectives that may conflict when viewed as global metaphors of infinite writ can be consolidated by recognizing that each perspective is embedded in a local--not global--structure and that apparently conflicting global perspectives can be structurally coupled by the analogy of mimicking which locally links similar structures between different systems; and Goerner who, in a related direction, offers an extended argument about the "ecological world hypothesis"--which she develops in considerable detail as based on chaos and ecologism's capability to support all prior world views and demonstrates how they can be fit together.

5. The development of modeling tools to extend our sensitivity to nonlinear dynamics in situations appropriate to public policy processes. Smith's Inapplicability Principle [Smith, 1995] points out that one very important implication of chaos theory is that we now have a systematic reason to expect that there is a group of mathematical models that represent natural phenomena quite well but that are not likely to be empirically verifiable. The lack of predictive power of these models seriously undermines their continued use in the "social engineering" that characterizes much of the analytical formalism of public policy advocacy. Efforts to build more heuristically useful policy models abound (e.g., Schofield, Isnard and Zeeman, Andersen and Sturis, and Saunders-Newton).

SOME CONCLUDING THOUGHTS

In conclusion, I must make the point that, among those who have studied public policy and its ways over the years, many of us could say (with regrets to Barbara Mandrell) "We were Chaos when Chaos wasn't Cool!" Our concern with disruptive political and socio-economic processes, the uncertainties that surrounded complex adaptive processes as regimes and systems of public decision making experienced transformational shocks, and the dramatic and disproportionate results of "small events" all were our "village" as students of public policy. Our many dogfights over paradigmatic issues may have mislead us into not understanding that our eclecticism was really an artifact of our sensing the frequently bewildering interweaving of the linear and nonlinear in our objects of study. We didn't have the benefit of the conceptual precision that has come with the intellectual tools of deterministic chaos and the specific ideas of complex adaptive systems, but we were in the neighborhood! This is what I call the "Rosser Problem." Economist J. Barkley Rosser, Jr. has stated well the methodological issue that seriously constrains our efforts to build competent theory relevant to policy inquiry: Does chaos really exist in the kinds of systems we focus on? As he put it:

> To a large extent, this ambiguity arises from a fundamental methodological difficulty. One is attempting to distinguish something that looks random but is not (chaos) from something that is truly random. This is not small feat. [Rosser, 1990,p. 283]

I fear we are often too willing to be satisfied by qualitative interpretations that nonlinear dynamical events abound and all is "precisely" chaotic (Has this now replaced the frustrating role of randomness and impotence and Unfair Gods for us?). Maybe this has too easily liberated us to proceed largely on metaphorical extrapolations in our efforts to understand policy processes without being too demanding about empirically-grounded challenges to our preferred hypotheses and the policy preferences that they permit us to support. For example, I question the notion that the very complex system to which public policy is applied--society--is properly characterized in fractal terms. Its subsystems (family, small primary groups, organizations, institutional networks) lack the self-similarity with the macrosystem of the society to make free use of the fractal metaphor. A point that is related to the existence of chaos and our ability to differentiate **(continued on page 8)**

"CHAOS...AND PUBLIC POLICY..." (cont.)

it as analysts of complex policy systems is the very central issue of "control" as a dominant concern among those who attempt to frame and implement public policy. What is our ability to control nonlinear processes in policy settings? James Yorke--who in 1973 coined with Tien-Yien Li the term "chaos" as we use it in NST-- was our guest speaker at the 1994 Annual Conference of the Society for Chaos Theory in Psychology and the Life Sciences at Johns Hopkins. During a post-banquet discussion, Yorke was commenting on his optimism about his current research efforts to "control" chaos in low-dimensional systems. I asked him his judgment of the likelihood that we could control chaos in high-dimensional systems like large-scale social networks or political systems. His response was very pessimistic!

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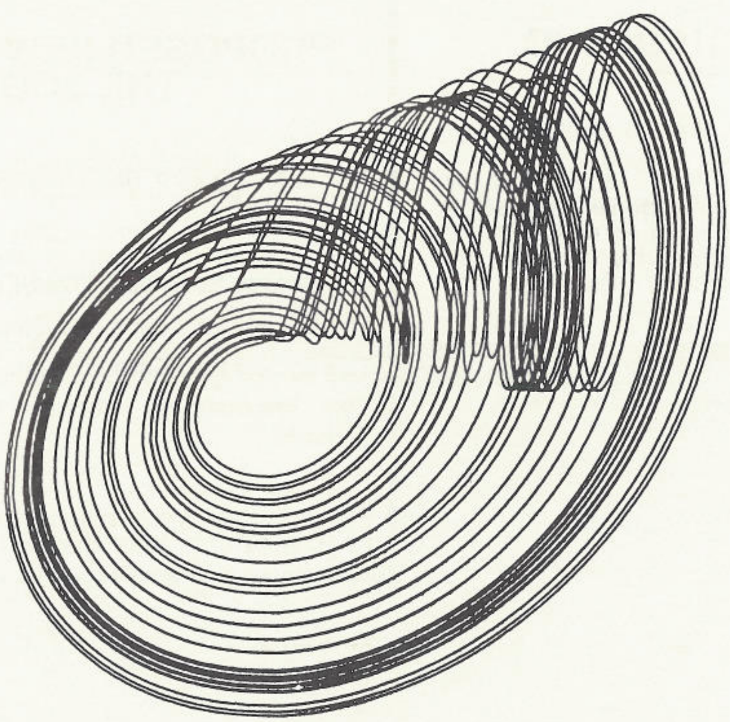
Phil Kronenberg, a Society for Chaos Theory member, has been professor of public policy at Virginia Tech since 1977. He earlier served on the faculties of Indiana University, University of Tennessee, and the US Air War College. He has consulted for the US Office of Management and Budget, Federal Emergency Management Agency, and other firms and public agencies. He has four books and numerous articles in the fields of public policy, organization theory, and international security. His home is in Reston, Virginia, where he lives with his wife, Renee Loeffler, also a Virginia Tech faculty member, and their three children.



CONFERENCE ANNOUNCEMENT AND CALL FOR PAPERS THIRD WINTER REGIONAL CONFERENCE THE SOCIETY FOR CHAOS THEORY IN PSYCHOLOGY AND THE LIFE SCIENCES

FEBRUARY 3-5, 1995; NORTHAMPTON, MASSACHUSETTES

This year's regional conference will take place in the beautiful and quaint New England town of Northampton, Massachusettes at the Northampton Hotel.

Society member, Derek (Rick) Paar, Department of Psychology, Springfield College, will be coordinating the conference.

The theme of the Winter Conference will be "From Theory to Application." The Winter Regional Conference is an informal place to share recent work, ideas, and so on. Rick Paar is setting-up a special Saturday night session on possible applications of the new nonlinear sciences to "Schools in the City."

Send proposals to Derek Paar, Department of Psychology, Springfield, MA 01109-3797. Phone: (413) 748-3264 or (413) 567-1889. Rick does not have an email address.

APPROXIMATE COSTS:

Rooms per night: Single $75.00; Double $85.00

Saturday Night Banquet: $26.00

Registration Fee: $35.00

BROWSING IN CHAOPSYC

Past President Fred Abraham is working on putting our computer network, CHAOPSYC, into a more user friendly form such as World Wide Web for easy browsing and retrieval. These are preliminary steps towards the creation of an Electronic Journal for The Society for Chaos Theory in Psychology and the Life Sciences. Thank you, Fred.

PROPOSED NEW NAMES FOR THE SOCIETY

The following new names have been proposed. What do you think?

The Society for Chaos Theory.

The Society for Chaos and Complexity Theories.

The Society for Nonlinear Systems Science(s).

The International Society for Chaos/Complexity Theories.

Please submit your suggestions to Jeffrey Goldstein, 29 Hayes Road, Amity Harbor, NY 11701 USA

1995 ANNUAL INTERNATIONAL CONFERENCE, THE SOCIETY FOR CHAOS THEORY IN PSYCHOLOGY AND THE LIFE SCIENCES

August 8-11, 1995
Adelphi University, Garden City, (Long Island), New York

When the Society was formed, it was decided to alternate the dates and place of the Annual Conference to match, in consecutive years, the APA and the APS conferences. Thus, in 1994, the Annual Conference at Johns Hopkins in Baltimore coincided with the APS Conference in Washington. In keeping with this tradition, the 1995 Annual Conference will precede the APA Conference that is taking place in New York beginning August 11, 1995.

Adelphi University, with approximately 7,000 undergraduate and graduate students, is in the suburbs of New York City, more precisely in Nassau County, Long Island, about 20 miles from Manhattan and in walking distance from a commuter rail service of the Long Island Railroad. Moreover, Adelphi is only about a 20-30 minute car ride from JFK International Airport and about 30 minutes from LaGuardia Airport.

Also, by holding the conference at a university, costs will be much lower than staying in Manhattan.

More information on the Annual Conference will be forthcoming in future issues of the Newsletter and mailings.

REQUEST FOR SUBMISSIONS

The newsletter is requesting submissions for future issues. Please send articles, research notes, book reviews, artwork (in PCX format or fine copies), announcements, advertisements (future issues will include ads for software, and so on), etc.

Send to:

Jeffrey Goldstein
29 Hayes Road
Amity Harbor, NY 11701 USA
(516) 789-4145

THE SOCIETY FOR CHAOS THEORY
IN PSYCHOLOGY AND THE LIFE SCIENCES
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