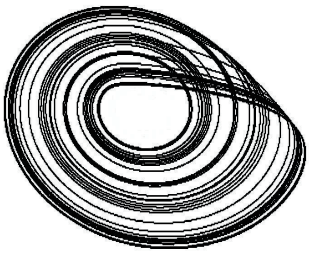
Society for Chaos Theory in Psychology & Life Sciences

N E W S L E T T E R



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This year, the Society for Chaos Theory in Psychology and Life Sciences (SCTPLS) will host its annual meeting at Johns Hopkins University in Baltimore, MD. The conference provides a unique opportunity for scholars and practitioners working in the field of nonlinear dynamical systems to report research, network and exchange ideas with like-minded individuals and congregate in a pleasant collegial environment.

The SCTPLS, founded in 1991, is the oldest Society of its kind. It has continued over the years to provide leadership in the area of dynamical systems modeling and it has been instrumental assisting the scholarly community at large with the adoption of nonlinear dynamical concepts in its theory building and research. Through its annual conferences, SCTPLS serves its mission of nurturing and further developing the dynamical intellectual tradition, which originates in antiquity and continues to this day to provide an impulse of innovation in scientific research and theory building, social and life sciences in particular. Researchers interested in participating are encouraged to consider submitting their work for inclusion in what promises to be an excellent conference program.

Johns Hopkins University was founded in 1876 as the first institute of higher learning in the nation devoting a significant part of its efforts to research. To this day, it is still one of the most prestigious universities in the country, and a prominent research institution. It is hosting SCTPLS for the second time (the first time was in 1994). Instructions for presenters and this year's workshop offerings follow.

SCTPLS Annual Conference to be held at Johns Hopkins University, Baltimore, MD, August 4-6, 2006

Location, Accomodations, and Registration

The Johns Hopkins University will host the conference, and convenient (and very affordable) lodging has been arranged on site. Early registration fees for the conference will be US $185 for regular members, $135 for student members, and $260 for non-members until July 15, 2006. After July 15, the on-site registration rates of $210/160/285 will apply. The banquet dinner on Saturday August 5, 2006 and refreshments during the conference are included with your registration.

Official lodging for this conference will be booked through the Society for at Johns Hopkins. We note that Wolman Hall, known in earlier times as the Cambridge Apartments, was once the residence of American novelist F. Scott Fitzgerald.

Room rates for single occupancy are $115 for the 2-night package August 4, and 5, and $60 for additional nights. See website for additional information. about lodging.

Schedule

Thursday August 3, 2006
Arrive (if attending morning workshop next day)

Friday August 4, 2006
Registration and workshops. Sunset session with guest speaker TBA

Saturday August 5, 2006
Conference day. Banquet with guest speaker Dr. Robin Vallacher, Florida Atlantic University.

Sunday, August 6, 2006
Conference Day. Annual business meeting.

Three Exciting Workshops at the Baltimore Conference

Three exiting workshops will start us off in Baltimore this year. Dr. Liebovitz (Florida Atlantic University) will conduct an introductory workshop in chaos theory and fractals, Dr. Glenda Eoyang (Human Complex Systems Institute) will discuss the applications of nonlinear dynamical systems to peace and conflict, and Dr. Mary Ann Metzger will offer a methodological workshop on the use of time series analysis and interpretation of results. Below are abstracts for each workshop as well as a biographical sketch of the workshop moderators.

1

Introduction to Fractals and Chaos

Larry S. Liebovitch , Ph.D.

This workshop will present an introduction to fractals and chaos and their applications. Fractals are things that have pieces that are ever smaller copies of the bigger pieces. A tree is fractal. It has ever finer branches that are smaller copies of the larger branches. Fractals can be used to better understand the structure and function of proteins, cells, the heart, and the brain. Chaos means simple systems that do surprisingly complex things. Chaos can be used to better understand the surprising things that molecules, cells, and people do. The topics covered will include: 1) Fractals: Introduction, Self-Similarity, Scaling, Dimension, Statistical Properties, 2) Chaos: Introduction, Phase Space, Sensitivity to Initial Conditions, Bifurcations, Analyzing Data, and Control of Chaos.

The workshop will be based on the book, Fractals and Chaos Simplified for the Life Sciences, by L. S. Liebovitch, Oxford University Press, 1998 and a CD-ROM with curricula materials for a mathematics course for non-science students (http://www.ccs.fau.edu/~liebovitch/overview.html). The workshop does not require a background in mathematics.

Larry Liebovitch is a Professor and the Interim Director of the Center for Complex Systems and Brain Sciences at Florida Atlantic University (liebovitch@clifford.ccs.fau.edu ; http://www.ccs.fau.edu/~liebovitch/larry.html). He has used nonlinear methods, including fractals, chaos, and neural networks to study genetic regulatory networks, the spread of biological and electronic infections, motions in proteins, the timing of heart attacks, and the swimming of one-celled organisms. He is the author or co-author of 2 books, 20 book chapters, 69 journal articles, and has given presentations in the U.S., Belgium, Brazil, Canada, China, Denmark, Finland, France Germany, Israel, Poland, and Sweden.

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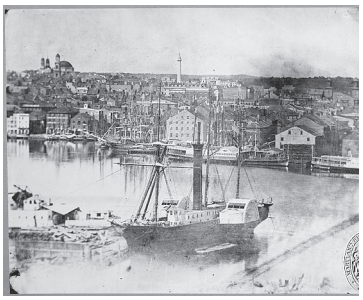

Human Systems Dynamics Applied: Peace, Sustainability, and Evaluation

Glenda H. Eoyang, Ph.D.

Human systems dynamics (HSD) is the field of inquiry and practice at the intersection of complexity and the social sciences. Tools and techniques have been created, adopted, and adapted from a variety of fields to help researchers and practitioners see and influence emergent patterns in the complex, nonlinear dynamics of human systems.

In this half-day seminar, Glenda Eoyang, HSD pioneer, introduces some of the core concepts, methods, and tools that have proven useful in working with individuals, teams, organizations, and communities. Participants share their related methods and tools and explore how HSD might inform their own work. Each approach is applied to one of the urgent issues of our times: peace, sustainability, or evaluation in complex

systems.

By the end of the session, participants will:

- Connect the field of human systems dynamics to its roots in complexity, philosophy, and experience.
- Consider ways in which HSD might inform their own praxis.
- Use tools and techniques from human systems dynamics to see and influence patterns in human systems.
- Consider the complex dynamics and options for action to address three urgent, contemporary, global issues: peace, sustainability, evaluation.

Glenda Eoyang is founding Executive Director of the Human Systems Dynamics Institute (geoyang@hsdinstitute.org; www.hsdinstitute.org), a research and consulting group developing theory and practice in human systems dynamics—the emerging field at the intersection of complexity and social sciences. She began her work with complex systems in 1989 and received the first doctorate in Human Systems Dynamics from Union Institute and University in 2002.

Eoyang's theoretical work covers a range of models and approaches. She has used nonlinear time series modeling, computer simulation modeling, and simulation games to explore the dynamics of human systems. As a trainer and consultant, she helps clients use insights from complexity to find options for adaptive action. As a long-time member of SCTPLS, she has shared her experiences and emerging learning at many past conferences. She has written numerous articles for academic and business publications on topics ranging from fractals for business administration to human computer interface design, youth gangs, productivity, large group events, team building, sustainability of organizational change, and program evaluation. Her books, like her presentations, are accessible and relevant to people who strive to understand and influence the dynamics of human systems of all kinds.

Drawing Conclusions from Time Series

Mary Ann Metzger, Ph.D.

This will be a practical workshop on methods for approximating behavioral processes underlying empirical time series using available software for linear (SAS Statespace) and nonlinear (Artificial Neural Network) approaches to approximation. Emphasis will be on methods applicable to difficult time series, including very short series, that are suspected to be nonlinear and non-stationary. The workshop will also cover the following topics:

- Linear and nonlinear approximations for short-term prediction
- Methods for describing behavioral patterns and summarizing dynamics
- Non-stationary time series: Bayesian multi-process models
- Using results for prediction, classification, and comparison
- Examples: Application to observations on animal and human behavior
- Nuts and bolts: Using available software to build models to approximate a process

Mary Ann Metzger has degrees in Mathematics and Psychology from the University of Connecticut, and postdoctoral work in Mathematical Psychology at the Rockefeller University, New York. She was a member of the Psychology Department faculty at UMBC from 1973 to 1999 and is now Professor Emerita. Her specialty is the application of systems dynamics to understanding psychological processes, including intellectual development, developmental disorders, and patterns of family relations. Relevant reading for the workshop: Mary Ann Metzger (1995) Tracking sequences of attractors in cognitive state-space. In R. Post and T. van Gelder (Eds.) Mind as Motion: Dynamics, Behavior, and Cognition, MIT Press.

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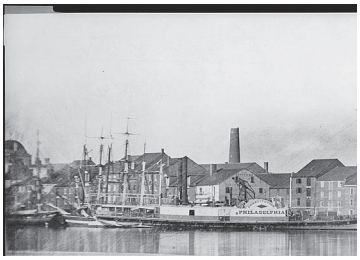

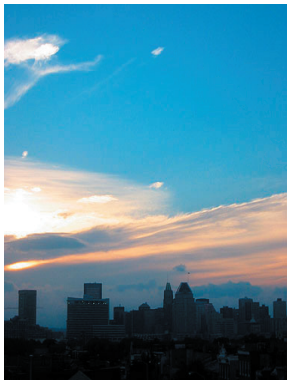

http://www.societyforchaostheory.org/conf2006/cfp

CFP & Instructions for Presenters

We invite all interested scholars to submit abstracts reporting work in nonlinear dynamical systems theory, which includes chaos theory, fractals, complex systems, and related topics. The Society for Chaos Theory in Psychology and Life Sciences is a multidisciplinary organization, and its conferences present work in all areas of psychology, general biology, neuroscience, medicine, and the social sciences, as well as anthropology, art, education, literature, mathematics, philosophy and physics. The program will include workshops, invited addresses, symposia, panel discussions, a poster session, and sessions of individual papers. Advances in basic or applied research, developments in theory, reports of empirical results, and methodological papers are all welcome. We continue to encourage contributors to consider alternative presentation formats, such as posters, product demonstrations, short workshops, debates around controversial topics, and roundtable discussions.

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

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

Each person submitting is limited to a maximum of two presentations as first author (okay to be a co-author on additional submissions by others).

Publication Opportunity

All presenting conferees are further invited to prepare their papers for review and possible publication in the Society's research journal Nonlinear Dynamics, Psychology, and Life Sciences. NDPLS is peer-reviewed and abstracted in PsycInfo (Psychological Abstracts), Medline (Index Medicus), and JEL/Econlit. NDPLS uses American Psychological Association (APA) style. Click JOURNAL on the SCTPLS web site to access Instructions for Authors. All SCTPLS members receive NDPLS and the SCTPLS Newsletter as a benefit of membership.

deadline for submissions

April 22, 2006

Presidents' Letter

Matthijs Koopmans

These are exciting times in nonlinear dynamics, as two major conferences are coming up within the next few months. Preparations are in progress for our annual conference, which is to take place at Johns Hopkins University in Baltimore, MD this year from August 4-6. As is our custom, we will hold workshops on the first day, followed by two full days of conference. We have three exciting workshops lined up. Larry Liebovitch (Florida Atlantic University) will give an introductory workshop on chaos theory and fractals, Glenda Eoyang (Human Dynamical Systems Institute) will moderate a workshop, which offers a nonlinear dynamical perspective on peace and conflict, evaluation and organizational development. Mary Ann Metzger (University of Maryland) will offer a more advanced workshop on the use of time series analysis. Abstracts for these workshops can be found in this NL issue. Robin Vallacher (Florida Atlantic University) has agreed to give a keynote address. Dr. Vallacher is a leading authority on the application of nonlinear dynamical concepts in social psychology, and we are very excited to have him as a speaker.

We are inviting submissions -- and a call for papers can be found in this issue. We encourage you to participate.

The International Nonlinear Science Conference, to be held in Heraklion, Crete (Greece) from March 10-12, 2006, promises to be a great success. The program is very strong and has wide international participation Conference coordinator Ivelisse Lazzarini (Creighton University) has an update elsewhere in this issue.

To enable our Society to continue to play a leadership role in the field, the Education Committee has been revived recently. In its new incarnation, it consists of Ivy Lazzarini and Jayne Fleener (Louisiana State University). Their most immediate function will be to reconfigure the Society's website, such that it provides useful information and source material for teachers and students, but they also have a broad mandate to rethink the potential pedagogical function of our society, trying to find ways to inspire scholars to rigor, terminological clarity and other virtues when they nonlinear dynamical principles in their work.

In another important development, our newsletter has changed editors. Robert Porter offered his resignation as NL editor in connection with the circumstances outlined in the editorial he published in the last issue. I regret his departure, as his was a very productive tenure. (My reply to the editorial appears elsewhere in this issue). I am excited to announce that Koen DePryck (Institute of Knowledge Management) has taken over this important responsibility, and this issue bears the first fruits of his editorial acumen.

Finally, to allow for more opportunity for open discussion about Society matters, a new listserve, CHAOFORUM has been set up. Subscription information can also be found elsewhere in this issue.

2nd International Nonlinear Science Conference

Heraklion, Crete, Greece , March 10-12, 2006

We are happy to announce that the scientific committee has finished reviewing all submissions and participants have been notified. We have rich variety of presentations in our program including topics from: Simulations For Social Systems; Education / Pedagogy; Philosophy Sciences; Methodology & Mathematics; Biomedical & Neuroscience; Biophysics & Environmental Science; Psychology; Management; Sociology; and Economics.

The INSC will be the place to gather to stimulate your mind and share with colleagues from around the world your views and scientific ponderings. We hope you are getting geared to meet with us because we are certainly doing are very best to greet you.

All conference speakers must register for conference by February 1, 2006 in order to remain on the program. If you are not a member, your conference registration includes a complimentary membership to SCTPLS through the end of the year. Please register to secure your place in the INSC 2006.

Please visit the INSC conference website to obtain more details and information

http://www.societyforchaostheory.org/insc/2006/

Koen DePryck to be new **newsletter editor**

We are delighted to announce that Koen DePryck has agreed to take on the Newsletter Editorship. Koen is currently director of the Center for Adult Education in Antwerp (Belgium) and president of the Institute of Knowledge Management in Brussels (Belgium). He received his MA in Philosophy (Aesthetics and Epistemology) from the University of Ghent (Belgium) and his doctorate in Aesthetic Studies from the University of Texas at Dallas. His work spirals around a number of themes: evolutionary epistemology, biopoetics, theory of systems, onto-epistemology, and time. Frederick Turner summed it up as follows :

"It is already clear that postmodernism is an unsatisfactory view of the world: the skepticism, antifoundationalism, and distrust of any form of narrative or argument that has characterized this last phase of modernism cannot long resist its own corrosive critique. What view of the world will succeed postmodernism? (…) Koen DePryck's book [1993. Knowledge, Evolution and Paradox: The Ontology of Language. SUNY Press] in a remarkable synthesis, lays the groundwork for an answer. Using new concepts derived from the study of iterative, chaotic, and probabilistic processes in nature and in the computer, he develops a way of looking at both the sciences and the humanities that fully meets the concerns of the mainstream of modern philosophy, while opening up whole new areas of research. This book joins a handful of important and daring new works that have recently broken with the current conventional wisdom of the humanities, and that chart the altered shape of the academy as it will exit in the twenty-first century"

Koen DePryck has taught a wide range of subjects, from logic, systems analysis and programming languages over philosophy of science and philosophy of art to studio art. He is actively involved in the design of constructivist learning environments—both physical and virtual and acts as a consultant to several schools and corporations.

Prompted to elaborate on the reasons for his interest being SCTPLS Newsletter Editor, Koen observes "The 2 main reasons I'm excited about the editorship of the NL are, first, that is hard to find relevant information—The NL should play an essential role in pushing relevant information to the members—but also that the NL is sort of a calling card for the field. It should help attract new researchers, etc."

We look forward to working with him. (MK)

CHAOFORUM new **discussion group**

CHAOFORUM@listproc.umbc.edu is a new discussion group that we have set up exclusively for SCTPLS members to provide an opportunity for unrestricted discussion of matters of interest to them, including scientific and organizational matters.

To join this list, send an email to listproc@listproc.umbc.edu. The email should contain one line in the body of the message. The line will be a command to subscribe, the name CHAOFORUM, and your name.

For example, if Thomas Piperson wanted to subscribe, he would send the line:

Subscribe CHAOFORUM Tom Piperson

You will receive an automatic reply with instructions on how to post to the list.

The CHAOPSYC discussion group continues to operate as a platform for discussion of scientific matters that is open to SCTPLS and non-SCTPLS members alike. SCTPLS members, additionally, are automatically subscribed to the members listserve whose primary function is to post SCTPLS announcements.

Daddy, Why are People so Complex?

Allan L. Combs
Saybrook Graduate School

Abstract. *The implications of Warren McCulloch's 1945 concept of heterarchy are analyzed in terms of human value and motivational systems. The results demonstrate the near impossibility of predicting behavior on the basis of any hierarchical scheme, or even which among a set of hierarchical schemes will be selected as the basis of a behavioral choice. Thus, for example, people regularly say one thing and do another.*

Keywords: *heterarchy, hierarchy, values, motivation, Warren McCulloch*.

In 1945 neurophysiologist Warren McCulloch published a paper in which he demonstrated that a simple circuit of six neurons could produce behavior unpredictable from any hierarchical theory of values. The logic of his demonstration extended far beyond simple nerve cell networks to the very limits of understanding and predicting human behavior. But first let us examine this simple network and proceed from there. McCulloch invites the reader to consider a situation in which any of one of three behaviors, A, B, or C, might be selected. Now suppose these are arranged in a hierarchical order of value or preference:

A > B > C

Something like this is seen in virtually all theories that involve aesthetic or moral preferences and in motivational theories in general. A is chosen over B, and B over C. But paradoxically given a choice between A and C, the latter is chosen.

C > A!

This is the situation McCulloch discussed in the 1945 paper. He set up a theoretical demonstration in terms of three nerve cell circuits (Figure 1), each consisting of two cells. The entire network was organized so that circuit A inhibits circuit B and circuit B inhibits circuit C, while circuit C inhibits circuit A. Clearly this is a looped network and not a straight-forward ordering of preferences.

Hierarchy and Heterarchy

The term heterarchy is often used to refer to lateral networks in discussions of holons and holarchy. The term holon was coined by Arthur Koestler (1978) to refer to a system that is complete in itself, but part of a larger network of other systems. For example, a living cell in the human body is a holon, complete at its own level but only one element in a larger system of cells that make up, for instance, an organ such as the adrenal medulla. The adrenal medulla, in turn, is complete in itself while part of the larger system of the human body. The body is thus a holarchy composed of multiple levels of holons. In such complex systems lateral or egalitarian influences between cells or organs are said to be heterarchical. At the same time other influences remain hierarchical, such as the control the pituitary gland exerts over all the other endocrine glands with the hormones it releases into the blood stream, while it is in turn regulated by hormonal and neuronal influences exerted from the hypothalamus, a part of the limbic system of the brain.

Curiously, since the publication of McCulloch's original paper over sixty years ago the complex possibilities suggested by his treatment of a simple mixed system of hierarchical and heterarchical components have been largely ignored, though some consideration is currently given to them in management circles. In 1945 McCulloch had already pioneered the notion that the brain could be thought of as a computer with nerve cells as its computational elements. He and a few like-minded

An organism possessed of this nervous system – six neurons – is sufficiently endowed to be unpredictable from any theory founded on a scale of values.

Warren S. McCulloch, 1945

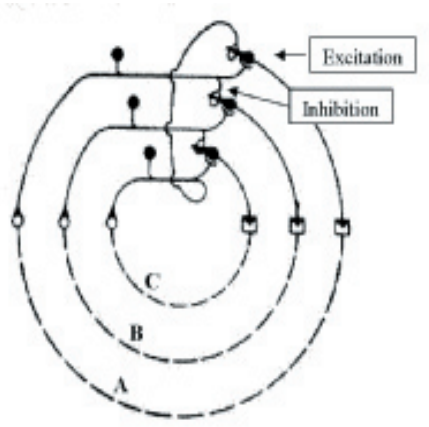

Figure 1. Three two-cell nerve circuits. Through simple branching inhibitory connections the outermost circuit (A) inhibits the middle circuit (B) which inhibits the central circuit (C), while the latter in turn inhibits the outermost (A).

brain scientists were hoping to find more or less precise neuronal logic circuits that would, in the end, add up to a brain equivalent of the Turing machine (digital computer). In fact, McCulloch's work was foundational for the later development of "neural network" computers as well as neural network brain models, which today have virtually replaced the digital "computational brain" theories of the 60s, 70s, and 80s.

One obvious application for McCulloch's ideas on heterarchy is to the realm of values. This was the context of his paper, though clearly he did not mean to limit the application of his thoughts to social or religions values alone. Indeed, the examination of neuronally based values brings to mind the more inclusive topic of human motivation.

Motivation in the History of Psychology

Motivation and its relationship to neural action in general were central to American psychology during its formative years around the turn of the 20th century. For instance, William McDougall's (1908) ideas on biologically based instincts, which he later termed "propensities," were instrumental to the later work of Konrad Lorenz (1952), mid-century pioneer of the field of ethology and recipient of a 1973 Nobel Prize for his work on animal behavior. Early 20th century behavioral theorists such as John B. Watson (1919) and Walter Cannon (1915) believed that biological drives such as hunger, thrust, and sexual arousal, are activated by "local stimulation" such as the feeling of an empty stomach, a dry mouth, or blood engorging the genitalia. By mid-century such theories were beginning to appear simplistic. Psychologist Clark L. Hull (1943) proposed the notion of a brain-based "general drive state" that animates an organism and leads it to act on the kinds of local drive stimulation suggested by Watson and Cannon. As early as 1938 the prominent Harvard psychologist Karl Lashley went further, insisting that motivational states must result from an integration of complex neuronal and hormonal factors in the brain itself. By the mid-1950s motivational theorists were searching the brain for "on" and "off" centers that would excite or inhibit particular biological drives as well as emotions such as anger and fear (e.g., Beach, 1947; Morgan & Stellar, 1950). Several prospective centers were discovered in the hypothalamus, though most of these did not fair well in subsequent research.

By the mid-60s, however, the whole field of motivational psychology was coming unraveled. Competition was growing form new theories that emphasized social learning (e.g., Bandura, 1973, 1977) and cognitive processes (e.g., Bruner, Goodnow, & Austin, 1956; Neisser, 1967), while at the same time traditional motivational theorists were regrouping to discover their discipline had grown too large to handle. Imagine a field of study that includes topics as widely disparate as the "simple" reflexes (tropisms) that propel single-celled organisms in and out of the light, all the way to "higher" human needs such as belongingness and self-esteem; including paternal and maternal drives, the need for novelty and exploration, and such airy but important motivations as the search for beauty, truth, self-actualization, and self-transcendence (e.g., Maslow, 1962). Perhaps the last great theorist of the field of motivation was Sebastian Grossman (1967), who divided motivations into two broad classes: homeostatic and non-homeostatic. The former are concerned with the integrity of the body itself, and include such drives as hunger, thirst, and the need for warmth. The latter are not directly tied to body integrity, and include a wide range of drives such as mating, novelty seeking, care of the young, and so on. An important distinction between these two classes of motivation is that the former are amenable to only modest modulation through learning while the latter vary widely with learning and culture.

Thus, efforts to gather all the variegated motives behind behavior under one theoretical roof have proven too complex and too nebulous to be productive. Not surprisingly, there has been a notable drop-off in number of basic theoretical publications on the topic of motivation since the 1960s (Hilgard, 1987), and it is no longer included in general psychology texts.

Complexity and Behavior

Putting theoretical considerations temporarily aside, let us turn our attention to ordinary moment to moment human activity and reflect on some of the behavioral choices often available. In doing so, keep in mind that each choice is animated by its own brand of motivation or, in McCulloch's terms, value. Now, consider someone named John. Suppose it is Saturday afternoon and John is looking for something to do. He might like to eat sweets, engage in some morally elevating activity such as writing letters for Amnesty International, satisfy an aesthetic

yearning by visiting an art museum, seek a sexual dalliance, relax and read a book or watch TV, respond to a parental urge by spending time with his children, seek spiritual fulfillment visiting a place of worship or engaging in prayer or meditation at home, or he might exercise at the local gym, etc. Notice that these examples address a variety of motivations, ranging form biological urges to the satisfaction of uniquely human values that tap the moral and aesthetic senses. If we assigned a letter to each and ordered them by preference we would have a situation something like that outlined by Warren McCulloch, though considerably more complex.

But in fact the reality of the situation is more complex still. Each possibility has several alternative forms, so that John might choose any of a number of sweets ranging from chocolate cookies to peppermint candy (assuming they are available). A similar range of choices are available for the other possibilities as well. For instance, if John decides to read a book he might ponder the selection on his chair-side table, which it happens to include Moby Dick, Travels with Charlie, Lolita, and The Hitchhiker's Guide to the Galaxy. One could go on pondering examples of activities for a Saturday afternoon indefinitely, listing far too many to diagram in a McCulloch nerve-cell circuit. Notice, however, that such activities are not unrelated to each other, but group themselves into categories representing more inclusive value or motivational vectors such as satisfying biological urges, addressing moral or ethical concerns, providing escape from the demands of the day, and so on. My point is that John's choices can be nested into larger categories. At the same time, however, they each carry sub-categories nested in them as well. For instance, John might choose to eat a pastry and discover to his delight several varieties of pie waiting for him in the pantry. Now, after choosing one of these he must further decide whether to put ice-cream on it, what flavor of ice cream would be best, whether to warm the pie, and so on. You see the point.

Here we are getting a picture of options within options within options, each animated by its own source of motivation. But if all this weren't enough, we must also recognize that motivational states very with time and circumstance. Sexual arousal, for instance, increases with time since the last release and often increases with novelty. Konrad Lorenz (Lorenz, 1997) tried to model the growth of the "pressure" of biological drives with a hydraulic system that likened them to a reservoir that slowly fills with water, increasing the pressure on the dam that holds it in check. A sufficiently long period without the opportunity for consummation can sometimes lead to a "vacuum release" in which the organism simply goes off half-cocked, as it were, emitting the desired behavior in the absence of an appropriate stimulus. This can be seen in the sexual responses of male dogs, but also is observed, for instance, in the escape reactions of birds in the wild. My point is that at any instant an organism stands before a remarkable set of potential behaviors, while the form and composition of this set varies continually with time.

Why is behavior so complex?

But hold on. Let's put the issue of complexity to the side for a moment and return to McCulloch's original idea of heterarchy. Now, suppose John is trying to decide between three alternatives. Ordered in terms of his inclination to engage in them, let's say they include (1) satisfying himself with some appetitive behavior, (2) finding a solution for a troublesome moral dilemma that has come up at work, or (3) relaxing by reading a book. If he chooses the first of these he might, in the order of his usual preferences, (A) seek a sexual encounter, (B) eat something sweet, or (C) have a cup of coffee. If he chooses the second alternative he might, in the order of his usual preferences, (A) engage in moral reasoning to solve the problem, (B) respond to the dilemma in a way dictated by habit, or (C) act on impulse. If he chooses the third option, to read, let's say his first preference (A) is a recent novel by John Grisham, followed by (B) any novel by Michael Crichton, and lastly (C) to scare himself with a book by Steven King.

Now, if John follows his inclinations as expected he will choose to satisfy an appetitive urge, and the urge with the highest priority is be to seek sexual fulfillment. But the choice he makes in reality may be quite different, depending on his situation at the moment, and how recently he has experienced sex. He might elect to read a book, demonstrating that given the proper circumstances books can take precedence over sex! What is more, he might decide he needs to read something exciting for a slow day, and select the Steven King novel over his usual John Grisham. In each case the total situation has conspired to create a heterarchical loop in an apparently straight-forward hierarchical order.

Such heterarchical loops, and the hierarchies that give birth to them, are vital to understanding the degree to which behavior is governed by complexity. Whether John elects to read King or Grisham on a particular Saturday afternoon is not very important. But let's suppose he chooses to deal with the moral dilemma at the work. If he is an administrator his decisions might affect a large number of people, and set a policy that could last into the future. If he attacks the dilemma by moral reasoning then we can at least hope his level of moral thinking is high enough to lead him to an outcome that is just and equitable for all those whom it touches. But if on this Saturday afternoon John is fatigued and annoyed by something his wife said to him earlier in the day he might take the easy way out and respond to the dilemma according to his past habits. If he has made wise choices in the past this might squeak him through, but there is also an excellent chance that he will instead come up with yet another mindless administrative dictate that takes no account of the nuances of the situation. Or, on the other hand, he might just respond on impulse. Perhaps he is sensitive to the difficulties of the actual situation and a previous effort to apply moral reasoning has gotten him nowhere. Not wanting to be insensitive, he just does what feels right to him. This could be a catastrophe, but not necessarily. Impulse is often informed by intuition, which in its turn may be informed by feelings of care and compassion. It is said, for example, that during the domination of the Third Reich in Germany, if a Jew knocked on someone's door desperately seeking to hide from the SS, the homeowner's tendency to let him in was, as often as not, based on pure impulse. Many responded with compassion who, given time to reflect, might have chosen differently.

Now we come to an important point. There are theories of human cognition and a whole field of cognitive psychology that seeks to understand behavior in terms of mental processes. In similar fashion, psychologists spent most of the first half of the 20th century working out the principles of learning, and the implications of these for behavior. Likewise, ethologists, biologists, and others, have labored to understand behavior as biologically rooted motivational states, while growth theorists such as Abraham Maslow have emphasized motivational hierarchies inherent in human nature. What we see here is that none of these are privileged. A person may start out to solve a dilemma using moral reasoning, but failing to find a satisfying solution resort to habit, or just act on impulse. Indeed, perhaps the most telling criticism of psychological theories of moral development such as those of Laurence Kohlberg (1981) and Carol Gilligan (1993) is that people may give high level responses to moral dilemma questions and then turn right around and do the opposite. We all know this from day to day experience and have done it ourselves.

Neural and cognitive networks

McCulloch gave us a creative start on the problem of complexity and behavior with his concept of heterarchical nerve cell networks. The basic idea can be extended to a large number of neuronal circuits, but for a number of reasons it is unrealistic to do so. Not only does the situation become unwieldy to diagram, but unmanageable except in the most general terms for logic or mathematics. There is no need to proceed in this direction, however, as research since McCulloch's day has consistently failed to find evidence the types of neuronal circuits he proposed. What is more, by the mid 1980s the idea of the brain as a computational device was also failing to find physiological or anatomical support. Alternatively, contemporary neuroscience tends to view the brain in terms of distributed neural networks. These carry patterns of activity perhaps best understood as dynamical configurations that have important features in common with chaotic attractors (e.g., Freeman, 2000). Such systems can be

mapped topologically in terms of the size, shape, and the depth of their attractor basins.

Such patterns of activity can be understood as actual activity patterns in the brain, for which there is considerable evidence, or as cognitive and emotional patterns of the mind. Evidence for the latter is developed in several publications by the present author (Combs, 1993, 1996, 2002). Thus, a more realistic approach to understanding complex patterns of motivational states is to imagine them as separate but loosely connected attractors, either in the activity of the brain itself or of the processes of the mind (Figure 2). Each would represent a particular motivational state directed toward, say, eating sweets or reading John Grisham.

Jamesian neural networks

Interestingly, William James (1890/1981) envisioned the mental process as well as underlying neuronal events in a surprisingly similar manner. He conceptualized the conscious mind in terms of substantive and transitive "parts," the former referring to direct objects of attention or experience such as the taste of John's sweet or a moral principle at the immediate focal point of his thought. According the James, such objects of attention are surrounded and connected by transitive parts which include vaguely sensed "feelings of tendency" at the fringe of consciousness experience. These include imperative feelings such as "wait!" or "hark!" or "look!" and vague feelings such as a sense of correctness or incorrectness, threat, or anticipation. The substantive object of attention is "bathed" in them, and they give it subjective meaning. Transitive feelings are represented at the level of the brain by active neuronal circuits that form extended associative networks. These can combine by neurological summation to abruptly thrust a substantive object across the threshold of consciousness into direct attention. Thus, the substantive parts of consciousness typically appear full-blown and suddenly, unless one is a shrewd observer of the hard-to-see fringe processes.

James left most such speculation to "a physiology of the future" but now, a century later, we can appreciate his vision of neural networks and their relationship to the dynamics of mental life. Today we understand his objects of attention to be active attractor patterns with basins deep and wide enough to represent such an object as a center of gravity for the neural and mental life. Here, consistent with James' original thought, the transitory aspects of consciousness can be understood as mental and neuronal boundary conditions that constantly shape and re-shape attractor basins and link them together in associative webs. These supple shifting webs amount to a landscape of possibilities that is, in McCulloch's words, "unpredictable from any theory founded on a scale of values" (1945, p.45).

In Gregory Bateson's words to his fictional daughter,

> *They say what they hope will happen and then I tell them it won't happen because there are so many other things that might happen. And I know it is more likely that one of those many things will happen and not one of the few.*

Metalogue: *Why do things get in a muddle?* 1972, p.8

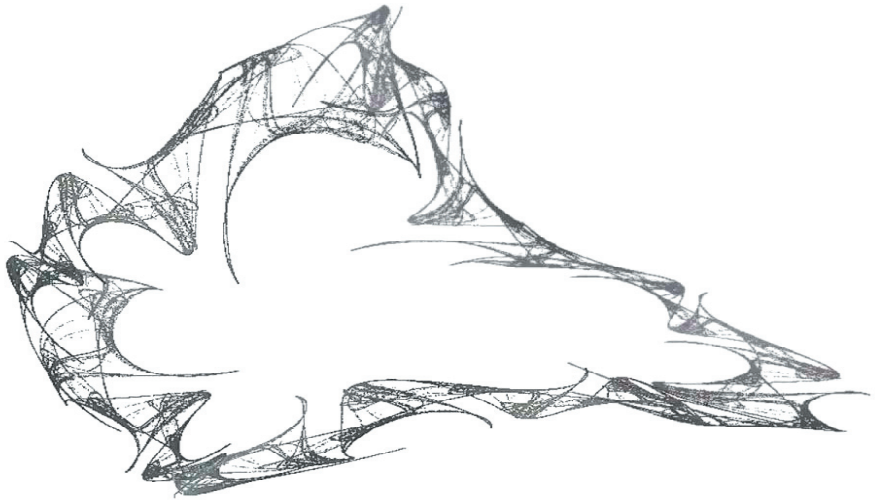

Figure 2. Example of a number of oosely connected chaotic attractors. With permission of J.C. Sprott.

1. This is apparent in any web search that cross-lists “heterarchy” with “management” or “business.”

2. In 1943 McCulloch had published a ground-breaking paper titled A Logical Calculus Immanent in Nervous Activity with the young mathematician Walter Pitts.

3. Though some prominent figures of the day, such as Norbert Wiener, were skeptical of conceptual schemes not grounded in actual physiological investigations of the brain. John von Neumann was supportive of the general notion of nerve cells as computer components, but believed they contributed to a computational process that was at least partially analogue.

4. This and several other lists given this article are not intended to follow any particular theoretical scheme, but simply are examples of behaviors that we all engage in.

5. One is reminded of the proverbial “Harvard Law of Behavior” which states if a rat is placed in an operant box and all the relevant conditions are diligently controlled; it will go off and do what it pleases!

6. During the 1940s and 1950s many theoretical problems in neurology were “solved” by postulating closed loop circuits in which neural activity folded back upon itself creating continuous loops of activity. Such circuits were said, for example, to be at the root of brain motivational centers as well as certain motor control operations. By the mid 1960’s, however, it was becoming all to apparent that what had been a good idea on paper was not to be found in meaningful numbers – or evidently at all – in real living organisms.

7. An alternative but equivalent conceptualization would be to imagine one large attractor with many basins.

References

Bandura, A. (1973). Aggression: A social learning analysis. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1977). Social learning theory. New York: General Learning Press.

Bateson, G. (1972). Steps to an ecology of mind. New York: Ballantine.

Beach, F.A. (1947). A review of physiological and psychological studies of sexual behavior in mammals. Physiological Review, 27, 240-307.

Bruner, J.S., Goodnow, J.J., & Austin, G.A. (1956). A study of thinking. New York: Wiley.

Cannon, W. (1915). Bodily changes in pain, hunger, fear, and rage. New York: Appleton.

Combs, A. (1993). The evolution of consciousness: A theory of historical and personal transformation. World Futures: The Journal of General Evolution, 38, 43-62.

Combs, A. (1996). Consciousness: Chaotic and strangely attractive. In W. Sulis & A. Combs (Eds.), Nonlinear dynamics in human behavior. London and Singapore: World Scientific.

Combs, A. (2002). The Radiance of being: Understanding the grand integral vision; Living the integral life; 2ed ed. St Paul, MN: Paragon House.

Freeman, W. (2001). Neurodynamics: An exploration in mesoscopic drain dynamics. New York: Springer.

Gilligan, C. (1993). In a different voice: Psychological theory and women’s development. Cambridge, MA: Harvard University Press.

Grossman, S.P. (1967). A textbook of physiological psychology. New York: John Wiley & Sons.

Hilgard, E. (1987). Psychology in America. New York: Harcourt Brace Jovanovich.

Hull, C.L. (1943). Principles of behavior: An introduction to behavior theory. New York: Appleton-Century-Crofts.

James, W. (1890/1981). The principles of psychology. Cambridge, MA:

Harvard University Press.

Koestler, A. (1978). Janus: A summing up. New York: Random House.

Kohlberg, L. (1981). Essays on moral development (Vol.1). San Francisco: Harper & Row.

Lashley, K.L. (1938). Experimental analysis of instinctive behavior. Psychological Review, 45, 445-471.

Lorenz, K. (1952). King Solomon's ring. New York: Thomas Y. Crowell.

Maslow, A. (1962). Toward a psychology of being. New York: Van Nostrand.

McCulloch, W.S. (1945). A heterarchy of values determined by the topology of nervous nets. Bulletin of Mathematical Biophysics, 7, 89-93.

McCulloch, W.S. (1943). A logical calculus of the ideas immanent in nervous activity. Bulletin of Mathematical Biophysics, 5, 115-133.

McDougall, W. (1908). An introduction to social psychology. London: Methuen.

Morgan, C.T., & Stellar, E. Physiological psychology. New York: McGraw-Hill.

Neisser, U. (1967). Cognitive psychology. New York: Appleton-Century-Crofts.

Koestler, A. (1979). Janus: A summing up. New York: Vintage.

Watson, J.B. (1919).). Psychology from the standpoint of a behaviorist. Philadelphia: Lippencott.

Reply to Bob Porter

Matthijs Koopmans

In the October 2005 issue of SCTPLS' Newsletter (NL), Robert Porter published an editorial, which expressed concerns about the integrity of the Newsletter editorship. Bob wrote the piece in response to events surrounding the publication of the work of the Constitutional Review Committee (CRC) this summer, and the possible publication of a rebuttal by our Society's Treasurer, Steve Guastello. (Neither piece ultimately appeared in the NL). Some time has now passed since the editorial appeared so I return to the discussion with reluctance. Since a reply is in order, here goes…

I dispute Bob's assertion of editorial independence, which, in my opinion, it reflects a misunderstanding of what the NL and its editor are for. The NL is not an independent newspaper or scholarly journal. The NL is primarily intended to allow the Society to communicate with the membership about Society business, announce conferences, publish calls for papers, book reviews and to celebrate our accomplishments in the field. In this context, the NL editor serves at the discretion of the Executive Committee (EC) of the Society, who is ultimately responsible to its members for the NL content. The EC therefore has the right to insist that certain pieces be printed, although it is of course regrettable that things came to that last summer.

The NL is our ticket to the outside world and a tool to recruit members. It is sent to the press, to prospective new members, and it is distributed at professional meetings of other scholarly organizations, all for the sake of strengthening our Society. Bob's editorial did not support any of these functions in a constructive way. In fact, by pursuing its own agenda without any regard for the detrimental impact on our ability to do these other things, Bob's editorial inadvertently illustrates why having an independent newsletter editors is a problematic.

A Report from the Field

The Human Systems Dynamics Institute

Glenda H. Eyolang

I started my chaos journey in December of 1989 when Chaos: Making a New Science (Gleick, 1988) helped me solve some really messy issues in my fledgling company. Since then I've studied, researched, taught, consulted, and written about the complex dynamics of human systems.

In the early days, SCTPLS and the Chaos Network formed a small cluster of kindred spirits. Each of us had our own special interests, but we also were curious about and respectful of the paths of others. We were building a shared inquiry in which our interactions established the emerging patterns of this new field of study and action.

Over time, though, our community grew larger. Differences among us took precedence. Our languages and methods diverged, so it became more difficult for us to engage in shared inquiry. Boundaries formed and splintered the field into qualitative/quantitative; academy/industry; community/organization; macrosystem/microsystem; simulation/reality. Though each of us continued to pursue our own questions, it became more difficult because we lacked the coherent community to support this difficult and embryonic work. Some of us saw a real possibility that the applications of nonlinear dynamics to human systems might dissipate into marginalized projects at the edges of traditional fields of study--relegated to the end of a dusty hall in a crumbling university departments.

In graduate school, I began to think of the field itself as a laboratory for complex adaptive systems. We were certainly a large number of relatively autonomous agents with the ability to interact in unpredictable ways, and system-wide patterns could emerge from our interactions over time. This framing established the question, "What conditions would encourage coherent patterns to form in this emerging field of research and practice?" Based on my research I concluded that we needed a boundary of some kind to contain the process of self-organizing, some way to clarify and negotiate differences that made a difference, and myriad opportunities to engage to make sense of the differences as they emerged.

Of course others had established groups to support systemic emergence in the field: SCTPLS, Plexus Institute, Chaos Network, and many others. Each had its own characteristic patterns and life cycle.

In 2003 we founded the Human Systems Dynamics Institute in an attempt to establish conditions and to study the process of complex adaptation that would follow. The plan was relatively simple.

1. Name the field—Human Systems Dynamics.

2. Define simple rules to articulate the differences that make a difference.

- Teach and learn in every interaction.
- Reinforce strengths of self and other.
- Search for the true and the useful.
- Give and get value for value.
- Attend to the part, the whole and the greater whole.
- Engage in joyful practice.

3. Provide opportunities for interaction in a variety of ways, including training, certification and membership network, publishing, consulting, and supporting research.

The mission of the HSD Institute is to facilitate the development of theory and practice in human systems dynamics—the emerging field at the intersection of complexity and social sciences. We are a virtual network of practitioners

and scholars who explore principles of nonlinear dynamics in the context of individuals, organizations, and communities.

Our network engages in action learning and research while providing practical consulting support to government, business, and industry. We address a wide range of practical and theoretical issues. Our Associates apply human systems dynamics in a variety of ways.

- Royce Holladay in Minneapolis works with educators to help them establish sustainable reform.
- Judy Tal and her team in Tel Aviv developed a game in which people simulate the formation of fractals to engage in deep dialogue.
- Margaret Hargreaves in Boston is completing her dissertation on applications of complexity to public health planning and health services to counteract health disparities.
- Cathy Perme in Minneapolis and Mallary Tytel in Hartford developed a problem solving game to help middle managers in an international financial services firm build capacity to deal with uncertainty and surprise.
- Leslie Patterson of the University of North Texas, brought a team together to analyze discourse related to the No Child Left Behind debate.
- Mary Dailey-Fisher, Brenda Fake, and Vicki Poehls developed an iterative and adaptive planning model for the water and waste water industry.
- Alejandra Tobar-Alatriz is working with young and culturally diverse activists to shape language and tools to leverage their work in complex adaptive systems.
- Lois Yellowthunder is leading projects to explore relationships between human systems dynamics and peacemaking.
- Katherine Barton and her team have developed and are distributing an easy-to-use protocol for Radical Inquiry to help practitioners structure and document their explorations of innovative approaches.
- In 2006, we will develop a training program to help others see and influence human systems in action, including an Introduction to Human Systems Dynamics (April 1 and 2 in St. Paul, Minnesota).

The experiment continues, but we have learned a great deal in our first two years.

- To be successful, the conditions for self-organizing in human systems must include an element of emotion and personal relationship. Ideas are not enough.
- Progress requires that we build structures to meet current needs and that we engage in creative destruction for structures that met needs of the past.
- Self-organizing may move slowly or quickly. The one constant is that the pace is unpredictable. The system itself determines the pace of its evolution.
- Establishing boundaries provides clarity to the emerging pattern, differences contribute passion, and exchanges provide a motive force. When any of these factors changes, the self-organizing process shifts direction.
- Differences within tend to become boundaries between unless we continue to focus on conversations that engage diverse perspectives across a wide range of contexts.

Each of these lessons shapes our individual and collective understanding of human systems dynamics and sets the conditions for future action. If you would like more information about the work of the Institute or to be included in our mailing list, please contact Julia Wolter at jwolter@hsdinstitute.org.

More information about the Institute is available from **www.hsdinstitute.org.**

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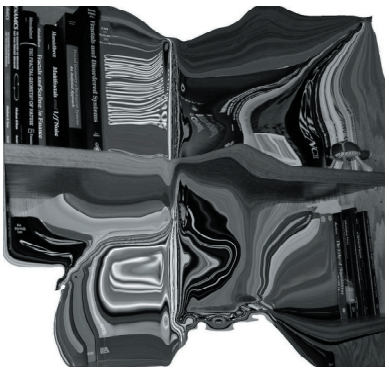
Glenda H. Eoyang, Ph.D.
Founding Executive Director



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.

Cooper, S. B. (2004). Computability theory. Chapman and Hall. ISBN 1-58488-237-9. It has a lot in it that relates to nonlinear dynamics, via such topics as coding, enumerability, incompleteness, P and NP, determinacy, and of course chaos and fractals. It is mathematics, but the author has an interest in what one might call sociohistorical contexts, and a light style. He is a mathematician at Leeds University in England. – RAMG.

Crowe, B. (2004). Music and soul making. Lanham, MD: The Scarecrow Press. Explores fascinating new avenues in music therapy, showing how music can touch people in a deep and healing way. This complex interaction between music and human emotion results in what Barbara Crowe calls soulmaking, the ability of music to heal and thus make us vital, whole, alive, and balanced. … She provides concrete examples 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 speaks to them all. – Publisher. "Deterministic chaos," "chaos theory," and "complexity science" are index terms in this book. The author proposes complexity science as a paradigm for this exposition. – SJG.

Dawkins. R. (2005). The ancestor's tale: A pilgrimage to the dawn of life. UK: Phoenix. 685 p. pb. ISBN 0 75381 996 1. It has had rave reviews, the Financial Times says it is 'One of the richest accounts of evolution ever written' and other reviews say it is for the lay reader. – RAMG.

Galison, P. (2003). Einstein's clocks, Poincare's maps: Empires of time. New York: W. W. Norton. "A unique and enlightening view on the origin of time as we know it in the modern age. Deftly weaving together discussions of physics, technology, philosophy, and politics, [Galison] constructs an account of the development of space-time physics in tight connection with the invention of the mechanisms of clock synchronization and time-zone division that we take for granted… Poincare became a key figure directing the effort to synchronize clocks by telegraphic signals throughout the French colonial dominions, which as also an essential part of the mapmaking process, because accurate times were necessary for accurate measurements of longitude." – H. Chang, review in American Scientist.

Gluck, K. A., & Pew, R. W. (2005). Modeling human behavior with integrated cognitive architectures: Comparison, evaluation, and validation. Mahwah, NJ: Lawrence Erlbaum Associates. This unique project, called the Agent-Based Modeling and Behavior Representation (AMBR) Model Comparison, involved a series of human performance model evaluations in which the processes and performance levels of computational cognitive models were compared to each other and to human operators performing the identical tasks. In addition to quantitative data comparing the performance of the models and real human performance, the book also presents a qualitatively oriented discussion of the practical and scientific considerations that arise in the course of attempting this kind of model development and validation effort.

Karwowski, W. (Ed. 2006). Handbook of standards and guidelines in ergonomics and human factors. Mahwah,

NJ: Lawrence Erlbaum Associates. Although governmental standards can be considered "linear with a venegence," this pragmatic and comprehensive contribution was produced by an SCTPLS member.

McGuire, D., Batty, M., & Goodchild, M. (Eds., 2005). GIS, spatial analysis, and modeling. ESRI Press. Topics and chapters: Assessing the Uncertainty Resulting from Geoprocessing Operations; Spatial Statistical Modeling in a GIS Environment; Linking General-Purpose Dynamic Simulation Models with GIS; Dynamic, Geospatial Landscape Modeling and Simulation; Urban Growth Using Cellular Automata Models; A Data Model to Represent Plans and Regulations in Urban Simulation Models; Urban Land-Use Transportation Models; Retail and Service Location Planning; Simulating Spatially Explicit Networks for Dispersion of Infectious Diseases; The Use of GIS in Transport Modeling; The Integration of Case-Based Reasoning and GIS in a Planning Support System; Hydrologic Modeling; Environmental Modeling with PCRaster; Transition Potential Modeling for Land Cover Change; Modeling the Interaction Between Humans and Animals in Multiple-Use Forests: A Case Study of Panthera Tigris. Integration of Geographic Information Systems and Agent-Based Models of Land Use: Prospects and Challenges; Generating Prescribed Patterns in Landscape Models; GIS, Spatial Analysis, and Modeling: Current Status and Future Prospects.

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 20th century and the most consistently challenging artistic force in Eastern Europe today. The acronym refers to Neue Slowenishche Kunst, a Slovene collective that emerged in the wake of Tito's death and was shaped by the breakup of Yugoslavia. … 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.

Turchin, P. (2003). Historical dynamics: Why states rise and fall. Princeton, NJ: Princeton University Press. Natural scientists have made great strides in understanding dynamical processes in the physical and biological worlds using a synthetic approach that combines mathematical modeling with statistical analyses. This book shows that a similar research program can advance our understanding of dynamical processes in history. -- Publisher.

Whelan, S. (Ed., 2005). Handbook of group research and practice. Thousand Oaks, CA: Sage. This book is largely about what its title suggests – group dynamics in social, organizational, or clinical contexts. Three nonlinear chapters are of interest, however: "Chaos, complexity, and catastrophe: the nonlinear dynamics perspective" by Holly Arrow is one of seven chapters on perspectives; "Nonlinear methods for the social sciences" by Stephen Guastello is largely about statistical approaches to testing hypotheses about dynamics; and "Social life in silico: The science of artificial societies" by Damon M. Centola and Michael W. Macy is a synopsis of what can be done with agent-based modeling.

Zhang, W-B. (2005). Differential equations, bifurcations, and chaos in economics. Singapore: World Scientific. ISBN: 9812563334. From the Series on Advances in Mathematics for Applied Sciences, and Advances in Mathematics for Applied Sciences. New book by SCTPLS author.

NDPLS Citation Report 2005

Stephen Guastello & Meghan Doyle, Marquette University

Impact and Immediacy factors are now available for NDPLS current through December 2004. We compiled Impact and Immediacy Factors based on information available in ISI's Web of Science. Journal Citation Report produces Immediacy and Impact factors for the Science edition journals (4500 journals), but not for the Social Sciences Citation Index (1400 journals). Our manual computation of the two factors is based on SSCI citations should be compared with values for journals that are listed in the JCR. It appears that some prominent psychology journals are listed in both indices. The results for NDPLS are encouraging once again.

Impact Factor – This is the number of citations of NDPLS articles over a 5-year period divided by the number of articles published during that period. This year we made a procedural change in our computation of the Impact Factor to maintain consistency with ISI's computational method. This year we counted the citations to NDPLS articles that were published in 1999-2003 that appeared in articles that were published in 2000-2004. NDPLS published 91 articles from 1999-2003. We found 127 citations of NDPLS articles in SSCI journals during the SSCI reporting period 2000-2004. We also found 46 citations to the 91 NDPLS articles in NDPLS 2000-2004. The total of 173 citations divided by 91 articles produces a current Impact Factor of 1.90.
The Impact Factor should be interpreted as meaning that, on the average, an NDPLS article can expect 1.90 citations in qualifying venues within five years of its publication. An important caveat, however, is that there is a strong power law distribution associated with citation levels throughout the scientific literature, and not a normal distribution. It is also noteworthy that the current Impact Factor does not reflect citations to NDPLS articles that were originally published before 1999. It is ISI's thinking that the vast majority of citations that are ascribed to any one article appear within the first five years of publication. It is also well-known that "classic" articles exist that continue to garner citations well beyond five years. Several articles from the first two years of NDPLS continue to receive recognition in other journals.

Immediacy Factor – This is the number of citations of NDPLS articles within one year of the date of publication of each article. In other words, citations for 1999 articles that would count for this index would have had to be published in 1999 or 2000, and could possibly include citations to an NDPLS article in press insofar as that information could be ascertained from the data base.

For articles published in 1999-03, there were 60 qualifying citations in the ISI-SSCI data base, with citations to 2003 articles that appeared through the end of 2004. There were 12 additional citations within NDPLS for NDPLS articles. The total of 72 citations divided by 91 articles renders an Immediacy Factor of 0.79. The Immediacy Factor should be interpreted as meaning that, on the average, an NDPLS article can expect 0.79 citations in qualifying venues within one year of its publication. The caveat concerning power law distributions applies here as well. Neither of the foregoing indices includes citations in other social science journals that are not counted in SSCI, nor does it include citations in books or in journals outside the social sciences that might otherwise be included in JCR.

Most frequency cited articles – For the benefit of those who are interested in who is reading and citing what material where, a short list of frequency cited articles appears below. Specifically, these five articles were published during the 1999-03 period and received the largest (6 or more) number of citations outside of NDPLS during the 2000-04 period.

Farrar, W. T. IV, & Van Orden, G. (2001). *Errors as multistable response options.* NDPLS, 5, 223-266.

Heath, R. A. (2002). *Can people predict chaotic sequences?* NDPLS, 6, 37-54.

Lange, R., & Houran, J. (2000). *Modeling Maher's attribution theory of delusions as a cusp catastrophe.* NDPLS, 4, 235-254.

Marks-Tarlow, T. (1999). *The self as a dynamical system.* NDPLS, 3, 311-346.

Medvinsky, A. B., Tikhonov, D. A., Enderlein, J., & Malchow, H. (2000). *Fish and plankton interplay determines both plankton spatio-temporal pattern formation and fish school walks: A*

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