Society for Chaos Theory in Psychology & Life Sciences

NEWSLETTER

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An Invitation to

INSC 2012

5[TH] INTERNATIONAL NONLINEAR SCIENCE CONFERENCE

University of Barcelona

Barcelona, Spain, March 15-17, 2012

Deadline for early bird registration: *February 1, 2012*

Additional charges apply after this date

http://www.societyforchaostheory.org/insc/2012/

Beautiful Barcelona...

Gaudi's *Sagrada Familia*

Gaudi's *Casa Batllo'*, now a Museum

University of Barcelona, Faculty of Psychology, venue of the 5th INSC.

A Showcase of Nonlinear Science

The International Nonlinear Science Conference (INSC), which is sponsored by SCTPLS in conjunction with a featured university, is the ideal venue for presenting original work applying nonlinear dynamics and related concepts to psychology and the life sciences. For 21 years, the Society and its conferences have been founded in the principles of interdisciplinary work, acknowledging the ubiquity of nonlinear dynamics across the behavioral, social, and life sciences. The conference is typically intimate in size with around 60-70 attendees representing psychology, biology, economics, business, physics, mathematics, and other scholars organized around a common interest in nonlinear dynamics. Attendance is typically broad geographically as well, with membership in SCTPLS representing each of the global continents. The program includes prominent keynote speakers, cutting-edge pre-conference workshops, symposia, individual sessions, and posters presentations.

Our keynote speakers for 2012 are:

Peter Allen
Complex Systems Research, Cranfield School of Management, UK
Complexity, Understanding and Evolution

Albert Diaz-Guilera
Professor at Departament de Física Fonamental, University of Barcelona SPAIN
Networks of Networks

David Pincus, Ph.D.
Associate Professor of Psychology, Chapman University, Orange, CA
Complex Biopsychosocial Dynamics, Behavioral Medicine, and Psychotherapy

Jorge Wagensberg Director,
Science Museum of Barcelona
Barcelona, Spain
Individuals versus individualities: A Darwinian Approach

We are anticipating a large complement of original research from worldwide sources on applications of nonlinear dynamics to biomedical science, psychology, management and social policy, and economics. The schedule of speakers will follow soon.

Visit the conference web site: [www.societyforchaostheory.org/insc/2012]

For more information about our keynote speakers, hotel choices, conference registration, and local logist

PRESIDENT'S STATEMENT January, 2012

David Pincus
President SCTPLS

Winter here in sunny Southern California is short, and the warmth and light of spring are already creeping in. I expect that for those of you who attended the 20th Anniversary Conference here in Orange this past summer, the warmth of this experience is still with you. The growing networks of ideas, new relationships, and new projects for the coming year were the clear theme to emerge out of this important celebratory conference.

And as we start rolling through 2012, it is time to begin to harvest those seeds that we planted in the summer of 2011. From the West Coast of the United States, SCTPLS will be traveling this spring to the University of Barcelona in beautiful coastal city of Barcelona Spain, for our 5th International Science Conference (INSC). Next, we will make a summer-time bounce to the East Coast for our 22nd Annual Conference at Johns Hopkins University in Baltimore, MD. From the Pacific and Atlantic coasts of the United States and Western Europe, we turn our attention to the bottom of the planet, where our new membership committee is involved in networking, in person and through social media, filling the gap down under for those who are looking to understand psychology and the life sciences as they truly occur in nature, without twisting them into normal distributions or the narrow confines of linear cause and effect. And ever-present, our journal, web-site and other publications continue to serve as hubs of information flow, binding us together in a manner that allows us each to flourish in our own ways. From all points across our planet, we – a community of scholars – work collectively day by day to better understand the natural world as it unfolds within and around us. And all of this we will simply refer to as "2012."

In the coming year, it is my hope that your society will support you, and us, together in this important work to come.
Sincerely,
David Pincus, SCTPLS President

Membership Committee Report January, 2012

The annual conference held in Orange this past summer saw the emergence of a newly vamped membership committee. Many of us experienced the same single phenomena of not having much awareness about NDS theories, or complexity science in general. Our curiosity allowed us to meet together and self-organization branched out to different continents to open up new horizons for our organization. A newly aligned membership committee is dedicated to building awareness of our society, providing resources for connection, and above all, a place to meet and network with those with common interests. On a global level, we have all shared many different experiences, heard the different needs of members and non-members, and experimented with new and creative ways to increase membership.

Committee member Victoria Gaetan teamed with Dr. Mickie Vanhoy to tackle the United States, and reach out to even more members who may not be aware of our organization. Gaetan shared her experience of running into challenges about the popularity of NDS. At the University of Central Oklahoma, "Psyence Friday's" have increased popularity of NDS theories by presenting and educating the general public about current research within the field. Furthermore, Gaetan found that continuous presentations on NDS theories really allowed for students to gain a broader perspective, and debate between traditional cognitive models of psychology vs. nonlinear dynamics. The USA team is working hard to get the work out by presenting at various conferences such as the one held by the Oklahoma Psychological Society.

Australia has begun to see some NDS action, and in full force for that matter. Caroline Fielden really took charge in Australia to help spread the word about SCTPLS. The passion driven behind this marketing was quite simple, Fielden was looking to increase awareness of methodologies that she has been using, and to find likeminded people with whom to share and gain information. In Fielden's experience, isolation was what she felt. She believes that psychological research needs to embrace more nonlinear approaches. Because of this, Fielden has created a Facebook group for Australian members to find a safe haven in which likeminded and curious individuals can check out what is going on. This group addition on Facebook allows for people to organize events, and plan fun outings just to discuss chaotic ideas (the type of chaos we like of course). She shared that just speaking about her interests and sharing topics within NDS helped sparked interest in others.

On the other side of the world, Spain is the first European country to see full effects of the new marketing efforts. Shana Narayan was recently introduced to Nonlinear Dynamics, and the more she learned about its applications, the more she became a believer. In Spain, Narayan worked closely with Dr. Jose Navarro and colleague Miquel Nadal to start giving "the talk" on complexity science, chaos theory, and just about anything concerning nonlinear dynamics.

Narayan's main focus is to reach out to students, and to increase student membership because she finds that this theory is not given as much credit as it should, and by reaching out to other students new ideas are sure to emerge and self-organize. The Spain team for membership devised a mini group activity to mimic Guastello's *Leadership Emergence* (2007) followed by a presentation of the basics of NDS. You could call it an introductory presentation to spark awareness. Access to a real classroom setting really allowed a personal interaction, and to clear up misunderstandings or ask for clarification for the students. It also engaged members to see NDS working in real time setting, and understanding it while it occurred.

Although we're all functioning on different corners of the world, two things are very evident: first, nonlinear dynamics is still not as popular as traditional linear approaches, and second, the more we spread the word, the more interested potential members we find. The first step begins with us. To share our passion and interests, and just to talk about what we know, what we've learned, and what we're doing. We can clearly see the results of simple forces organizing mini presentations, or reaching out and organizing groups of people through social media. These little steps are making the global visions of SCTPLS more attainable. The newly revised membership committee is committed to spreading the word, providing resources, and pulling likeminded or curious people together just to increase the awareness of complexity science. We are dedicated to building this organization, to introducing new methods of networking, and being a team of voices for nonlinear dynamics diehards all over the world. Regardless of your location, contact your local continental support to bring SCTPLS to a neighborhood near you.

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Feature Article

Self-Complexity and the Interpretation of Entropy and Information Statistics

Stephen J. Guastello, Marquette University

Abstract

Linville's theory concerning the complexity of the psychological self relies of concepts of information measurement to produce its core measurement of complexity, which is in turn thought to be positively correlated with indicators of psychological well-being. Empirical research, however, has not supported this assertion as it was initially intended. Research on complex adaptive systems, however, shows that self-organized systems generally display mid-range values, whereas low-range values denote stereotypic, rigid, and possibly maladaptive behavior. High-range values, furthermore, tend to reflect disordered systems that could be maladaptive for other reasons. As a result, the linear correlations between metrics of complexity of the self and psychological well-being that pervade the empirical research are not appropriate. The substantive theory of self-complexity, however, is not inconsistent with expectations from complex adaptive systems, and recommendations are given here to improve the data analysis and interpretation of empirical results currently on record.

Entropy and Complexity

Concepts and metrics for information and entropy were introduced to psychology several decades ago (Attneave, 1959; Quastler 1955). They have encountered a resurgence of interest, however, in conjunction with developments in nonlinear dynamical system (NDS) theory and its applications (Guastello & Gregson, 2011; Guastello, Koopmans, & Pincus, 2009). A search of the PsycINFO database produced 56 journal articles published in English during the inclusive dates 2002-2010 that were indexed under both keywords "entropy" and "nonlinear," of which 50 percent were published in 2008-2010. There were 564 total references in all languages indexed under "entropy" (only) during the same nine-year period. Of particular concern here is the information statistic H that is central to research on the complexity of the self (Linville, 1987), the predictions from which often run contrary to theoretical expectations as researchers have seen them (Rafaeli-Mor & Steinberg, 2002). The objective of this article is to clarify how the non-supporting results could arise from questionable uses or interpretations of the entropy statistic, and not necessarily from the substantive theory being fundamentally wrong.

The first section of this article explains the construct of entropy in conjunction with recent developments in NDS theory. The second section unpacks the issues connected to the theory of self-complexity. The third offers some suggestions that could be useful for reclaiming and reinterpreting a large amount of data related to the theory.

The concept of entropy went through several incarnations over the last 150 years. Its first meaning was *heat loss* or *unavailable energy*, given conditions of temperature and pressure (Ben-Naim, 2008). Its second meaning arose in conjunction with statistical mechanics where it referred to the unpredictability of the location of molecules in a container. This paradigm characterized entropy as being one of *order versus disorder*.

Shannon (1948) broke the entropy concept into two parts, information and entropy, and thus generated the third epoch of meaning. *Information* is what we have available to predict the behavior of a system. *Entropy* is the movement of the system that is not accounted for by the information. For a multichotomous outcome involving N equiprobable states, N-1 bits are needed. If a system were truly random and produced an infinitely long string of observations, one would require as many bits of information to determine the series as there were original data points.

The computations assume that unequal prior probabilities of system states are the norm, however. The Shannon entropy (H_s) for the set of categories, S, with probabilities of occurrence p_i, is:

$$H_s = \Sigma_i \left[p_i \log_2(1/p_i)\right] \qquad (1)$$

Information, I, is calculated the same way as H_s, and the two entities add up to H_{max} which is in turn a function of the number of possible states:

$$H_{max} = H_s + I = \log_2 S. \qquad (2)$$

Although the relationship is straightforward, H_{max}, can be more elusive than appearances indicate. For some problems, there would be states that are theoretically possible but never actually occur within the set of observations; such states become for all intents and purposes non-existent.

It is important to note that information in this context is a *quantity*, and does not reflect the substance of information that is conveyed. For instance it is possible to transcribe a conversation among several people, apply a coding scheme to categorize the utterances, and calculate information and entropy statistics on the categories of utterances. Then if one were to analyze the same conversation according to a different protocol of categories, one could obtain different indices of entropy and information (Guastello, 2000). Neither set of numbers would be wrong necessarily, but they are relative to the lens or filtering process one applies to the data (Gregson, 2006). Of course, one can design a study that would permit the comparison of the efficacies of different category coding schemes, but that is another matter beyond the scope of this article.

The H statistic that is prominent in self-complexity research is the difference between H_{max} and the information function:

$$H = \log_2 n - [\Sigma_i(n_i \log_2 n_i)]/n, \qquad (3)$$

where n is the number of objects or features to be categorized, n_i is the number of features within a category i (Linville, 1987, p. 666). It is calculated for each individual's data set in the study, and thus H_{max} is a different value for each individual.

The fourth generation of entropy constructs is more germane to time series analysis and originated in NDS theory. In this version, entropy *is* information and is *generated by* a system as it changes state over time. Although the morass of theoretical connections is beyond the scope of this article, it is noteworthy that Shannon entropy is now a member of a family of constructs that includes cross-entropy, mutual entropy, approximate entropy, sample entropy, Kolmogorov-Sinai entropy, Kullback-Leibler entropy, diffusion entropy, topological entropy, the Lyapunov exponent, and the fractal dimension (Guastello & Gregson, 2011). It is possible to transform the Lyapunov exponent, which is a measure of turbulence in a time series to a fractal dimension under limiting conditions. It is also possible, furthermore, to convert the Shannon information function to an *information dimension*, which becomes a fractal dimension under limiting conditions (Sprott, 2003), but the computation is only relevant for time series analysis where a metric is discretized into states that are defined as gradually decreasing widths of an interval.

The connections between information, entropy, complexity, and the fractal dimension are important, nonetheless, for interpreting the meaning of H or its variants with respect to the functionality of a complex adaptive system. The idea of complexity in NDS was introduced to describe situations where there are potentially thousands of agents in a social system who interact according to rules that are programmable. It is not practical to calculate the results of those myriad interactions by calculating iterations of each possible dyadic interaction individually, so agent-based modeling programs were developed to generate agents, let them interact accordingly to user-supplied rules, and then show a picture of the results. The results often illustrate conditions where stability occurs and the relative number of final states. The final array of states *emerges*, to use another popular word; emergence is, in essence a self-organized process (Goldstein 2002; Guastello & Liebovitch, 2009; Holland, 1995; Sawyer, 2005).

A complex adaptive system (CAS) is a living system that displays order and disorder strategically (Waldrop, 1992). Although the system might have self-organized its resources to engage in a strategy for survival, it is ready to adapt to new environmental or internal stimuli on short notice. When it adapts, it reorganizes its communication, feedback, or work flow patterns to respond to the new situation and engage in a pertinent response. The perceptual, cognitive, and psychomotor parts of the CAS interact with each other, shape each other, exchange information, and are not replaceable or removable without fundamentally altering the dynamics of the system as a whole. Attempts to correct "flaws" or change a part of a CAS often do not succeed because the parts adapt in such a way as to protect the system from intrusions from outside the system (Dooley, 1997; Guastello, 2009).

Another perspective on complexity is tied to the number of dimensions associated with the time series of events produced by the system. Here the fractal dimension and the Lyapunov exponent can be used to describe the complexity of a system. The frequency distributions of dependent measures or states conform to power law distributions, and the fractal dimensions can be determined by calculating the shape parameter of the power law distribution (Bak, 1996; Guastello & Gregson, 2011).

Greater levels of dimensionality, turbulence, or entropy are associated with healthier and more adaptive CASs, and less entropy with rigidity or stereotypic behavior. Dimensions associated with self-organized systems' behavior generally range between 1.0 and 2.0. Systems that are more aggressively exploring new states display dimensions between 2.0 and 3.0. Chaotic systems often display dimensions greater than 3.0 (There are some well-studied chaotic systems with fractal dimensions that are only slightly greater than 2.0, however). Dimensions of 1.0 are associated with perfect oscillators. As the dimension declines from 1.0 to 0.0, the system is gravitating to a fixed point.

Ashby's (1956) law of requisite variety is applicable here. For the effective control of a system, which in this context is the environment in which our CAS is living, the complexity of the controller must be at least equal to the complexity of the system that is being controlled. Complexity in this context refers to the number of discrete system states, although in NDS research complexity is often discerned by calculating a Lyapunov exponent or fractal dimension on a continuous variable observed in time series. Ultimately, there are limits to the amount of complexity that ensures survival. Excess complexity could result in wasted energy or loss of time when responding to events. One would be unlikely to observe full-blown chaos in work group performance or organizational strategies unless the group or organization is deliberately trying to put a competitor or adversary off-guard (Dooley, 2004; Guastello, 2009, 2010). By the same token "chaos" is a deterministic process.

In mental health, Tschacher, Scheier, and Grawe (1998) showed that psychotherapy had the effect of reducing the complexity of mental or emotional states from relatively disorganized into ones that were more organized. The *reduction* in complexity was associated with an improved subjective sense of well-being. Self-organized ordering has been observed in other mental health events (Pincus, 2009; Pincus & Metten, 2010), and general medicine (Burton, Heath, Weller, & Sharpe, 2009; Sturmberg & Martin, 2010).

The principle of optimal variability or optimal complexity has become prominent in physical rehabilitation (Harbourne, Deffeyes, Kyvelidou & Stergiou, 2009; Harbourne & Stergiou, 2009; Katsavelis, Mukherjee, Decker, & Stergiou, 2010a, 2010b; Kurz, Markopoulous, & Stergiou, 2010; Stergiou, Harbourne, & Cavanaugh, 2006). Some impairments to walking, for instance, can produce overly rigid and inflexible movement, while other impairments can produce very disrupted movements. When we execute a repeated and well-rehearsed action, we do not perform the action exactly the same way each time, although the performance goal might be accomplished equally well each time. The residual variability in the movement execution serves the purpose of permitting some adaptation to situational nuances. Although expert musicians and athletes can give the appearance of performing the action exactly the same way each time it is performed, that is often only an appearance that they maintain by making any of a number of subtle internal adjustments. Too much variability makes the action noisy or unstable. For coordinated movements, if one movement goes too far out of the normal bounds, the reciprocal action cannot respond extremely enough to regain the performance goal. For instance, most people who have slipped on the ice have had the experience of regaining their balance before falling sometimes, and sometimes they were not so successful.

A similar principle of disrupted coordinated movement is thought to be operating in human groups performing coordinated tasks. Emergency response teams, for instance, need to maintain the balance between a well-rehearsed plan and a high level of adaptability to unforeseen events, especially if the environment is producing changes in situations at a chaotic level of complexity and high rate of speed (Guastello, 2010). The next question is thus whether the same principle of optimal complexity could apply to human social interactions more generally, hence the interest in the construct of the self and the complexity of its composition.

Self-complexity

The concept of complexity in the self structure has an extensive history (Marks-Tarlow, 1999; Rafaeli-Mor & Steinberg, 2002). Several ideas from Linville (1987) concern us here: Self structures that are more complex are expected to be more adaptive to stresses and challenges, whereas rigid or overly simplistic structures would be less adaptive and more negatively affected by the same stresses challenges. The healthier self structures would also display less overlap (greater differentiation) among the parts, than less resilient systems; events that could impact on one aspect of the self would spill over less onto other aspects of the self. Note here that the operating hypothesis was unidirectional such that greater complexity is thought to be better than less, and there was no clear recognition of the principle that too much complexity could be a problem, albeit of a different sort.

Linville's experimental procedure required participants to read a stack of index cards that showed self-concept ideas and then sort them into categories with appropriate instructions for rendering their own self structures in the categories. The categories typically involved life domains such as work, family, and socializing with friends. Participants could make as many categories as they felt were necessary to accommodate all the cards. Participants varied in the number of categories they used, and the distributions of cards into categories were unequal. Equation 3 was computed using each participant's categorization; it rendered the differing numbers of states and distributions into a single number that could be used to compare in a relatively standard experimental design and analysis.

Although there was copious subsequent research that supported the core hypotheses, there were many examples of contrary results. The meta-analysis of 70 studies showed a generalized correlation of -.04 (Rafaeli-Mor & Steinberg, 2002), meaning that the long-run relationship between self-complexity and well-being was near-zero and slightly in the wrong direction compared to what was hypothesized. The discussion of results examined possible limitations in the substantive theory the self-complexity and whether the H statistic was an appropriate metric. The latter issue is the central concern here. Rafaeli-Mor and Steinberg correctly pointed out that H reaches a maximum when the system is random. They noted that H did not capture the principle of overlap, and Luo, Watkins and Lam (2008) introduced a metric that apparently did so by using the assumption that the parts of the self system were hierarchically organized. Although the notion of a hierarchically organized self system could have some merit in its own right, NDS theory offers some very different interpretations of what to do about the problem with research methodology, however, which are elaborated next.

Reinterpretations from NDS

The research on dimensionality and self-organized systems indicates that there is an optimal level of complexity for a system to operate effectively, and that self-organized systems reflect a level of complexity that denotes a balance between order and disorder. People perceive, interpret, and process social information in order to reduce the uncertainty of social events and thus make predictions about what other people will say and do and make appropriate responses themselves. Therefore it would be beneficial to have a broader understanding of human nature, rather than a narrow set of interpretive schemata. Just as importantly, people are naturally more comfortable with a view of themselves that is stable and predictable. Hence we the self-consistency principle and the empirical evidence that people state their attitudes to be consistent with their behaviors rather than the other way around; this finding troubled psychologists, who wanted to predict behavior based on attitude information, for a few decades. One can only imagine the tenability of a life where a person becomes somebody different every morning when he wakes up based on a roll of the dice.

A broader repertoire of responses (possible behavioral states), is also adaptive. The opposite situation of too-broad a repertoire has not been fathomed yet in psychological research, but some likely outcomes might a dissipation of the skills that have fallen into disuse, motivation for a career change that permits the exercise of a broader repertoire, and possibly some confusion when confronted with critical decisions where the individual sees too many viable options to decide exactly which one to pick. The latter case might induce a criticism that the individual does not have enough "focus" to accomplish a particular mission.

Thus it follows that the relationships between entropy and behaviors that signify well-being are curvilinear. The linear correlation would be useful only in limited circumstances: For research subjects that range from the rigid and insufficiently complex form of dysfunction to healthy and adaptive, a positive correlation would be expected. For research subjects that range from healthy and adaptive to the disorganized form of dysfunction, a negative correlation would be expected. It is possible that a single clinical research sample is not likely to produce equal numbers of dysfunctions at both ends of the spectrum, so the deficit would not have been easily apparent.

The first recommendation, therefore, is for those who have the data available to re-analyze it for curvilinear effects. If one were to treat the *r* values used by Rafaeli-Mor and Steinberg in their meta-analysis as absolute values, the weighted average would become .15, and the unweighted average would be .18. This is to say that positive and negative could support the optimal variability hypothesis with the understanding that some clinical sources would be unhealthy because of their rigidity (entropy too low), whereas other afflictions would be unhealthy because they were too disordered. These estimates based on absolute values are more promising, but should be taken with some reservation because: (a) the near-zero correlations could be indicative of no relationship, which was assumed in the re-analysis, or it could be the result of a good curvilinear effect; and (b) The H_{max} index could still use some work, which leads to the next two recommendations.

The second recommendation concerns the relationship between entropy and information in the Shannon computational model. As mentioned earlier, there was a shift in thinking from information being what we need to know to predict the behavior of the system to information being what is generated by the system. This change in thinking, albeit annoying and confusing in some respects, leads to two principles: (a) Entropy and information are the same computation for all intents and purposes. (b) No one knows what the true H_{max} of the human self system really is, but it is unlikely that anyone would be as random (schizoid?) as Eq. 3 would permit. The second recommendation, therefore is to drop the prefix $\log_2(S)$ from Eq. 3 and just use the information function in the remaining part of the equation, or Eq. 1.

The third recommendation is another suggested alternative to *H*. Tschacher et al. (1998) noted the impossibility of defining H_{max} for their research problem and instead preferred a computation that reflected the balance between order and disorder:

$$\Omega = 1 - (H_s / \Pi s_i^2), \qquad (4)$$

where H_s is defined as before. The denominator is potential entropy (or information) and defined as cross-product of the variances (s_i^2) of all states, or $p(1 - p)$. · was first introduced by Banerjee, Sibbald, and Maze (1990). It does not have an extensive history in psychological research, but could be worth the effort to explore it further in a context such as this one. A curvilinear relationship between · and outcomes associated with well-being would also be expected in the long run.

The fourth recommendation concerns the issue of overlap in a high-functioning self system. Although it is true that *H* does not measure any overlap, the problem takes care of itself now that the relationship between dimensional complexity and the behavior of self-organized complex adaptive systems has been clarified. Self-organization by definition involves a modicum of overlap in the form of communication links among its contributing components (Haken, 1988). Thus the recommendation is not to worry about it for the time being. This recommendation is not meant to preclude exploration into new indices of overlap; network theory, which is another developing facet of complex systems theory, could indeed make some useful contributions here eventually. It is important not to lose sight of the main principle here, however, that complex adaptive systems exhibit a middle range of complexity. The optimal level of complexity will depend on demands, which can be broadly defined as life in general or more narrowly defined for a specific range of situations.

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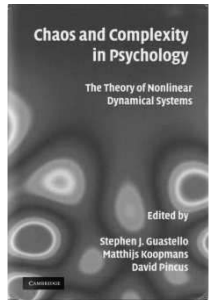


Chaos and Complexity in Psychology: Theory of Nonlinear Dynamical Systems (Edited by S. J. Guastello, M. Koopmans, & D. Pincus, Cambridge University Press, 2009). An introduction to most major accomplishments in nonlinear psychology: Introduction and basic principles of nonlinear dynamics, collective intelligence, neurodynamics, psychophysics, sensation and perception, cognition, developmental psychology, psychopathology, psychotherapy, individual social psychology, group dynamics, organizational behavior, social networks. **Order from Cambridge University Press**. www.cambridge.org

European Conference on Complex Systems 2011 (ECCS'11) Report

A Report from *Kyle Findlay*

The annual European Conference on Complex Systems (ECCS) took place this year from the 12-16 September 2011 in Vienna, Austria (*Website: http://www.eccs2011.eu)*. I was lucky enough to make the five day conference held at the University of Vienna. The classic surrounds of Vienna, home at some stage to scientific greats like Sigmund Freud and Kurt Gödel, leant the entire event an air of sophistication and old-world charm.

Attendees were treated to five full days of stimulating lectures and workshops relating to complex systems in their various guises. As members of the SCTPLS well know, complex systems come in many, many forms, and most of them were represented at some point during the conference. Indeed, with over 700 attendees, and dozens of talks (and hundreds of posters), the conference was intuitively split up into several general streams, including *Foundations* (e.g. physics, complex networks, information theory, etc.), *Life* (e.g. gene-regulatory networks, protein folding, etc.), *Populations* (e.g. predator-prey, animal and human populations, game theory, etc.), *Policy* (e.g. urban planning, politics, etc.), *Society* (e.g. social networks, idea spreading, crowd behaviour, traffic, etc.) and *Computer Science* (e.g. robotics, control, data integration, etc.).

The first two days (Monday and Tuesday) and the last day (Friday) consisted of lectures split up into these streams as well as keynotes by well-known researchers like Murray Gell-Mann, Geoff West and Robert Devaney.

Gell-Mann opened the conference with a talk entitled "Generalized entropies", which focused on the generalization of entropy formulations for numerous potential applications in superstatistics. To be honest, the technicalities were beyond this humble chronicler who felt far more at home in the realm of network theory and related social research topics. Gell-Mann collaborator, Constantin Tsallis continued Gell-Mann's them with his keynote talk entitled "Statistical mechanics for non-ergodic systems: An overview". Coupled with the Foundations stream (and similar), researchers interested in these topics had much to keep them occupied.

Of greater familiarity to me was Geoff West's talk on scaling in biology, cities and businesses. West has done a wonderful job over the years of describing and popularizing the universal scaling patterns that we see in both natural and man-made systems. I was a bit disappointed to see that he covered the same research that he has been working on at least since I became familiar with it in 2007. However, it is truly interesting research that continues to gain supporting evidence and momentum with time. Most of his talk focused on the distinction between sub-linear scaling (natural systems which exhibit economies of scale with growth) versus supra-linear scaling (mostly social systems which experience open-ended growth and are prone to crashes). West highlighted a fascinating and clear line of research that has some potentially depressing implications for society: most of our social and economic systems require continuous growth; however, these systems are prone to crashes. To avoid them collapsing permanently, we need to continually innovate to stay ahead of the curve. However, such paradigm-shifting innovations need to keep coming at a faster and faster rate in order to keep up with unbounded growth. What happens as we asymptotically approach an innovation limit? West didn't have an answer to this question, and, so, while his talk was as riveting as ever, it did leave one in a slightly dour mood.

Of the remaining keynote speakers, I also particularly enjoyed Robert Devaney's exploration of the fractal geometry of the Mandelbrot Set. Many SCTPLS members might be familiar with Devaney's work on mapping the cartography of the Mandelbrot set from the 1980s (for those that are not, you can see more here: http://math.bu.edu/DYSYS). He delighted a full lecture hall by describing the heuristics one can use in order to always deduce one's location within the Mandelbrot set by simply elucidating the exponent corresponding to the region of the Mandelbrot set that one finds oneself in. A visually stunning and fun talk indeed!

Finally, my Thursday and Friday were spent attending various satellite workshops, which were independently organized by each satellite's organizing committee. Having a keen personal interest in social networks, network theory and idea dissemination I found myself continually gravitating back towards the XNET satellite, run by Renaud Lambiotte and co. who did a fantastic job of pulling together a plethora of leading researchers in their respective fields to demonstrate network applications across a broad range of topics (many of which Lambiotte had contributed to himself!). Highlights here for me included Alex Arenas and co's' work on extracting semantic meaning from word networks, J. Gomez-Gardenes and co's' work on explosive synchronization in complex networks, Paul Expert and co's's work on differentiating between clinical populations by deriving functional networks from neuroimaging data and Antoine Delmotte and co's superb efforts to identify stable states in temporal biomolecule networks, amongst many, many others.

All in all, I found the conference incredibly stimulating and enjoyed the diverse range of topics on offer. I couldn't help but be struck by the thought though that, despite all the diversity, psychology and talks/papers on the human condition in general were conspicuous in their absence. Instead, the conference had a strong focus on computational methods. This is by no means a bad thing, but it highlighted a strength of the SCTPLS that I really appreciate - namely, that we spend a lot more time trying to understand people and the human condition. This is a differentiating point that I feel is unique to the SCTPLS and something that keeps me coming back…

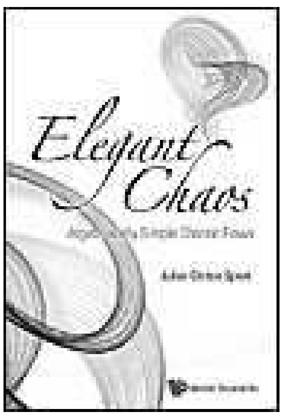
Nonlinear Dynamical Bookshelf

Hofkirchner, W. (2011). *Emergent information: An outline unified theory of information framework*. Singapore: World Scientific. Many academics refrain from undergoing unification, as most understandings are reductionist. This book contends that it is the noble task of an as-yet-to-be-developed science of information to go one step in the direction of a unified theory of information without falling back into reductionism or anthropomorphisation. To be able to success in an ambitious task like this, the book advocates the application of complex systems theory and its philosophical underpinnings. Information needs to be interpreted in terms of self-organization to do justice to the richness of its manifestations.

Pryor, R., & Bright J. (2011). *The Chaos Theory of Careers: A New Perspective on Working in the Twenty-First Century*. Routledge. Outlines the application of chaos theory to the field of career development. It draws together and extends the work that the authors have been doing over the last 8 to 10 years. This text represents a new perspective on the nature of career development. It emphasizes the dimensions of careers frequently neglected by contemporary accounts of careers such as the challenges and opportunities of uncertainty, the interconnectedness of current life and the potential for information overload, career wisdom as a response to unplanned change, new approaches to vocational assessment based on emergent thinking, the place of spirituality and the search for meaning and purpose in, with and through work, the integration of being and becoming as dimensions of career development. It will be vital reading for all those working in and studying career development, either at advanced undergraduate or postgraduate level and provides a new and refreshing approach to this fast changing subject. Key themes include: Factors such as complexity, change, and contribution People's aspirations in relation to work and personal fulfilment Contemporary realities of career choice, career development and the working world.

Rosser, J. B. Jr. (2011). *Complex Evolutionary Dynamics of Urban-Regional and Ecologic-Economic Systems: From Catastrophe to Chaos and Beyond*. New York: Springer. Drawing on the middle chapters from the first edition of J. Barkley Rosser's seminal work, From Catastrophe to Chaos, this book presents an unusual perspective on economics and economic analysis. Current economic theory largely depends upon assuming that the world is fundamentally continuous. However, an increasing amount of economic research has been done using approaches that allow for discontinuities such as catastrophe theory, chaos theory, synergetics, and fractal geometry. The spread of such approaches across a variety of disciplines of thought has constituted a virtual intellectual revolution in recent years. This book reviews the applications of these approaches in various subdisciplines of economics and draws upon past economic thinkers to develop an integrated view of economics as a whole from the perspective of inherent discontinuity.

Sprott, J. C. (2010). *Elegant chaos: Algebraically Simple Chaotic Flows*. Singapore: World Scientific. This heavily illustrated book collects in one source most of the mathematically simple systems of differential equations whose solutions are chaotic. It includes the historically important systems of van der Pol, Duffing, Ueda, Lorenz, Rössler, and many others, but it goes on to show that there are many other systems that are simpler and more elegant. Many of these systems have been only recently discovered and are not widely known. Most cases include plots of the attractor and calculations of the spectra of Lyapunov exponents. Some important cases include graphs showing the route to chaos. The book includes many cases not previously published as well as examples of simple electronic circuits that exhibit chaos. No existing book thus far focuses on mathematically elegant chaotic systems. This book should therefore be of interest to chaos researchers looking for simple systems to use in their studies, to instructors who want examples to teach and motivate students, and to students doing independent study.



Stollenwerk, N. (2010). *Population biology and criticality: From critical birth-death processes to self-organized criticality in mutation pathogen systems*. Singapore: World Scientific. The present book describes novel theories of mutation pathogen systems showing critical fluctuations, as a paradigmatic example of an application of the mathematical of critical phenomena to the life sciences. It will enable the reader to understand the implications and future impact yet follow the mathematical tools and scientific origins of critical phenomena.

Zhang, W. (2012). *Computational ecology: Graphs, networks and agent-based modeling.* Singapore: World Scientific. Graphs, networks and agent-based modeling are the most thriving and attracting sciences used in ecology and environmental sciences. As such, this book is the first comprehensive treatment of the subject in the area of ecology and environmental sciences. From this integrated and self-contained book. Researchers university teachers and students will be provided with an in-depth and complete insight on knowledge, methodology and recent advances of graphs, netowkrs and agent-based modeling in ecology and environmental sciences.

Keegan, S. (2011). Qualitative Research As Emergent Inquiry: Reframing Qualitative Practice In Terms Of Complex Responsive Processes. Litchfield Park, AZ: Emergent Publications. (104 p.). Commercial qualitative research is employed in both the public and private sectors to help organizations understand their customers or clients, with the aim of providing them with better services, products or environments. Using their research knowledge, the researchers act as consultants, helping their clients to shape their strategy and decision making. The role of the commercial qualitative researcher is therefore quite different than that of most academic researchers. Commercial qualitative research has long an uncomfortable position straddling a positivist and a socially constructed understanding of knowledge generation. This often creates misunderstandings between researchers and clients, not least because these different epistemological stances are not explicit. This essay explores how the concept of emergence derived from the complexity sciences, alongside contributions from neuroscience, can help us to conceptualize an holistic theory of commercial qualitative research—emergent inquiry—which embraces the role of emotion in judgment and decision making.

Tait, A., & Richardson, K. A. (Eds.). (2011). *Moving Forward with Complexity: Proceedings of the 1st International Workshop on Complex Systems Thinking and Real World Applications.* Litchfield Park, AZ: Emergent Publications. (400 p. + index) It's somewhat ironic that a discipline that draws so much on real world phenomena, arguing against the oversimplification of models, has had limited impact on business/social modeling. While many of the more beguiling concepts have embedded themselves in everyday language, complexity thinking, as a formal discipline, is clearly much less widespread. There are islands of success, but the intellectual tectonic shifts required to make them continents have not been forthcoming. This collection is the start of an attempt to redress the balance. Each of the 18 chapters attempts to build a bridge from concepts to application. We'd be deluding ourselves, and misleading the reader, if we claimed that these pages contain off-the-shelf tools that can be applied by those with no background in complexity science. However, we hope that this collection provides inspiration to those who wish to take complexity to the masses.

Wallis, Steven E. (2011). ***Avoiding Policy Failure: A Workable Approach*****. Litchfield Park, AZ: Emergent Publications.** (125 p.) Why do policies fail? How can we objectively choose the best policy from two (or more) competing alternatives? How can we create better policies? To answer these critical questions this book presents an innovative yet workable approach. Avoiding Policy Failure uses emerging metapolicy methodologies in case studies that compare successful policies with ones that have failed. Those studies investigate the systemic nature of each policy text to gain new insights into why policies fail. In addition to providing intriguing directions for research, this book also suggests a bold new standard for evaluating policies. While this method is broadly generalizable, specific examples are provided showing how to develop better Economic Policy, Military Policy, and Constitutional Organizations. This book shows scholars, researchers, and policy analysts how to develop more effective policies so that we may achieve our highest aspirations and avoid the horrendous failures of the past.

Zeraoulia, E. (Ed.). (2011). ***Models and applications of chaos theory in modern sciences*****. Taylor & Francis.** Description: This book presents a select group of papers that provide a comprehensive view of the models and applications of chaos theory in medicine, biology, ecology, economy, electronics, mechanical, and the human sciences. Covering both the experimental and theoretical aspects of the subject, it examines a range of current topics of interest. It considers the problems arising in the study of discrete and continuous time chaotic dynamical systems modeling the several phenomena in nature and society highlighting powerful techniques being developed to meet these challenges that stem from the area of nonlinear dynamical systems theory.

ANNOUNCING
22nd Annual International SCTPLS Conference
26-28 July 2012
Johns Hopkins University, Baltimore, Maryland, USA

START PLANNING NOW to attend **the 22nd Annual International SCTPLS Conference, July 26-28 at the Johns Hopkins University in Baltimore MD.**

Gilman Hall, The Johns Hopkins University

Keep your eye out for further announcements, or visit our website for updates. In the meanwhile, here are some highlights to get your conference planning into full gear:

KEYNOTE TALKS by:
Jeffrey Goldstein, Ph.D., Adelphi University

"Honest Toil in Complexity Science"

The address will provide a general sketch of how the sciences of complex systems have been, over the past several decades, radically revising our understanding of the dynamics of such systems. This unprecedented amplification of understanding has concomitantly been deepening of our capacities for making more effective interventions in complex systems. Not only have new mathematical and physical tools applicable for specific contexts emerged, but also novel problem-solving and critical-thinking approaches. The researcher, the theorist, the intervener now possess much greater insight into, e.g., cooperative structures, coordination dynamics, networked interactions, and how development can proceed.

One of the keys for the advances made by complexity science has been vigilance on the part of theorists and researchers, against strong temptations not to, to follow this precept offered by Bertrand Russell: "The method of 'postulating' what we want has many advantages; they are the same as the advantages of theft over honest toil. Let us leave them to others and proceed with our honest toil." The following topics illustrate how excursions into relatively lesser known regions of the world of complexity can offer suggestions as to how complexity science has remained true to "honest toil": Constraints Everywhere: Constants, Attractors, Parameters: "Attractors" in Number Theory: Krapekar's Series, Rebooting Winfree's Dynamical Constraints; *The Emergence of a New Logic for Complex Systems:* Some linguistic parallels for dynamical systems; Complexity and Limits of Tractability: Insights from Computational Complexity Theory, Borges Paradox of the Seer and Logics for Complex Systems Multifoldedness in the Building Blocks of Emergence.

Biographical sketch: Jeffrey Goldstein, Ph.D. is Full Professor, School of Business, Adelphi University; author/editor of numerous books including: *Complexity and the Nexus of Leadership: Leveraging Nonlinear Science to Create Ecologies of Innovation*; *Complexity Science and Social Entrepreneurship: Adding Social Value through Systems Thinking*; *Complex Systems Leadership Theory*; *Classic Complexity*; *The Unshackled Organization; Annuals of Emergence: Complexity and Organization 2004-2010;* and the forthcoming *Flirting with Paradox in Complex Systems: Emergence, Creative Process, and Self-transcendence.* He is a co-editor-in-chief of the journal *Emergence: Complexity and Organization*, editorial board members of *Nonlinear Dynamics, Psychology, and the Life Sciences,* member of the Board of Trustees for SCTPLS; author of over 150 scholarly papers focusing on pure and applied complexity science; lecturing at eminent universities throughout the world; consultant to many public and private organizations; and co-founder of the Institute for Research in Complexity and Society (www.complexityandsociety.com.)

EXTRA! EXTRA! EXTRA!

We have just confirmed that our conference will begin Thursday July 26 with a Keynote talk by:

Professor Yaneer Bar-Yam, Founding President of the New England Complex Systems Institute

The specific topics to be covered by Dr. Bar-Yam will be coming soon. In the meanwhile, his bio can give you some idea of the breadth of topics from which he will have to choose:

Professor Yaneer Bar-Yam is Founding President of the New England Complex Systems Institute. His research focuses on developing complex systems concepts and applying them to diverse areas of scientific inquiry and to major social problems. He has worked on fundamental properties of evolution and learning, the evolutionary origins of altruism and collective behaviors, the relationship between observations at different scales, the relationship of structure and function, information as a physical quantity, and quantitative properties of the complexity of real systems. Applications have been to social, biological and physical systems. He has developed quantitative models for a wide variety of complex system behaviors including network dynamics, market instability and the current financial crisis, negotiation, economic development, pandemics and invasive species, ethnic violence, and biological cell function and regulation.

Professor Bar-Yam has advised government agencies, non-governmental organizations and corporations about solving problems using principles and insights from complex systems science. These include The Centers for Disease Control and Prevention, The Centers for Medicaid and Medicare Services, a wide variety of healthcare organizations, the Securities and Exchange Commission (SEC), the UN, the World Bank, Asian Development Bank, the US military (Navy, Air Force, Army and Department of Defense) and intelligence community (CIA, NSA, TSA) and military and civilian engineering corporations (Boeing, Lockheed-Martin, Raytheon, SAIC). He has advised Congressman Barney Frank as Chairman of the Financial Services Committee, and Congressman Michael Capuano on the financial crises. He is a Visiting Scholar at the Federal Reserve Bank of Boston.

He has been engaged in the education of complex systems concepts to academic, executive and professional audiences with over 2,000 graduates of his courses nationally and internationally. His textbook "Dynamics of Complex Systems," published in 1997 by Perseus Press, provides a wide-ranging perspective on the understanding of complex systems. His popular book "Making Things Work" describes the use of complex systems science for solving problems in military, healthcare, education, systems engineering, international development, and ethnic violence.

He is chairman of the International Conference on Complex Systems (ICCS), managing editor of InterJournal and Springer book series on complexity, and author of over 180 research papers in professional journals, including in Science, Nature, PNAS, American Naturalist, and Physical Review Letters. His work has been described in The Wall Street Journal, Science News, Washington Post, Wired Magazine, New Scientist, London's Daily Telegraph, Slate Magazine, Seed Magazine, Technology Review, Reuters, Gizmodo, among others. He has been interviewed by BBC Radio, ABC News, and other media outlets. He has also contributed important work to the dynamics of material growth (including the growth of high quality diamonds), defects and disordered materials, protein folding, neural networks and models of human creativity, individuality and attention. Professor Bar-Yam received his SB and PhD in physics from MIT in 1978 and 1984 respectively.

PRECONFERENCE WORKSHOP IN NONLINEAR METHODS (July 26, 9:00 AM to 5:00 PM.)
Following the success of the pre-conference workshop on nonlinear methods at the 21st annual conference, we will be offering another **preconference workshop on nonlinear methodologies** specifically suited for research in the behavioral and life sciences. Building on the format of 2011, the 2012 workshop will cover a variety of methods and will be accessible to a wide audience, from beginners looking to better understand the scientific literature, to experts looking to expand their repertoire of analytic models and tools. We will be completing the workshop in the next couple of weeks. Watch your e-mail or the society website (www.societyforchaostheory.org) for announcements and updates.

News from SCTPLS Labs

Research Labs from Society Members Continue to Lead Their Fields into New Year
David Pincus, SCTPLS President

There has never been a better time to do research applying nonlinear dynamical systems to psychology and the life sciences. In 2012, SCTPLS will be working to increase the networking opportunities of members engaged in active lines of research. If you or someone you know is a researcher looking for collaboration or students, or a student looking for mentorship, be sure to think of SCTPLS as your go to organization for building relationships in the world of nonlinear science. As a start, here are just a few of the labs run by society members. Stay tuned for increasing links to member labs and research opportunities through our web-site, www.societyforchaostheory.org

Polemnia G. Amazeen, Department of Psychology, Arizona State University wowed attendees at the 21st Annual SCTPLS Conference with her work on coordination – across the various disciplines of psychology. Her lab is sure to be cranking out some of the top new faculty in nonlinear dynamical systems theory for many years to come: "My research is focused on understanding coordination, broadly defined as global-level behavior that emerges through the interaction of components. I look for general principles in coordination patterns across people (social interactions) and within people (motor-respiratory and bimanual coordination) using the tools of dynamical systems analysis. I have described several of my research projects here, but please e-mail me if you would like additional details (from: http://amazeen.lab.asu.edu/home)." Contact information: Amazeen@asu.edu

Anna Bosman, Radboud Univ, Nijmegen, Netherlands is applying nonlinear dynamics to understanding how embodied cognition can be applied to understanding and intervening with learning disabilities: "Although many (if not most) questions involved are still unsolved, I found that merely improving didactics is not sufficient to help children with learning disabilities. The attitude of teachers and educators and the interaction between teachers and students also play an important role in effective teaching. My meeting dr. Rutten-Saris, who developed a therapeutic treatment during her 30-year professional career as a creative art therapist and teacher, made me aware of the role of body language in interactions. Her analysis of interaction structures in children and adults with developmental disabilities has convinced me of the importance of body language in cognitive processing. Interestingly, from a philosophical point of view, her analysis coincides with my philosophical view that human cognition is principally embodied, and from a scientific point of view, her interaction analysis is best characterized by a dynamic systems approach. Future research will encompass the continuation of my work on reading and spelling and reading and spelling disabilities, extending research in the domain of embodied cognition, that is, studying body language within therapeutic treatment sessions, and attempting to apply dynamic systems theory in all of my research (from: http://www.ru.nl/dsg/participants_dsg/profielen/anna_bosman/)." Contact information: A.Bosman@pwo.ru.nl

David Schuldberg, Department of Psychology, University of Montana is a longtime member actively seeking to mentor new students. "I am currently using nonlinear dynamic models to study the phenomena of Positive Psychology, as well as temporal variations in emotion, stress and social-support, and self-reported personality characteristics. A key issue involves testing the correspondence of nonlinear dynamical models to "real" psychological data; I am interested in both model construction and the study of complex time series data. Current work in my lab is focusing on short-term dynamics of emotion and other variables; this includes observation, measurement, data analysis, modeling, and model-fitting (from:

http://psychweb.psy.umt.edu/www/facultyDetails.aspx?id=714)." Contact information: david.schuldberg@umontana.edu

Nick Stergiou is a new member with a big operation running at University of Nebraska at Omaha, Dept. Biomedical Engineering. "The Nebraska Biomechanics Core Facility (NBCF) is located on the campus of the University of Nebraska at Omaha. It is a center dedicated to the discovering of the neuromuscular control mechanism of human movement pattern. The director of the Nebraska Biomechanics Core Facility is Dr. Nicholas Stergiou. The NBCF is unique in that it is dedicated to interdisciplinary research that engages in both theoretical and experimental neuromuscular control questions. NBCF scientists have been responsible for many important discoveries related to the motor control of movement patterns. NBCF is also the home of the Center for Research in Biomechanics (CRB) and the HPER Biomechanics Laboratory" (from http://biomech.unomaha.edu). Contact information: stergiou@unomaha.edu

Wolfgang Tschacher is part of the organizing committee for the 17th Herbstakademie: "The Implications of Embodiment: Enactive, Clinical, Social." The meeting will take place in October next year (October 1 - 3, 2012) in Heidelberg, Germany. We will address the following main questions: Which role does the body play in feeling and thinking? Which new perspectives do embodiment and enactive approaches bring to the cognitive sciences dynamic systems approaches? How do clinicians and psychotherapists incorporate principles of and to embodiment into their work? How far-reaching is the influence of embodiment on social and communicative processes? The Implications of Embodiment is part of the series of Herbstakademie ("fall academy") meetings dedicated to the topic of complex systems in psychology, neuroscience and related disciplines. Information on this and previous meetings of the Herbstakademie community is provided here: http://www.upd.unibe.ch/research/symposien.html

Heart rate variability and slow oscillation processes in humans

The Sixth All-Russian Symposium "Slow oscillation processes in the human" and Fourth Seminar-School on nonlinear dynamics in physiology and medicine was held in Novokuznetsk on May 24-27, 2011 on the basis of Research Institute for Complex Problems of Hygiene and Occupational Diseases under the Siberian Branch of the Russian Academy of Medical Sciences, of the laboratory of physiology of slow wave processes (the laboratory head is Prof. A. Fleishman A. DM).

Papers of the scientists of the Russian Academy of Medical Sciences and Academy of Sciences, Graduate school as well as of practicing physicians were presented. 74 persons took part in Symposium and School. The papers of the scientists and physicians were sent from 16 cities of Russia, and also from the countries of the Far and Near Abroad (Kazakhstan, Belarus, the USA, and Denmark). It confirms that such large scientific direction in physiology and medicine can be successfully developed only with the international cooperation.

The subjects and the content of the lectures, reports and papers testify the further development of this interdisciplinary direction in Russia.

Professor A. Fleishman opened the Symposium and School with the introductory report "Evolution of the points of view at slow wave processes of heart rate variability (HRV) in human and its analysis according to up-to-date natural sciences concepts". In particular, 3 periods were considered such as: a) an empirical stage; b) elaboration of the general theoretical base and the general methodical measures of researches and clinical applications; c) development of new interdisciplinary concepts or paradigms on the basis of the theory of complicated systems, nonlinear dynamics, synergetics, and fractality. Definitions of interdisciplinary researches directions, new notions of multidimensional spatial structure of complicated wave processes of heart rate variability, their classifications, analysis methods, physiological correlations, and also possible clinical applications were given.

In the field of theoretical and basic researches the attention was focused on new methods of the analysis of nonlinear wave processes in physiology and their modeling, in particular, fractal HRV characteristics – Fano- and Allan-factors (Teich M., USA). The evidences of new universal method of the nonlinear analysis of the physiological information – Hilbert-Huang transformation – was given (Fleishman A., Korablina T., Russia). The model of nonlinear hemodynamic interaction in vascular nephrons tree was submitted in the paper of Postnov D., Postnova A. (Saratov, Russia) and Sosnovtseva O. (Copenhagen, Denmark). Besides, for the first time the mechanism of autolocalization of hemodynamic interaction was determined. It was based on mutual compensation of modulation rhythms of blood flow at each level of kidney branch.

The report of Professor Kulikov V. (Novosibirsk) was devoted to the study on the influence of nonlinear peculiarities of feeble ecological factors on hemostasis and reactivity of cellular inflammations in an experiment, and also using the phenomenon of hysteresis in the assessment of oxygen blood function. In particular, it was shown that the qualitative behavior of physiological system from the position of the base wave processes underlying dynamic steady balance as a whole was mediated by "hard" regulatory circuits, and the number of transient processes was defined by unstable parameters involving "labile" regulation mechanisms.

In the report "HRV features for people with the aggravated heredity on type 2 diabetes mellitus" of Gerus A., Fleishman A. (Novokuznetsk) it was shown that on the basis of dynamic study on autonomic changes in 200 young subjects having the aggravated heredity on type 2 diabetes mellitus steady HRV changes of three types were revealed: stable baroreceptor changes (with prevailing of 10 second rhythms); and 2 kinds of damage of vagoinsular maintenance in the form of domination or depression of high-frequency rhythms (HF).

Damage of trophotropic functions in the form of HF domination or depression coincided with the presence of polyneuropathy or advanced its development in the subjects who had no problems with carbohydrate metabolism. Polyneuropathy development at damage of slow wave homeostasis and absence of type 2 diabetes mellitus remains unclear and needs further researches.

Baroreceptor dysfunction in the form of steady LF domination in HRV spectrum coincided with the disorder in regulation of heart rate and arterial pressure. There were gender clinical differences: young women had a tendency to hypotension and young men tended to high blood pressure. Functional neuroautonomic changes were considered as risk factors in the nearest relatives of the patients with type 2 diabetes mellitus and could be a basis for preventive measures.

The second report of Professor Fleishman A. was devoted to nonlinear phenomena and the models of heart rate variability. He gave a complicated HRV structure which could be presented in the form of classified phase portraits or in the form of the continuous cascade of wave processes which could be considered as phenomena similar to turbulence and intermittency. The classification of clinical slow wave syndromes, phenomena of nonlinear dynamics and mechanisms of their manifestation was presented. The analysis of power HRV model was given, and also neuroimmune model of HRV regulation and the mechanisms of influence of vagus nerve on the inflammatory processes were presented.

As a matter of fact the reporter showed that nonlinear phenomena and HRV models reflected a new stage not only in the evolution of the points of view at theoretical problems of HRV regulation but also new approaches in practical usage of the new information for diagnostics and treatment of the most various diseases where autonomic nervous system played a main role in adaptive processes in pathology development and its prediction.

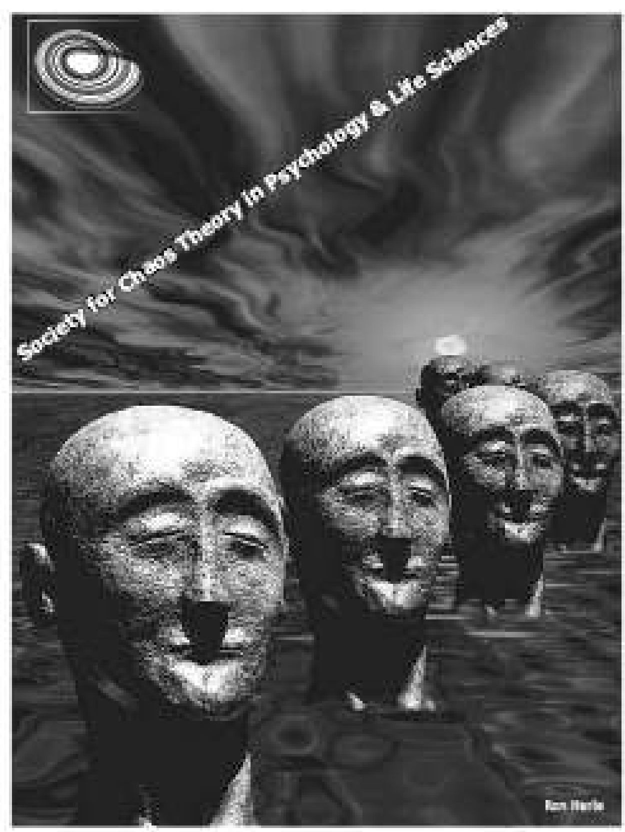
Kleshchenogov S. (Novokuznetsk) considered the problems of early diagnostics of pregnancy complications on the basis of indices of maternal, placental hemodynamics and heart rate variability. The report of Bokanina N. (Perm) was devoted to the research of adaptive possibilities of pregnant women in the first pregnancy trimester.

The major aspect of the published reports and researches are the papers showing practical efficiency of new technologies, for example: the possibility of predicting the outcomes of severe craniocerebral injury, a choice of drug therapy at arterial hypertension, elaboration of effective rehabilitation programs at pregnancy, prediction and management of treatment of traumatic painful syndrome of extremities, estimation of personal risk of fatal cardiovascular complications in the patients with acute myocardial infarction, determining risk factors of heart rate disorders.

The papers devoted to microcirculation and peripheral blood circulation revealing the mechanisms of pathogenesis of many diseases (vibration disease, traumatic pathology, cardiovascular pathology, etc.) have practical interest. The problems of prevention of psychosomatic disorders, the influence of ecological factors, and also genetic predisposition to such diseases as arterial hypertension, diabetes mellitus are described in the papers and reports of Symposium.

SCTPLS Poster for 2012

Following our little tradition, we make a new *beau art* poster to distribute to all our new members. This year's image is entitled, *The Emergence of Consciousness* by Ron Harle. Ron did the cover images for *NDPLS* in 2010. We thought it would be reflective of idea that is on many minds lately. The poster will be distributed (very soon) to all active members on the SCTPLS listserver. Enjoy!



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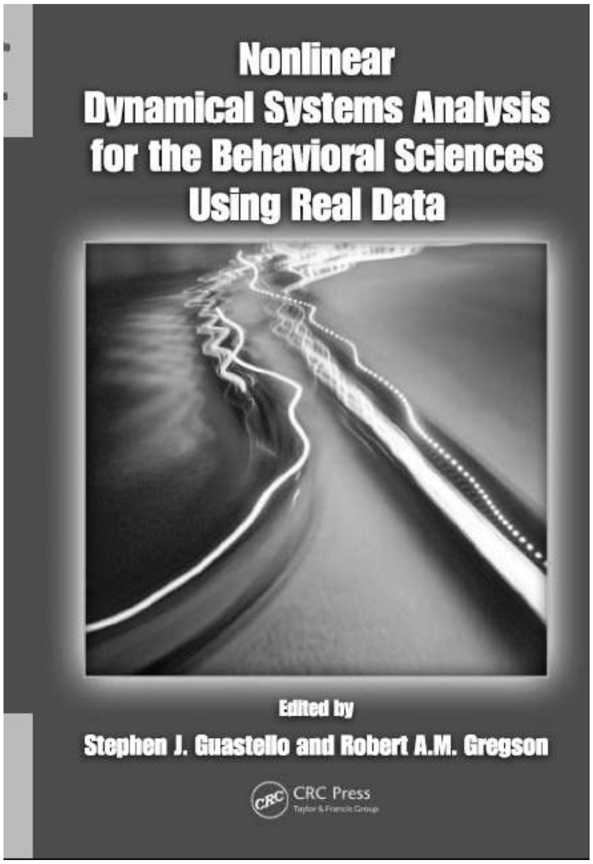

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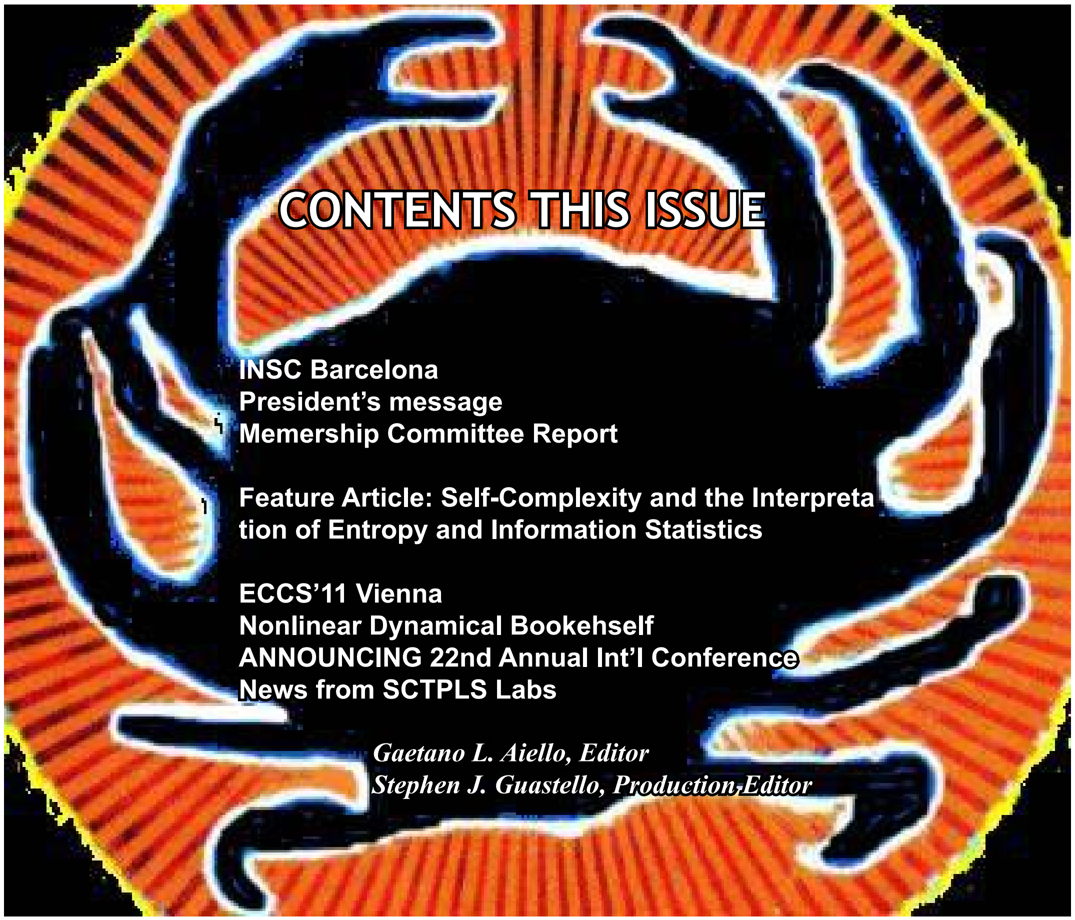

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