SYSTEMIC SOLUTIONS AND EVOLUTIONARY EPISTEMOLOGY: ABSTRACTS PREPARED IN 2015-2016

Edited by Stuart Umpleby
and Elise Hughes

Research Program in Social and Organizational Learning
The George Washington University
Washington, DC 20052
www.gwu.edu/~rpsol

2017

PREFACE

The Research Program in Social and Organizational Learning at The George Washington University hosts visiting professors for periods of several months or an academic year. In the 2013-2014 academic year, the Research Program hosted two visiting scholars. Both were Fulbright Scholars. Some of these abstracts were prepared by professors and visiting scholars associated with the Research Program. Others were prepared for panel sessions at conferences on cybernetics or systems science.

Abstracts 1-11 were from a Panel on Second Order Science by International Society for the Systems Sciences in Berlin, Germany August 5, 2015. Abstracts 12-16 were from a Meeting of the International Academy for Systems and Cybernetic Sciences held at Sichuan University, in Chengdu, China on October 22-26, 2015. The 17th abstract was from papers presented at the Policy Studies Organization Dupont Summit held in Washington, DC on December 4, 2015.

Stuart Umpleby, Director
Research Program in Social and
Organizational Learning

Table of Contents

CONTEXT TRUMPS CAUSALITY

Michael Lissack
Institute for the Study of Coherence and Emergence
Salem, MA

Many of the successes of our modern world have been the result of a focus on defined meaning and direct causality. Given these foci narrative heuristics can be transformed into efficient algorithms. But, efficiency comes at a price. Efficiency has little tolerance for ambiguity and even less tolerance for indirect forms of causality. Efficiency demands that context be treated as if it were a variable in a look up table. Our advances in material living standards and in life expectancy are due to efficiency's stubborn form of Ockham's Razor. Yet, the Anthropocene has its own demands – for context sensitivity, for the tolerance of ambiguity, and for the cultivation of resilience. Our challenge over the coming decades is to relax efficiency's iron grip so as to allow the resilience required for future generations.

SECOND-ORDER SCIENCE: THE REVOLUTION OF SCIENTIFIC STRUCTURES

Karl H. Müller
Steinbeis Transfer Center New Cybernetics
Vienna, Austria

Under the heading of "Second-order Science" a book will be published which presents a new architecture for the science system, based on a differentiation into three levels, roles and functions for the two additional levels. The lecture will be divided into three main parts.

The first part lays out the new environments of second-order science and emphasizes the new configuration of first-order science as we know it and the two new levels of zero-order science with its concentration of research infrastructures and second-order science which operates on the building blocks from first-order science like models, theories, test results, theoretical concepts or functions.

The second part focuses on significant major contemporary inversions within the science system which, in combination, constitute a new Copernican revolution. It will be shown that this new Copernican revolution can be characterized as a complexity and as a reflexivity revolution of the overall science system.

Finally, second-order science can be institutionalized as research programs and as curricula in a variety of ways and the lecture will offer several examples for new research and teaching programs in this field.

A GLOBAL STRATEGY FOR HUMAN DEVELOPMENT AS AN EXAMPLE OF SECOND ORDER SCIENCE

Stuart A. Umpleby
George Washington University
Washington, DC

In the 1960s the Institute of Cultural Affairs, based in Chicago, Illinois, started working with poor communities, helping people come together to work for positive change. They developed some very useful methods for facilitating group conversations. Over several years they used these methods in poor communities around the world. They would come together each summer to discuss what worked and what did not. They would modify their methods, plan the next year's activities, implement the activities, then come together the following summer to discuss what worked, etc. Academics do something similar with annual conferences, but they are more focused on publishing academic articles than on improving the lives of real people in real communities. The different purpose of inquiry affects the knowledge that is constructed.

Part of the motivation for defining and creating second order science is to recognize and increase innovative, problem-solving-oriented social actions, often conducted by NonGovernmental Organizations. Currently universities have large numbers of students and faculty members seeking to advance knowledge in the social sciences. Many of them are using a conception of social science taken from the physical sciences. But social systems are composed of purposeful, thinking participants, not inanimate objects. Perhaps in addition to searching for reliable cause and effect relationships part of the work that is called social science could be devoted to developing conversational methods that aid joint action toward shared goals. If this goal were be accepted within the social sciences in universities there would be a great increase in the number of people working to improve social systems and developing more effective methods of action.

DESIGNING SCIENTIFIC RESEARCH INTO DESIGN TEAM DYNAMICS

Thomas Fischer
Department of Architecture

Xian Jiaotong
Liverpool University
215123 Suzhou, China

This presentation offers an interim report of a research-into-design study between its pilot stage and its main stage. The study is an empirical investigation of the degrees of congruency between perceptions of "creative direction-giving" amongst collaborating (as opposed to co-operating) designers. One ambition of this project is to investigate designing scientifically, while doing justice both to the paradigm of empirical natural science and to the practice of design, as it is reflected in cybernetic design theory. Another ambition is to consider the experimental approach from a design perspective. The presentation will be contextualized with an outline of some underlying assumptions shared by cybernetics and design research that are incompatible with the ideals of natural science. These assumptions are: circular causality, non-determinism, and the subjective, included observer. The experimental design of the study, which aims to bridge the aforementioned incompatibility, will be presented, including the design of a novel data acquisition apparatus, and related data analysis methods. Results obtained during the pilot study indicate low congruencies between perceptions of "creative direction-giving" amongst collaborating designers, possibly due to designers' lack of sensitivity towards their team dynamics. Some possible methodological and design-experimental changes are being considered for the upcoming main stage of the study. These possible changes will be presented and offered for discussion.

DANCING WITH AMBIGUITY

Pille Brunnell
University of British Columbia
Vancouver, Canada

We live embedded in beliefs and premises (as indeed this statement is an example) that my be explicit or implicit and unaware. I begin with the explicit premise that ambiguity is a concept that we have created in response to a desire for precision or control; a desire that is generally satisfied in only some situations. My second explicit premise is that we live as participants in a systemic that we cannot fully specify or control. Given these premises, I wonder how we continue to manage, most of us adequately for the circumstances we are in, however ambiguous they may be. I claim that in part we continue to operate with a systemic dynamics on our part that couples with the systemic dynamics of our medium. In part we simplify through various processes, all dependent on language, and thus create locally effective control and an illusion of certainty.

I will explore some notions of how these two approaches could have arisen with biological evolution and with the evolution of language, inclusive of the many implications and entailments of living as languaging beings. Language and networks of conversation result in different lineages of beliefs and premises that lead to articulation as models (both conceptual and formal) which in turn serve to guide our actions. As each lineage of language and conversation evolves, it progressively excludes other models and actions. Since actions have consequences to the world we live, beliefs and premises have extensive implications to further possibilities. Without denying the value of models I will offer some conjectures on why it behooves us to also accept and dance with ambiguity as a way of enabling alternatives.

THE FINE ART OF GOAL FORMULATION: A MODEL OF NATURALISTIC THEATRE AS SECOND ORDER BEHAVIORAL SCIENCE

Tom Scholte
University of British Columbia
Vancouver, Canada

Robert P. Crease and John Lutterbie argue that "the structure of performance is essentially the same in the theatre arts and experimental science" when we consider that "[p]erformance involves the conceiving, producing, and witnessing of actions in order to try to get something that we cannot get by consulting what we already have." In both domains "the representation (theory, language, script) used to program the performance does not completely determine the outcome (product, work), but only assists in the encounter with the new." Grounded in Gordon Pask's "Meaning of Cybernetics in the Behavioral Sciences" and a wide range of Ranulph Glanville's investigations into James Clerk Maxwell's "Black Box" gedankenexperiment, this paper will seek to demonstrate that, not only does this proposed parallel between the theatre arts and experimental science hold true, but, in fact, the theatre can serve as a useful model for behavioral science of a decidedly "second order" nature. The theatre's organizational hierarchy will be examined within the framework of Pask's "experimental contract" and all of its members (playwright, director, actors) conceptualized as observers of Black Boxes in the form of Luhmannesque Interaction Systems or Paskian P-individuals and their constituent M-individuals. Each member of the experimental team becomes responsible for hypothesizing the unobservable goal-directed mechanisms within these Black Boxes and testing these hypotheses through observing the behavioral phenomena generated through the recursive procedures of rehearsal; each iteration of which is consensually designed through a Conversational process (again in the Paskian sense) amongst the assembled observers before, finally, appearing before an additional group of observers, the audience, who then go on to generate their own Conversations and hypotheses. Along the way, I will trace the manner in which the naturalist theatre has itself drawn fire from constructivists of various stripes due to its supposed interest in an "objective" representation of "reality" and indicate how a converse and complementary flow of Second Order conceptions into the fields of theatre studies and practice can rehabilitate this oft maligned but, I believe, epistemologically valuable cultural practice within a Radical Constructivist framework. My recent production of David French's SALTWATER MOON will serve as a case study through which to illustrate this approach.

PSYCHOHISTORY FOR OUR TIME: BRINGING FREUD AND PIAGET INTO THE TWENTY FIRST CENTURY

Robert Kalechofsky

The Need:

It has become increasingly apparent that a deep and proper understanding of the present time, the past and a sense of what the future may bring requires a keen historical sensibility concerning how people, nations and institutions function, coupled with the deeper insight into the mind/brain that the twenty first century revolution in the psychology and neurophysiology of humans yields.

That is, psychohistory, based on the phenomenological work and insights of Freud and Piaget (with their errors clarified by our present understanding of the mind/brain) will give us a new understanding of history for our time. I will bring Freud and Piaget into the twenty first century. Historical analysis will have a scientific, empirical basis which will also help to validate psychoanalytic and Piagetian theories.

To understand how human affairs, war and peace play out, historians generally take a phenomenological approach with data based in time and space, geography and story line involving kingdoms, human laws, governments, religions, the past, the present and the prognosticated future. Accessing our twenty first century understanding of minds/brains will importantly and additionally allow the perspectives of Freud and Piaget and psychology and neuropsychology to deepen our knowledge, insight and understanding of human affairs. Thus we will bring Freud and Piaget into the twenty first century and illuminate history with psychohistory.

The psychological proposals of Freud and Piaget during the twentieth century, their gedanken experiments and understandings of the mind/brain function of individuals, can now, in the twenty first century, be tested and probed by our growing insights of mind/brain activity, using functional MRI and other neurophysiological probing techniques. We may now probe and explore the mind/brain to determine the validity of Freud's ideas concerning the id, the ego and the superego and to deepen our understanding of them. Assessing Piaget's developmental ideas concerning number, cognition and logic can now be done using our deepened neurophysiological knowledge-- and this can be used in understanding past history, present affairs and our beliefs concerning our estimates of the future, by knowing what people were capable of understanding and how that affected what they did. For example, people's tendency toward egocentric thinking deterred the development of the understanding of a heliocentric solar system.

One can find the interplay of psychoanalysis and history in H. Stuart Hughes' 'History As Art And Science', p. 42-67 (1964), where he shows in a number of cases that a Freudian perspective deeply illuminates history: in the career of Joseph Goebbels, the Nazi propaganda chief, who was pained psychologically by the loss of his ancestral catholicism, and his need for a redeemer found its resolution in Adolph Hitler. In Erik Erikson's 'Insights And Responsibility', we note psychohistory at play in his suggestion that Hitler's brutality and cruelty toward people, cultures and countries was an outgrowth of his father's brutality and cruelty toward Hitler as a baby, a child and a youth.

We are then led to illuminate the mind of Freud and psychoanalysis by today's insights in the mind/brain and neurophysiology using MRI based investigations: How can we probe Freud's phenomenological psychology of the Id, Ego and Superego in the Mind/Brain. Where and how are they manifested in the geography of the brain? How do the Oedipus/Electra complexes manifest themselves in children and adult mind/brains? (consider Freud's understanding of Shakespeare's Hamlet's equivocations as manifesting an Oedipal problem). We would then have a literary analysis rooted in a psychoanalytical understanding. This , thinking of the king of Denmark and Hamlet as potentially historical personages, could be understood as psychohistory.

An interesting aspect of Jean Piaget's cognitive theory is that he tried to effect a connection between his cognitive analysis and Freud's psychoanalysis. He also worked, in his younger days, in Binet's laboratory in Paris, where I.Q. testing of children was being established. Piaget became particularly struck by the question of why children made errors. (not only what they knew-- but why they made mistakes. This led him to the studying of knowing and erring as developmental processes. (R. Kalechofsky deals with these processes in his book, ' Knowing and Erring'). As in Freud's case, Piaget's understanding of such things was phenomenological: how did children talk about what they knew or believed and how did they act on what on what they knew and believed. Both Freud and Piaget knew that the mind/brain and neurophysiology were there, but it was only in the revolutionary insights of the past twenty five years that our insights (derived from their understanding and errors), using MRI type analyses, begin to uncover where and how our thinking takes place.

Piaget's phenomenological analyses of the growth of logical reasoning and the younger child's trial and error analyses concerning balance on a see-saw, understanding the logic of class inclusion and the development of the logic of implicative reasoning can now be probed in today's MRI type investigations. Where and how children's discoveries concerning distance and weight to achieve balance are manifested in the brain-- where and how class inclusions are understood by children in Piaget's bead experiments, and where and how the child's mind/brain develops in the younger child to eventuate in the adolescent understanding of logical and implicative reasoning-- are now being studied.

In the following, I will show how psychohistory illuminates historical phenomena: Inside our brains we expect retaliation for aggression. This is a built-in tendency which may be manifested by all humans. It is also a gedanken experiment that requires empirical, neurophysiological validation. Freud accepted it, the so-called 'talion principle', in his theory of psychoanalysis. He believed, for example, it was the reason that many voyeurs are troubled by the fantasy that they will go blind. The talion principle has its roots in the biblical principle,' an eye for an eye, a tooth for a tooth…', which, today, has an excessive ring to it, but thousands of years ago was a measured sense of justice, since much more severe retribution was exacted in those times.

We find, using the talion principle, psychohistorical illumination when trying to understand the behavior of Arabic countries over the past hundred years (usually among Arabic males). It is triggered in a culture which promotes sharp retaliation for perceived hurts. It is often promoted in Koran based schools and madrassahs. The consequences can be seen in the extreme reactions to hurts perceived by Arabs in the Middle East due to the United States and the existence of the state of Israel. This results in the great difficulty Arab countries have in negotiating differences and peace treaties. This essentially psychological reason is not usually treated in traditional

historical and contemporary analysis. The lack of such understanding is manifest on our news broadcasts when terror activities of ISIS, Hamas and Al Queda are analyzed.

Further insight into the relevance of Freud's and Piaget's thoughts may be found in the very nature of warfare. The cognitive capabilities of men (usually men, not women, another phenomenon to be considered later) will determine the application of science and technology brought to the battlefield. Many years ago, axes, swords, battering rams to break sieges were used and as science and technology and developing cognitive capabilities came into play , submarines, nuclear weapons, poison gas, drones etc. came into the fray. Lurking in the brain were Freud's insights concerning the aggression drive. That it was a drive and not an instinct which Freud eventually "" understood it to be, lends it, thankfully, to sublimation and modification-- but we require more care and sensitivity to moderate our aggressive tendencies than is exhibited today in such ventures as the deeply flawed United Nations, conceived with reasonable expectations but in need of a mighty overhaul. We must keep in mind the dreadful frequency of war in this world. The world has been at war far more often than it has been at peace.

GLOBAL SYSTEMS MODELLING AND THE CLUB OF ROME: FUTURE DIRECTIONS?

Robert Hoffman
What if? Technologies
Toronto, Canada

This presentation traces the history of the relationship between global systems modelling and the Club of Rome from the Forrester/Meadows 'Limits to Growth' project and the Mesarovic/Pestel 'Mankind at the Turning Point' project. It examines the need for a shift from the Newtonian to an evolutionary systems paradigm and a renewed effort at global systems modeling inspired by the current interest in the Anthropocence as the geological era in which human decisions shape the evolutionary future of the earth system. The question underlying the presentation is, 'How do we come to an understanding of the world in which we live such that we can make decisions that achieve our goals? This, of course, is a question addressed by the systems and cybernetics community, particularly in the work of Kenneth Boulding, Umberto Maturana and Francisco Varela.

REFLECTION IN ACTION ON 'SECOND ORDER SCIENCE'

Raman Kumar Agrawalla, Ph.D.
Business Systems and Cybernetics Centre
Tata Consultancy Services,
Kalinga Park IT/ITES SEZ, Plot-35,
Chandaka Industrial Estate, Patia, Bhubaneswar 751024, Odisha, India.
e-mail: raman.a@tcs.com

The paper intends to put forward my perspective on Second Order science not in the mode of 'tell it like it is' (no one wholly and unequivocally knows what it is. However, there are praiseworthy, pioneering efforts and research in this regard (see Umpleby, 2014; Riegler and Mueller, 2014; Mueller, 2014; Lissack, 2014). Rather, I attempt to observe it as I see it. Second Order Science, in a sense, is seeding and sprouting, even if the idea of Second Order Cybernetics has been around for about five decades. Why this sudden interest in Second Order Science? Why is Second Order Science being discussed only in the cybernetics fraternity? What are the relations between the Second Order Science and the Second Order Cybernetics? For me, Second Order Science starts not with first Order Science but with Science per se. I do not see Second Order Science as some extension of first Order Science, rather it is Science; that is to be seen, that is being seen from the 'second order' from the start.

Hayek (1979) points out that all science starts with the classification. In the physical sciences, objects are classified by unchanging characteristics that are both measurable and distinguishable by controlled and objective tests. But not in the social sciences. The social sciences, including economics are the study of 'human action', and humans are not programmed robots or automatons. In fact, economics ought to be more about the Homo sapiens and not Homo economicus. The standard Arrow-Debreu world of perfect information, perfect knowledge is a chimera, in many real cases and circumstances.

The essential point of science or scientific theories is its explanatory power; its power to enhance understanding. Also, the power of prediction is one of the virtues of science though it has its peculiarities and problems. And there is difficulty in forecasting too far into the future that leaves having 'pattern predictions' as a good enough second best solution in many situations. Hayek observed that 'during the first half of the nineteenth century the term science came more and more to be confined to the physical and biological disciplines which at the same time began to claim for themselves a special rigorousness and certainty which distinguished them from all others. Their success was such that they soon came to exercise an extraordinary fascination on those working in other fields'. However, there has been a mechanical and uncritical application of physical sciences to social sciences (Hayek, 1942). Even now there is rampant belief and practice that the methods of the physical sciences—observation, experimentation and measurement- are applicable also to the study of society.

In the twentieth century, many modern disciplines, notably economics, and management science, triumphed to earn physics-like scientific status. But still, there is much to be achieved socially with respect to the understanding of many 'social phenomena', including the origin or unfolding of crises, be they financial, social, economic or socio-economic, cultural and political. Currently, we explain or see the patterns in these, mostly in hindsight.

Stuart Umpleby explains the ‘philosophical principles underlying Second Order Science’ as follows: ‘Cybernetics has added two dimensions, not to a single scientific field, but rather to the philosophy of science, thereby expanding science for all fields. The two dimensions are: 1) the amount of attention paid to the observer and 2) the effect of a theory on the system of interest. Adding these two dimensions to the contemporary philosophy of science would constitute a scientific revolution in the philosophy of science. The new philosophy of science becomes a more adequate guide to the development of scientific knowledge, particularly in the social sciences’. While taking the ‘the radical constructivist view of science’ Glasersfeld (2001) observes that ‘to most traditional philosophers, true knowledge, is a commodity supposed to exist as such, independent of experience, waiting to be discovered by a human knower. It is timeless and requires no development, except that the human share of it increases as exploration goes on'. But, all science intends “to co-ordinate our experiences and to bring them into a logical order” (Einstein, 1955, as quoted in von Glasersfeld, 2001).

Without an observer being part of the system, and without having ability and willingness to be in and out of the system; during observation and ruminations; in the multi-observer experiential world; it’s difficult to co-ordinate our experiences. Through the present paper, I am trying to reflect on Second Order Science, reflecting in action; with my curiosities, questions and confusion that might meaningfully expand the realm of the discussions. Specifically, I shall argue that Second Order Science is the body of knowledge that is emerging to study complex socio-economic phenomena with its own building blocks, methods, models and management frameworks. I can see that the Second Order Science has the potential to take the ‘understanding of understanding’ of the social or socio-economic phenomena; particularly all complex phenomena to an elevated level. The present paper is an explorative initiative in this regard.

MANAGEMENT AS EVOLUTIONARY EPISTEMOLOGY: A MACHIAN GENETIC CRITICAL PERSPECTIVE AS BASIS FOR A SECOND ORDER SCIENCE

Carl Henning Reschke
Institut für Managementforschung Köln
Mainzer Straße 80,
50678 Köln, Germany
carlhenning.reschke@imfk.de

The paper sketches an argument how an evolutionary ('genetic') epistemological model of actors' perspectives can be used to develop an enlightened approach to management of complex systems, such as organizations, along Popper's dictum 'The future is open'. This enlightened approach uses ideas from the history and philosophy of science and links into the program of second order science as discussed from different point of views by the authors in the 2008 volume of Constructivist Foundations and specifically for this conference by Lissack among others. Based on Mach, it takes a metaphysically critical, neutral monist approach that complements and may integrate other perspectives on second order science.

The development of concepts in management follows similar patterns as the historical development of scientific concepts. In line with Oeser, Management is based on heuristic information processing and condensation into action based on actors' perspectives organized in multiple layers of information processing. These filter information and perspectives and may lead to flawed interpretations and errors ranging from minor mistakes to large scale failures, if adopted uncritically for wide-ranging decisions. One major issue in management is thus to decide on a 'model of the world' and to identify misinterpreted signals to be able to adapt the model. These risks can be easily 'blended out' through the filters of company culture, reporting procedures and variables reported in MIS.

Management takes place via actors' heuristics, involving organizational procedures, management information and reporting systems, which lead to - sometimes flawed – interpretations and subsequent errors ranging from minor mistakes to large scale failures. While the epistemological issue is often defined as that we cannot know the future, we can know it enough to construct a vision and build models of what may (likely) happen. However, the bigger risk here is that the mental model of managers is partially wrong and the associated 'politics' of arguing for and against specific models lead to painful choices which are 'discovered' only in the future.

Thus it is necessary to identify early on indicators for deviations from the 'imagined world' and to adapt models and assumptions (‚hypotheses') as quickly and as fluidly as possible. Mach's genetic epistemological view based on a 'fluent' gestalt concept is helpful in this.

To describe the challenge and develop hints on how to deal with such situations, I employ physicist-psychologist-philosopher Ernst Mach's genetic perspective on the evolution of knowledge in the history of science. According to Mach, knowledge develops based on the adaptation of thoughts to observed facts and to each other. Scientists' statements on the nature of reality need to be based on observations, which require an analysis of the 'psychological worldview' in and from which observations are identified, measured, analyzed and interpreted. The thought system, the worldview of scientists influences observations, interpretations of observed facts and identification of causality in models of reality. In turn, observations lead to

adaptations of the thought structure of scientists as much as to a selection of observations that are deemed legitimate to support or refute a hypothesis.

This process often uses analogical reasoning to what is already known, which serves as basis for the further ‘agglomeration’ of thought structures. This type of reasoning is already used by managers, as it allows for quick decisions. It also poses the risk of making wrong decisions based on scarce information, if the underlying basis in an originally empirical, epistemological approach is not considered. The development of the worldview of managers and the psychology of epistemology and perception thus take center stage for the development of ‘enlightend’ approaches to humane management of members of organizations and information processing in organizations.

IN ORDER TO CREATE A BETTER, WISER WORLD WE NEED A REVOLUTION IN ACADEMIC INQUIRY

Nicholas Maxwell

We are heading towards disaster. Population growth, destruction of natural habitats and rapid extinction of species, vast inequalities of wealth and power around the globe, the lethal character of modern war, pollution of earth, sea and air, and above all the impending disasters of climate change: all these looming global problems indicate we face a grim future. In order tackle these problems intelligently, effectively and humanely, we need to learn how to do it. That in turn requires that our institutions of learning, our universities and schools, are rationally designed and devoted to the task. At present, they are not. We have inherited from the past a kind of academic inquiry so grossly irrational that it has actually contributed to the genesis of these problems. The great intellectual success of modern science and technological research has made possible, even caused, all these global crises. As a matter of supreme urgency we need to bring about a revolution in academia so that humanity may acquire what it so desperately needs: a kind of inquiry rationally designed and devoted to helping us make progress towards as good a world as possible. The kind of academic inquiry we need would put problems of living at the heart of the enterprise; the pursuit of knowledge and technology would emerge out of and would feed back into, the central and fundamental activities of improving our understanding of what our problems of living are (including global problems), and proposing and critically assessing possible solutions – possible actions, policies, political programmes, ways of living. The fundamental task would be to help people everywhere come to have a better understanding of what our problems are, and what we need to do about them.

SYSTEMIC SOLUTIONS FOR SYSTEMIC PROBLEMS

Stuart A. Umpleby
Department of Management
The George Washington University
Washington, DC 20052

The systems sciences and cybernetics emerged in the years following World War II. The systems sciences created many new approaches to engineering and management and contributed new ideas to existing academic fields while seeking to identify similar concepts among fields and trying to create a general theory of systems.

Systems science and cybernetics have both developed theories and practical methods. A major difference lies in the treatment of information. People in systems science have tended to use a transportation analogy for information. That is, they see a message as being like a train that enters a station. Cars/ words/ ideas are moved around, some are stored and then a new message/ train leaves the station.

Cyberneticians have taken a more philosophical approach to information, seeking to test various epistemologies through neurophysiological experiments. Cyberneticians have tried to create a common foundation for the social sciences by focusing on circular causal and feedback mechanisms initially and later on perception, cognition, knowledge, autonomy and understanding. Gregory Bateson and Margaret Mead, two influential members of the Macy conferences in the late 1940s and early 1950s, hoped that the new ideas of circular processes would help the social sciences to advance by using methods being developed by physical scientists.

In recent years the people working on cybernetics no longer seek to use the physical sciences to strengthen the social sciences, rather they are working to expand our conception of science so that it more adequately encompasses the social sciences. There are two assumptions that scientists currently make that need to be altered if the social sciences are to be successful.

First, physical scientists usually assume that the observer can be excluded (except in the cases of quantum mechanics and relativity theory). This choice is made because scientists are trying to be objective, and they assume that if an experiment is done correctly, everyone will see the same things. But in social systems the observer matters. Who says something can be significant. Furthermore, complexity is observer dependent. What is complex for one person may be simple for another and vice versa.

Second, physical scientists assume that theories do not alter the system observed. We believe that atoms and molecules are not influenced by what scientists say about them. But in social systems theories do change the system described. When Adam Smith described an economy and some people acted on his ideas, economic systems changed. When Karl Marx described social systems and some people acted on his ideas, social systems changed. In social systems there is a dialogue between ideas and societies.

If science expands by including these two considerations, there will be greater success in developing a science of social systems. The old conception of science, a science of inanimate

objects, would be a subset of the new conception of science, which includes purposeful systems, both individuals and institutions. Just as physics provides a general theory of matter and energy, cybernetics provides a general theory of control and communication. Today individuals, organizations and societies rely heavily on science for systemic solutions to systemic problems. By expanding and improving our conception of science, we shall be better able to solve human problems.

This presentation will discuss the history of systems science and cybernetics, the successes achieved in a wide range of fields, the difficulties encountered in finding a home within contemporary universities and some significant and exciting projects now being worked on.

RESILIENCE 2.0:
COMPUTER-AIDED DISASTER MANAGEMENT

Gerhard Chroust
Johannes Kepler Univ. Linz
gerhard.chroust@jku.at

Georg Aumayr
Johanniter Österreich, Ausbildung - Forschung,
georg.aumayr@johanniter.at

Many factors (larger population, more dependency on technology, more human-caused interference with the natural systems and equilibria, climate changes, ...) contribute to the seemingly growing number and severity of disasters. Additional exaggeration comes from media coverage. Consequently Disaster Prevention and Disaster Management have to be given increased attention. The ultimate goal of Disaster Management is resilience of the affected system and thus survival of the affected population.

We discuss the various ways systems behave in the case of an attack or threat and how to design and structure systems in such a way that a system instead of being fragile (losing its functionality due to the attack) will become resilient (having the capacity ... to bounce back to dynamic stability after a disturbance), or even antifragile (being able to "learn" to improve disaster resilience).

Resilience 2.0 identifies a new paradigm: modern Information and Communication Technologies (ICT) are employed as a basis for enabling resilience of a system. ICT provide the basis for sufficient preparation before an attack, for quick recognition, and for effective, efficient reactions to disasters. Only the coordinated intra- and interphase deployment of ICT promises sufficient success and can bring resilience to currently still fragile systems. Especially for the Response/Intervention Phase computer support shows to be considerably different from classical ICT-application. Reasons are extreme time and performance pressure, physical and psychological stress on personnel, potentially damaged ICT-platforms and communication infrastructure, plus unknown and/or adverse natural environment, etc.

The basic message of the presentation is that computer-aided disaster management offers a new level of reactivity: we call it Resilience 2.0.

A BETTER HEALTHCARE FOR A BETTER WELFARE ? CHRONOBIOLOGY AND LITHOTHERAPY : SUSTAINABLE SYSTEMIC SOLUTIONS.

Pierre Bricage
University of Pau et Pays de l'Adour,
Pau campus, France
pierre.bricage@univ-pau.fr

Man-made chemicals accumulate in Earth soils and waters: local systematic use of drugs creates systemic problems for our species survival. Our "Take-Make-Waste" society is not sustainable. Systemic solutions must arise at local and global levels. HOW chronobiology, for a better healthcare, and lithotherapy, for a better welfare, could be useful systemic solutions for prevention of such systemic problems?

The temporal organisation of living systems is evidenced as an innate and inheritable specific network of clocks that cannot be changed. But knowing these endogenous clocks functioning allows to understand WHEN and WHY therapeutic strategies are efficient or not. Sleep agenda recording and individual vigil chronotypes determination and their respect is the best way to avoid scholars' failure. Performance changes are depending on chronotypes and societal time changes. Results of students' competency tests (reports, talks, experimentations) are significantly increased (from 20% to 50%) when done AT THE RIGHT TIME. Man is an Earth clock shaped species. The minimal and maximal durations of all sleep cycles of a night obey a relationship that results from interactions between endogenous clocks and exogenous ones. All Earth living systems share a common ecoexotope of survival that is temporally structured by solar, lunar and terrestrial rhythms. These rhythms are synchronisers for our endophysiotope clocks. But some people are more sensitive to them than others and someones are resistant. Man night sleep changes depend on lunar cycles entrainment. Our Earth-hosted organism is physiologically structured with Earth as a fixed point and the analysis of sleep records points to circa-annual solar rhythms that can be considered as controls for the evidence of circa-monthly lunar rhythms.

WHAT methodology to evidence temporal organisations of living systems and their physiological responses? Only individual longitudinal measurements must be used. Into controlled network of clocks, different frequencies are running depending on responses to endogenous or exogenous changes. Not only "on" stimuli but also "off" ones have effects. For 1 clock, its latency phase duration is always equal to at least 1 period of the rhythm. HOW long is the latency of a network of clocks?

WHAT methodology to evidence lithotherapeutic effects? Stimuli responses must be tested according to a double-blind placebo-controlled survey. WHAT mineral to use FOR WHAT to do? It is a *a priori* complex study! WHAT scaling to use?, FOR WHAT treatment?, WHAT mineral to chose and WHY?, HOW and WHEN to treat? The characterisation of jade or jasper varieties, for example, is a challenge. The first difficulty is to identify commercial affordable sources of jade, nephrite and serpentinite, for testing for treatment of night urination difficulties.

Each control, placebo or treatment record is lasting at least 120 days. Compared with control, jadeite or nephrite enhances night quality with a decrease of at least 15 fold of awakenings and urinations. Depending on the jade variety, and its trace elements, properties change. Nephrite suits better with a 20 fold enhancement. The highest of all placebo effects was below a 4 fold

increase. The mineral crystal structure is evidenced to have an action. The area of contact of a stone with the skin is the limiting factor of an energy transfer. The day phase of our life is structured in cycles as the night phase is. Placebo effects are greater during the conscious day phase than during the unconscious night one, but red jasper treatment enhances significantly the number and the intensity of diurnal physical working. Minerals act in a dose-dependent manner as drugs do. Using hematite before serpentinite (jadeite or nephrite), enhances the effect, as with chemical agonists, minerals may act in synergy. Hematite sole gives a placebo effect. But hematite increases serpentinite effect from a 15 fold value to a 22 fold one. Surprisingly, within an interactive network of clocks, the latency phase of the whole is shorter than the shortest latency phase of each clocks, thus enhancing the system reactivity to changes: as a whole, a system is defined by some unanticipated emergent properties.

Lithotherapy with affordable, easy to obtain, and not subject to imitation minerals is a smooth way for an individualised, easy to use, non-violent, and non-invasive therapy to treat chronic pathologies, helping people in their today way of life. Chronobiology is a way of thinking not only for knowing diseases causes and to elaborate treatments, but also for apprentice assisted learning: the right interaction at the right place and the right time for the right person with the right person. New ways of research are emerging.

SOCIAL RESPONSIBILITY AS A NEXT STEP IN DEVELOPMENT OF SYSTEMIC BEHAVIOR TOWARD SYSTEMS SOLUTIONS OF SYSTEMIC PROBLEMS OF TODAY

Matjaz Mulej
University of Maribor, Faculty of Economics and Business
Slovenia

The modern education prefers narrow specialization in order to generate professionals with sufficiently deep knowledge in the selected rather narrow part of the entire humankind's knowledge. The modern practitioners seem to be the ones demanding this narrow specialization from their employees. Especially the modern neo-liberal economic theory tends to neglect any coordination and cooperation except by the so called free market. Though, data show that no laureate of the Nobel Prize for economics has provided any empirical evidence that competition works better for the entire society than cooperation. On the other hand, data about the socio-economic situation in the world show a poor and dangerous result of their concept in practice:

- monopolization rather than competition is dominating the world economics,
- the share of the richest few percent is higher than ever after the global economic crisis of early 1930s,
- 85% of the current humans earn less than six USD a day,
- Incomes of managers have grown twentyfold and in banks even more, while the employees in the western countries earn no more or even less that decades ago,
- The current number of refugees is bigger than the huge 56 million victims of the 2nd world war,
- Since the USA president has proclaimed the war on terror, the number of local wars keeps growing, which means that the 3rd world war is here,
- The fourth phase of the development of the basis of competitiveness is here for the richer 15 percent: after ownership of the natural resources, investment in their better exploitation, and after the innovation phase, the affluence phase is dominating,
- The affluence phase provides for an easy and rich life, but at the same time it kills ambition to work hard in order to have everything necessary, because the real needs are covered and the fictitious needs provide some market and ruin a lot of nature,
- The global debts are nearly three times bigger than the global GDP, the Japanese ones are four times bigger, and the USA and China have close to 220% of GDP in debts, while the debts to nature recovering are not even included,
- The multinationals are governing over government, claiming even their right to be reimbursed, if they must take care of the health of nature and humans,
- As a result, the nature and the society are so badly damaged that NASA etc. project a very dangerous future: in only two decades the world population might be decimated.
- Etc.

The common denominator of all the briefed attributes of the current global economics and natural environment of humans can be seen in the lack of systemic behavior:

- Ludwig von Bertalanffy wrote very clearly that he
    - had created his General Systems Theory against the over-specialization,

    - sees no bright future unless humans become citizens of entire world rather than of single countries and care for the entire nature rather small pieces of it only;
    - the notion system covers holism/wholeness rather than a narrow specialization; it relates to concepts that used to be considered metaphysical rather than scientific (because science developed the narrow specialization and delimitation of single (sub-) disciplines.
- Norbert Wiener created his Cybernetics in interdisciplinary creative cooperation;
- Therefore, not every complex part of the real life, even less every single topic of consideration may be called a system, but only the one that is worked on in an interdisciplinary creative cooperation – of the interdependent professionals.
- Both Bertalanffy and Wiener are poorly considered now, which causes very dangerous consequences for humankind and its natural preconditions of survival.

In the late 20th century the concept of social responsibility started to be changed *from being nice and do charity* to a much broader concept that is very close to an indirect revival of systemic behavior. In 2010 these efforts resulted in the international advisory standard ISO 26000 with its three basic notions:

- Social responsibility is defined as everyone's *responsibility* for their influences on humans and nature, i.e. on society;
- The seven basic contents are summarized in a circle, which is broken at its bottom for the concept *interdependence*,
- At the top the same circle is broken for the concept *holism*.

These three notions summarize the essence of the concepts of the (grand-) fathers of systems theory and cybernetics, briefed here earlier. What is added to their concepts is important too:

- The seven principles fortifying the mentioned three basic notions;
- The seven steps of making the systemic behavior by social responsibility the practice.

The ISO 26000s seven steps of integration of SR can be divided in two groups (author's note):

a) Insight into the given practice:
    1 the relationship of an organization's characteristics to SR
    2 understanding the SR of an organization
    3 practices for integrating SR throughout an organization
b) Resulting action for more SR:
    4 communication on SR
    5 enhancing credibility regarding SR
6 reviewing and improving an organization's actions and practices related to SR
    7 voluntary initiatives for SR.

Thus, the seven principles of SR can become reality:
1 accountability
2 transparency
3 ethical behavior (Ethical behavior is defined as: values of honesty, equity and integrity, i.e.: concern for people, and the environment and *commitment* to address the impact of its activities and decisions on stakeholders' interests.)

4 respect for stakeholder interests
5 respect for the rule of law
6 respect for international norms of behavior
7 respect for human rights.

On this basis, the humankind has a better chance of survival.
The seven core subjects cover everything essential; they are quoted in ISO 26000 (ISO, 2010): governance, management, organization; labor practices; environment; fair business practices; customers; human rights; community involvement and development. They are to be considered in interdependence and synergy based on two linking concepts: interdependence, and holism.

ISO 26000 states very correctly:
"An organization should look at the core subjects holistically, that is, it should consider all core subjects and issues, in their interdependence, rather than concentrating on a single issue. Organizations should be aware that efforts to address one issue may involve a trade-off with other issues. Particular improvements targeted at a specific issue should not affect other issues adversely or create adverse impacts on the life cycle of its products or services, on its stakeholders or on the value chain."

This clear definition requires the concept of holism and hence the concept of holism and wholeness to be more clearly defined as many authors in systems theory and cybernetics do due to their specialization, which contains little or no education in interdisciplinary creative cooperation.

This requirement recalls and supports systemic behavior (more in Mulej et al., 2013) and hence requires any effort to meet the Mulej and Kajzer (1998) *law of requisite holism* that states:
• Holism that is restricted to one single viewpoint is fictitious and misleading, making people forget that other viewpoints explore other parts of attributes of the same reality, and their insights are complementary to the ones from 'our' viewpoint.
• Holism is real only, when it is total to cover totally all attributes from totally all viewpoints and totally all their synergies. This reaches beyond human capacities, even in a team's interdisciplinary creative cooperation.
• Hence, the requisite holism lies between these two extremes. It can be defined only for every single case; authors must accept their responsibility for their choice of their selected 'dialectical system', i.e., their synergetic network of their selected essential viewpoints and relations and resulting synergies.

ISO 26000 is supported by the European Union (2011) as the way out from the current crisis; equal support is offered by several international organizations, including the ones of enterprises. Thus, the real humankind's problem are the most influential and greedy individuals and their global corporations. They are ruining the entire world, including the world of their own children and grand-children, by their big impact and lack of social responsibility, i.e. systemic behavior. To them, the war is no problem, but a chance for profit, while the broader and more long-term consequences are left aside.

Thus, the problems of survival of humankind are hidden more in values, culture, ethics, and norms, than in scientific knowledge:

- Education should go in the direction ‘knowledge-cum-values’ rather than knowledge alone,
- Practitioners should require, and get, professional with
    - ethic of interdependence,
    - capacity of and deep devotion to
        - interdisciplinary creative cooperation rather than individualism with over-specialization,
        - the rather broad and long-term criteria of efficiency and effectiveness.

Happiness of humankind and survival of humankind are the basic unavoidable goals, profit is one of several tool supportive of these goals. The alternative is the end of the current civilization, nothing less. This is why systemic solutions to systemic problems are urgent.

AN OUTLINE OF SECOND-ORDER SYSTEMS SCIENCE

Karl H. Müller
Steinbeis Transfer Center New Cybernetics
Vienna, Austria

The emergence of second-order science can be considered as a rather recent phenomenon and is based on a differentiation of the overall science system into three distinct levels, namely into

- first-order science as the traditional science system of exploring the world
- zero-order science as the new network of research infrastructures across all scientific disciplines with its catalytic function of enabling and accelerating first-order research through new experiments, data and information resources
- second-order science as the science of reflecting on the explorations of first-order science can be traced back to the rise of meta-analyses in the 1970s, operates as the systematic study of ensembles of building blocks from first-order science like theories, patters, relations, results, etc. and, like research infrastructures, works across all traditional disciplines and fields as well.

The general goals for second-order science can be summarized in the following way.

- First, second-order science aims at higher levels of robustness with respect to the outputs of first-order science.
- Second, second-order science is able to achieve higher levels of generality or integration, compared to the inputs or outputs of first-order science.
- Third, second-order science opens up new perspectives, produces highly innovative results and is capable of acting as an innovation pump for the overall science system.

In this lecture an outline will be presented on different pathways for the new field of second-order systems science. The presentation will be focused on three different trajectories for second-order systems science which correspond to the three main principal goals of second-order science.

- The first goal for future research design is to be able to provide higher levels of robustness, due to a pooling of data and a much wider data-base.
- The second path for research provides outputs or results with higher levels of generality or integration which can then be used, explored and tested for subsequent investigations by traditional systems science.
- The third trajectory leads to innovative and novel fields for systems science in general which is made possible through a systematic accumulation of available inputs or outputs from conventional systems science.

In this manner an overview can be presented on a new branch within systems science which should and will empower systems science significantly in the future.

GROUP FACILITATION METHODS TO AID COMMUNITY DEVELOPMENT GLOBALLY

Stuart A. Umpleby
Department of Management
The George Washington University

Presently many organizations and individuals are working to improve the living conditions of people around the world. The United Nations, individual countries, and many Non-Governmental Organizations are working to ease the burdens and improve the lives of people, particularly the poor. This presentation describes the work of the Institute of Cultural Affairs, an organization that practices grass roots organizing and trains people in rural or urban communities to work together to identify problems, and build networks of supportive people and organizations. In the 1960s the Institute of Cultural Affairs, based in Chicago, Illinois, started working with poor communities. They developed some very useful methods for facilitating group conversations. They gradually used these in poor communities around the world. They would come together each summer to discuss what worked and what did not. They would modify their methods, plan the next year's activities, implement the activities, then meet the following summer to discuss progress. Academics do something similar with annual conferences, but they are more focused on publishing academic articles than on improving the lives of real people in real communities. For examples of such conversational exercises, see www.gwu.edu/~umpleby/ptp.html

Currently the global network of universities is growing rapidly and striving to improve. Universities have large numbers of students and faculty members seeking to advance knowledge in the social sciences, using a conception of social science taken from the physical sciences. But social systems are composed of purposeful, thinking participants, not inanimate objects. In addition to searching for reliable cause and effect relationships more of what is called social science could be devoted to developing conversational methods that aid joint action toward shared goals. If this goal were to be accepted within the social sciences in universities there would be a great increase in the number of people working to improve social systems and developing more effective social change methods.