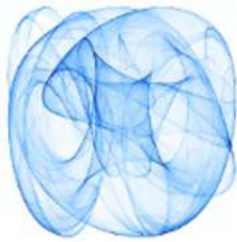


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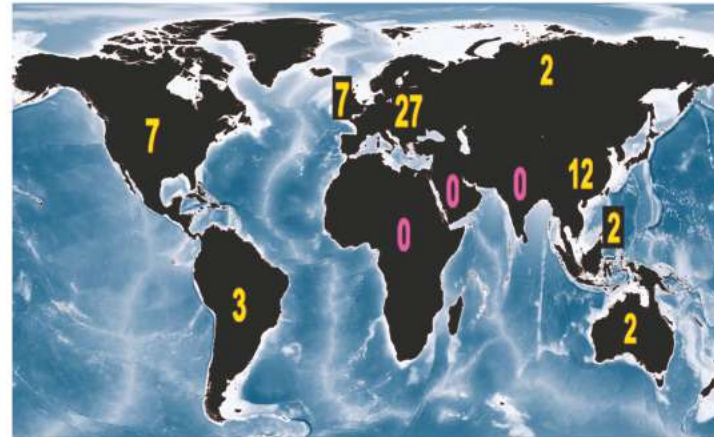
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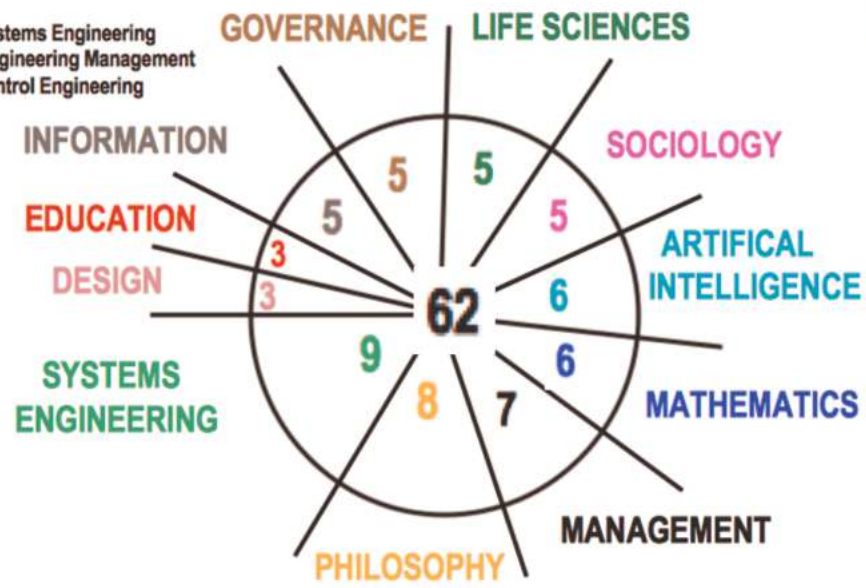
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Living Systems Variance and Invariance: Multi-scale Determinism and Indeterminism.

Pierre BRICAGE

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Abstract

The relationship between 2 actors of every living system is described using allometric laws, e.g. the metabolic rate of a lot of species was supposed to be proportional to its mass according to a 3/4 exponent power-law (Kleiber law). But according to **the paradigm of the gauge invariance of living systems** an other explanation of the invariant scaling of living systems is proposed with a 2/3 power-law. System of systems, emerging by embedments and juxtapositions of previous ones, a living system, whatever its level of organization, effectively functions in 4 dimensions (V_A : the Adult system Volume and t_g : the time of generation, the duration that is necessary to acquire the capacity of reproduction). **Brownian motion** is the basic fundamental process that governs its functioning. Every new living blue-print is always emerging by the merging of previous ones into an **Association for the Reciprocal and Mutual Sharing of Advantages and Disadvantages** -ARMSADA-. Considering the gauge invariance paradigm as a system, from the quantum of Planck to the whole Universe, a meta-analysis of a database of living systems internal (endophysiotope) and external (ecoexotope) interactions allows to quantify 45×18 **allometric relationships**. This allows to evidence -invariant independent processes (power-law exponent $\epsilon = 0$), -regulation processes of simultaneous limiting interactions ($\epsilon = +1$), -retro-action processes ($\epsilon = -1$), -competition between actors ($\epsilon = 1/2$) and -optimal exchanges flow ($\epsilon = 2/3$). From the Monera to the ecosystem levels the increasing of regulation processes allows more and more independence of the endophysiotope from the ecoexotope dependence. From the point of view of matter and energy flows, living systems optimize the input and output exchanges at their interface. The greater diversity of regulation processes occurs for the throughput flows into the endophysiotope. Whatever the level of organization living systems optimize their survival by changes of **the capacity to be hosted of the endophysiotope** according to the changes of **the hosting capacity of the ecoexotope**.

Key words: adaptation, adult phase, ago-antagonism, allometry, Brownian motion, controls, convergence, ecoexotope, embedment, endophysiotope, ergodicity, exaptation, exchange interface, feed-back, gauge invariance, growth, homeorhesis, homeostasis, iteration, integration, interactions, juxtaposition, limiting factors, modularity, networks, nodes, organization levels, percolation, power laws, reproduction, symbiosis

Pierre BRICAGE

Pierre Bricage, retired professor of Biology and Health and Social Sciences Engineering at the Université de Pau et des Pays de l'Adour, France, Europe, has made contributions in the fields of biology and ecology through teaching and researching in plant, animal and Human biological rhythms and physiology. He has researched the **biochemical, ecological and genetic determinisms** of plants growth and development. Focusing on the **sustainable management of natural resources, environmental education**, systems, and applied micro-informatics, he contributed to the fields of **engineering, technology and informatics**. His works on biotechnology include patents, co-contributions of bacterial strains, chemicals, quality control methodology and softwares. He has led training programs on governance, educative information and communication numeric technology. His contribution to the field of health engineering includes an AIDS curative vaccine methodology and a cancer curative vaccine one. In the field of societal engineering, he has researched topics such as associative governance, anthro-politics, territorial system governance and **systems evolution**. Pierre Bricage has published more than 250 works in over 20 countries. He has been appointed Vice-President of the French Association of Systemics and Cybernetics (AFSCET). Past deputy Secretary General of UES-EUS, Director of the World Organisation of Systems and Cybernetics (WOSC), he currently serves as the IASCYS Secretary General.

Trying to control migration between zones in the world

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Abstract

It is a fact that migration is a worrying problem in some world areas. Literature shows many studies about it. Nevertheless, no solutions out of common sense ones have been proposed. Assuming that the key implied factors are development and demography, we suggest in this research, as a first step, to state a stochastic demographic model neither considering sexes nor ages, but including the necessary and adequate economic, education and health variables. This model will be able to optimize, by means of a genetic algorithm, the amount and proportion of the main development indicators in different areas of the world, in order to reach the desired values of the population present in each area. The considered world areas are: Arab States, East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, South Asia, Sub-Saharan Africa, Middle East & North Africa, and North America. The input variables to be optimized (control variables) are those referred to health, education and economy (Life expectancy at birth, Adult Literacy Rate and Gross enrolment ratio for primary to secondary and Gross Domestic Product income (GDP) per capita), per world areas. Demography rates such as Net Migration Rate, Birth Rate and Death Rate are calculated from these input variables. The necessary data to calibrate and validate the model come from the World Data Bank and the UNDP reports.

Keywords: migration; development; stochastic demographic model; genetic algorithm; optimization.

Antonio CASELLES

Antonio Caselles has been the Vice President of the "Sociedad Española de Sistemas Generales" (SESUGE), the Spanish Society for General Systems, which is a member of the International Federation for Systems Research and the European Union for Systemics. He has also been the Director and Editor of the "Revista Internacional de Sistemas" (International Systems Review), a publication of SESUGE. Caselles is interested in the construction of logical-mathematical models which attempt to reproduce the structure and behavior of complex social, biological or ecological systems. These models, as computer programs, allow managers to simulate intervention strategies. He focuses on the automatic programming of computers including search functions that interrelate several variables (*data mining*). Caselles is the author of more than 100 articles published in scientific journals or as book chapters about systems theory and its applications to real-life problems, especially socio-economic, ecological and psychological problems. He has conducted diverse research projects with competitive public financing and has consulted with private companies and government agencies. He is the author of the books: *Control del desempleo por Simulación* and *Modelización y simulación de sistemas complejos*.

The Necessary Conditions for Human Flourishing in the Anthropocene

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Abstract

The phenomena which lead scientists to claim and name the new Earth epoch as the Anthropocene are upon us. The patterns of evidence can be experienced in daily living. We humans are born into an enabling world that brings forth our systemic sensibilities.

However, through cultural and institutional misalignment we have subjugated or undermined our natural systemic sensibilities. What has displaced our natural, systemic sensibilities is an institutionalised set of commitments to a systematic paradigm that promotes thinking and acting in terms of linear cause and effect, a focus on objects or elements rather than the relations between them, and a naïve, destructive, set of beliefs founded on what some describe as ‘classical faculty psychology’.

We thus need to understand how we might recover, rebuild or reinvest in our systemic sensibilities which are integral to developing systems literacy and systems thinking in practice (STiP) capability. Only by corraling sensibility, literacy and STiP capability will we be able to invent and enact the new governance systems that our times demand. This is also the necessary pathway to fully appreciate the hidden power of systems thinking because sensibility alone is not enough to transform our governance systems such that they are fit for surviving and thriving in an Anthropocene that is impacting on us all.

Keywords: Anthropocene, governance, systems thinking

Raymond ISON

Raymond Ison is a professor of systems at the School of Engineering & Innovation, Faculty of Science, Technology, Engineering & Mathematics, The Open University UK, Walton Hall, Milton Keynes, MK7 6AA, UK, <http://www.open.ac.uk/choose/ou/systemsthinking>. He is also President of the International Federation for Systems Research (IFSR), a Trustee for the American Society of Cybernetics, and Director of the World Organisation of Systems and Cybernetics (WOSC). Ison focuses on Systems scholarship that draws on second-order cybernetics and the biology of cognition and for developing the use of Mode-2 modalities of research practice. He has made significant contributions in the areas of systemic governance, systems practice and social learning, systemic environmental decision making, ‘knowledge transfer’, design of learning/inquiring systems and agricultural/food systems. His research has found practical application in diverse fields including water management, organizational change, staff induction, Higher Education reform and rural development. Ison was awarded the Wesley College Foundation Medal by the University of Sydney in 2016. Ison is the author, co-author or editor of six books, nine journal special editions, 37 book chapters, and 137 refereed papers.

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The Systemic Methodology of Organization of Active Innovative Media

Helena Knyazeva

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Abstract

Some methodological foundations of effective construction of active media for innovative development are under consideration in the paper. The ideas of universal evolutionism, ecology understood in an extended sense, emergent properties, time management, and the creating desirable futures turn to be useful here. The modern evolutionism is based on the theory of complexity and non-linear dynamics and includes the ideas of uneven in tempo and cyclical course of evolution, the appearance of emergent properties of systems at different hierarchical levels, the mutual activity of complex systems and their environment, active adaptation and enactive behavior of systems or their elements, the possibility of influencing the course of evolutionary processes in complex active media in order to choose favorable ways of development in passing points of instability, to construct trends, and to shape preferable and attainable futures. Knowledge of principles of co-evolution of complex systems allows us to disclose the basic meanings of a new concept of "assembling a subject". The assembling a subject of action and management is inseparable from an assembling the world. Under the assembling the world can be understood the ways of birth and self-maintenance holistic entities in it, the integration of parts into a whole while constructing complex systems, i.e. *nonlinear synthesis* of parts into whole (S.P. Kurdyumov). The world in its assemblage and a subject in his assemblage are in relation to mutual determination and mutual construction. Dispositions of an individual (a subject) to his perception, thinking and action, that is his *habitus* (M. Mauss, P. Bourdieu), are objectification of social structures at the level of individual subjectivity. The individual draws into himself the world, just as the world is built through dispositions of minds of individuals serving as knots for the growth of complex structures and the formation of active reflective media. The structure of individual consciousness seems to be isomorphic to the structural conditions of the world in which it arises. Co-evolution is not simply a process of adjustment of parts to each other by formatting a complex evolutionary whole, of resonant positional relationship of parts and synchronization of their tempos of development, but it is enactive cognition of the world by a human being, synergism of knowing, acting and constructing subject and of the world surrounding him, his medium. This is also an interactive connection between human organizations and single individuals, the universal collaboration, complicity and solidarity, concerted efforts in constructing and rebuilding of the world, and thereby their own mentality. This is a discovery of universal affinity of all with everything and of mysterious connection between the past, the present and the future.

Keywords: active innovative media, co-evolution, complex systems, emergent properties, evolutionary holism, nonlinear synthesis, time management, universal evolutionism.

Helena KNYAZEVA

Helena Knyazeva is a professor at the National Research University Higher School of Economics in Moscow. She sits on the board of the Bertalanffy Center for the Study of Systems Science, the Association of Complex Thinking, the German Society of Complex Systems and Nonlinear Dynamics and the Russian Philosophical Society. Knyazeva is also an editor for *Ludus complexus: Revista Multiversitaria de complejidad*, *Praxema: Journal of Visual Semiotics*, *Complex Systems: An Interdisciplinary Scientific Journal*, and *Exploring Unity through Diversity*. Her fields of expertise include philosophy of complexity, synergetics, cognitive complexity, enactivism, methodology of interdisciplinary studies, theory of innovations, and futures studies. Knyazeva has authored about 450 publications, including 10 monographs and 23 peer-reviewed journal articles. Knyazeva has been appointed to the Academic Council of the Multiversidad Mundo Real Edgar Morin and as a council member for the Darwin Project.

SOME CONSEQUENCES OF A LACK OF SYSTEMIC BEHAVIOR IN PORTS: A CASE.

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Key words: creative cooperation, logistic services, pollution, social responsibility, systemic behaviour

Abstract: Ports serve ships and inland with logistic services, first of all. Given the current technology, waste, pollution of air and water and land are difficult to avoid. These problems are additionally difficult to handle, if process participants fail to behave in a systemic way, i.e. with a (requisitely) holistic approach, based on interdisciplinary creative cooperation on the part of any of process participants and/or their combined teams. The contribution will present a case based on field research, combining observation of a port and use of systems approach in mathematical way.

Matjaz MULEJ <http://www.epfip.uni-mb.si> https://en.wikipedia.org/wiki/Matjaz_Mulej

Matjaz MULEJ, after his Doctorates in Economics/Systems Theory and in Innovation Management, used to work at the University of Maribor, where he still works with doctoral students. He works also in other Slovene higher education institutions. He retired in 2001 as Professor Emeritus of Systems and Innovation Theory. For the recent 10 years he has applied systems theory also to social responsibility as personal and organizational attributes – ethics of responsibility, interdependence and requisite holism. He published more than 1.800 publications in over 40 countries (see: IZUM/Cobiss/Bibliographies, 08082). He was visiting professor at foreign universities for 15 semesters, mostly in US, including Cornell (as Fulbright scholar), also in Austria, China, Germany, Mexico, and gave talks in about 50 further universities around the world. He consulted to organizations in 6 countries about 500 times. He is author of **the Dialectical Systems Theory** (see: François, 2004, International Encyclopedia), **Innovative Business Paradigm and Methods for transitional countries and enterprises**; many millions of innovation results value are reported. He is a member of the European Academy of Sciences and Arts, Salzburg (2004), European Academy of Sciences and Humanities, Paris (2004), International Academy for Systems and Cybernetic Sciences, Vienna, now in France (2010; establishing former head, now vice-president). He was president of IFSR, president of the Slovene Systems Research Society (since 1991), head of the research unit of IRDO Institute for Development of Social Responsibility. Under his impact University of Maribor became 'Sustainable and Socially Responsible University of Maribor' with an action program for 2014-2020. He was granted all available official awards for his work on non-technological innovations in Yugoslavia, Slovenia, Maribor and University of Maribor. In 2013-2016 he published and edited 9 books, 3 collections of articles (in Systems Research and Behavioral Science, Kybernetes, Systems Practice and Action Research) with more than 100 authors from 30 countries, and 4 conference proceedings, all about **systemic behavior via social responsibility**. His most recent award is HORUS platina award for 60 years of volunteering as a practice of social responsibility.

A SYSTEMIC INDEX OF HUMAN DEVELOPMENT: an application to the 22 Mediterranean Countries.

Francisco PARRA-LUNA

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ABSTRACT

The problems of the 22 Mediterranean countries are so obvious, so interconnected, and yet so increasingly close, that the part of Systems Theory more involved in the human, and more familiar with the complex interrelation of the factors that determine or explain social problems, is compelled to reflect and present any suggestion that could offer valid answers to the problems, or at least give rise to the formulation of new solutions acceptable to the world's political leaders.

It does not seem necessary to remember the cases of wars, terrorism, dramatic mass emigration, trafficking in persons, drugs, trafficking in women, female mutilations, etc., on the side of less developed countries, along with even more serious problems such as the general situation of women in the world, famines generated in large parts of the planet, tax havens, secrets banking, law fraud, corruption, etc. on the side of those considered "developed". And it will not be necessary to remember them because they will surely be in the mind, if not in the conscience as would be expected, of all.

Can you do something ?. Could the Social Systems Theory, by being specialized in the most unpredictable and complex, point out some idea? Perhaps it is positive to build and publish "urbi et orbi" a measure of the concept of "human development" that goes entering slowly and gradually into the consciences of the rulers. And in aiming this first idea will consist of the proposal to present a new "**index of human development**" that could well be applied without great difficulty by all countries of the world, and precisely through a new application as will be seen, from the well-known formula of systemic transformation $(T) = Y / X$ where "Y" are the Outputs and "X" the Inputs.

Keywords: Needs, Values, Human Development; Transformation; Global Index

Francisco PARRA-LUNA

Francisco Parra-Luna is an academician who has been president of and/or founded many systems theory organizations such as the **Association Internationale des Sociologues de Langue Francaise**, the **Sociedad Espanola de Sistemas Generales**, and the **Instituto Univesitario de Recursos Humanos**. He is also a member of the editorial board of the journal Systems Research and Behavioral Science. Parra-Luna is the founder and was the first president of the **Sociocybernetics and Social Systems Theory group in the International Sociological Association**. Parra-Luna has authored 19 books and more than 50 articles. Parra-Luna has won several prizes and distinctions including first prize from the Fundación Rumasa in 1979, second prize from the Institute de Estudios Laborales in 1979, the Prize del Centro de Investigaciones Sociológicas in 1982, the national prize on "Marketing político" in 1983, and the national prize for "Martin Artajo" on Employment Politics in 1987. He also had a square in the town Villanueva de los Infantes, Spain dedicated to him in 2010.

Systems Thinking in Practice: Three cases of Organizational Cybernetics application

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Abstract

Organizations in general and companies, in particular, are facing enormous complexity. This complexity is generated by the multiple dynamic interactions among economic, demographic, political, ecological, sociological, etc. issues. We could identify many different kinds of complexity, but in this work, we will focus mainly on three types: dynamic complexity, structural complexity, and complexity in group decision making. Within the systems thinking field, several approaches help to face those. Good examples, among many others, are Organizational Cybernetics (OC), Team Syntegrity (TS) and Systems Dynamics (SD). In this work, we will focus our attention mainly on the first two approaches.

It has been expressed by managers of both public and private organizations their need for a structured facilitative process that can guide the application of these approaches. In this work, I present a conceptual framework that, based on Beer's Viable System Model (VSM), it aims at helping managers to cope with the complexity faced by their organizations. I will also present three examples of application. One is related to the use of OC to help the design and implementation of strategic management policies in a big public institution. The second example shows how it was applied to make a diagnosis of the organizational structure of an international industrial company. And the third example presents the results of applying TS and ICT tools to improve the quality of the decisions of a group of qualified persons.

Keywords: cybernetics, management, organization, syntegrity, Viable System Model

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Second order systems: theory and applications.

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Abstract. Drawing on concepts from systems theory and second order cybernetics, notably the work of Gordon Pask (1975, 1976) and Heinz von Foerster (2003), I outline a unifying general, transdisciplinary theory of second order systems. In brief, a second order system is conceived of as a 'psychosocial unity' embodied in one or more 'biomechanical unities'. The unities are autopoietic (self-reproducing) in the sense of Humberto Maturana (Maturana and Varela, 1980). The main features of the theory are described, including: the emergence, ontogeny, dynamics and interactions of second order systems. I also discuss metrics for measuring the complexity of second order systems. Also given are explanations and examples of how the theory can be applied to individual social actors and, recursively, to collectives, such as families, organisations, social systems, and cultures. The examples draw from my own work in organisational psychology, cognitive psychology, educational psychology and educational technology. Critical comparisons are made with the social systems theory of Niklas Luhmann and the cybersemiotic transdisciplinary framework of Søren Brier.

Key words systems theory, second order cybernetics, second order systems, transdisciplinary

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