

ABSTRACTS

OPENING LECTURE

COLLECTIVELY AUTOCATALYTIC SETS AND THE ORIGIN OF LIFE

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Theories of the origin of life have gone through several stages, with accompanying experimental work. The start of the modern era in this field lies with Stanley Miller's stunning early work showing abiotic synthesis of several amino acids, followed by an era of prebiotic chemistry, including sugars, nucleotides and other abiotically synthesized biomolecules.

With the discovery of the structure of double stranded DNA and RNA, focus shifted, largely in the work of Leslie Orgel, to the search for conditions in which a single stranded RNA molecule might line up free nucleotides according to Watson Crick base pairing, and in the absence of an enzyme, ligate these free nucleotides into proper 3', 5' phosphodiester bonds, make a template complementary strand, the two strands would melt apart and cycle. These experiments, after some 40 years, have never worked.

On the theoretical level, Eigen and Schusters' Hypercycle model was build upon template replicating RNA strands which formed a hypercycle in which replicating strand pair I, helped replicating strand pair I + 1 replicate around a cycle of such mutualistic strand pairs.

This era was followed by the RNA world hypothesis. The discovery of ribozymes led to a sustained effort in which two RNA world views predominated. In the first, a population of RNA ribozyme sequences would mutually catalyze one another's formation, creating what I will call a collectively autocatalytic set. In the second, a single ribozyme would act as a polymerase able to copy any RNA sequence, including itself - the first self replicating molecule it was hoped. At present, David Bartel has made a candidate ribozyme that can template copy 14 nucleotides.

We may be entering a third era. In 1971 I published a first paper in which polymers, such as proteins, could form a collectively autocatalytic set. This set arises as a phase transition analagous the phase transition in Erdos Renyi random graphs, but "one level up", in a world of chemical reaction graphs and a hypergraph structure in which some molecules in the reaction graph can catalyze some reactions in that very reaction graph. I will discuss how, at a sufficient diversity of polymers, the formation of such a collectively autocatalytic set arises with probability near one.

On the experimental front, G. von Kiedrowski made a single autocatalytic DNA sequence, then the first collectively autocatalytic set of two DNA sequences. In 1995 Reza Ghadiri at Scripps, made the first self reproducing 31 amino acid sequences, and shortly thereafter a collectively autocatalytic set of peptides. Recently, his former post doc, Gonen Ashkanazi has made a collectively autocatalytic set of 9 peptides. In addition, Ashkanazi has engineered these peptides to realize all Boolean functions of 2 inputs, so autocatalytic sets with complex dynamics can now be studied.

Still more recently Mike Steel and Wim Hordijk have improved on my own initial model, showing that the density of catalysis can be much smaller and still yield a phase transition to collectively autocatalytic sets.

At present we are at the stage of generating random "never before born" peptides. I made the first libraries in the late 80s and 90s. Luigi Luisi and independently, Tetsuya Yomo have made such libraries. In 1996 Thomas LaBean in my lab showed that such random peptides fold to molten globules or better. This work has been repeated by both Luisi and Yomo. It is known from phage display that the probability a small peptide binds an epitope is about one in a million. The probability of catalysis of a specific reaction is still unknown. I personally hope collectively autocatalytic sets will be generated soon.

I note that these autocatalytic sets can be fully exergonic. Real cells link exergonic and endergonic reactions, and more specifically carry out work cycles of such reactions. My hope is that these will be achieved in the near future, and wedded to reproducing liposomes to create the first proto-cells. Roberto Serra is working at this level, Eors Szathmary is as well, showing open evolution of collectively autocatalytic sets.

Finally I mention new work at the frontier of the quantum world and classical world, in what I am calling the "Poised Realm" whose dynamics are neither Schrodinger's equation for closed quantum systems, nor classical behavior, but very new behavior for open quantum systems in a quantum/classical environment. My own belief is that life lives partially in the Poised Realm.

PLENARY

NONLINEAR BRAIN DYNAMICS IN PERCEPTION: THE 'CODES' OF THE BRAIN

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A major challenge for neuroscientists is to deduce and explain the neural mechanisms of the rapid transposition between stimulus energy and abstract concept - between the specific and the generic - in both material and conceptual aspects. Brain researchers are attempting three explanations of perception in terms of neural codes. Cellular neurobiologists find rate and frequency codes for stimulus features in trains of action potentials induced by stimuli and carried by topologically organized axons. Cognitivists correlate grouped firings of nerve cell assemblies with generalizations over classes of stimuli (faces, objects, odorants, words, etc.). Dynamicists correlate 2-D spatial patterns of brain waves (EEG) with the meanings of stimuli. The patterns self-organize and evolve on trajectories through high-dimensional brain state space. This multivariate code is expressed in landscapes of non-convergent ('chaotic') attractors, which form the memory bank of the brain. Each pattern resembles a Nambu-Goldstone boson condensate in a dissipative system. It forms by a discontinuity in the oscillation of the EEG when a stimulus directs a search trajectory across a separatrix into a basin of attraction. Convergence to an attractor activates a memory of the stimulus, which is expressed in the spatial pattern of amplitude modulation of a carrier wave. It is proposed that cortical dynamics is governed by the interplay between point and limit cycle attractors in a state of self-organized criticality. The discontinuities are precipitated by beats in Rayleigh noise, by which the signal-to-noise ratio approaches infinity, i.e., a singularity. It should be noted that the field of neural activity is a continuous vector field having soliton-like properties within its well-defined life-span and correlation length, quite unlike the scalar fields of electric and magnetic potential by which the neural activity is measured.

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PLENARY

WORKING WITH NEW PARADIGMS AND CHALLENGES IN CONTROL THEORY

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In the last years, the development of automation and its pervasive diffusion in a large number of industrial installations and of devices of common use has given rise to control problems which do not fit perfectly with the classical paradigms of control theory. This has raised the interest in developing new paradigms, which can handle e.g. the inherent complexity of problems involving hybrid dynamical structures and/or distributed control/computational capabilities. In this paper, we briefly illustrate two areas of research in which new points of view, control schemes and models have been proposed for dealing with networked control systems, in one case, and with home automation systems, in the other. Although different in many aspects, the two situations we consider provide good examples of the work that has to be done, on one side, at a technical, operational level to find new design solutions to specific control problems and, on the other side, at a more foundational level, to provide comprehensive frameworks in which complex systems can be modelled and studied.

1.

**INVENTIONS AND SUSTAINABILITY
IN AN AGENT-BASED MODEL OF INNOVATION**

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One of the most intriguing observations on societies is the growth of the number and diversity of artifacts that human beings use. But social scientists are not able to prove the sustainability of the innovation processes that provides all these artifacts, and it is difficult to discover what sort of conditions might lead to their crisis and even collapse. In this paper we present a model based on a social organization theory that is able to simulate worlds where the number and diversity of artifacts grow unboundedly. We discuss some results and make observations useful for understanding the processes that sustain the growth of diversity in social organizations and in the artifacts around which they are organized.

2.

SUBTHRESHOLD THOUGHTS DISORDER: A CONTINUUM WITH PARANOID DELUSIONS ? THE ROLE OF ATTRIBUTIONAL HEURISTICS BIASES IN A SYSTEMIC THEORETICAL FRAMEWORK

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The aim of present paper is to comprehend if delusional thought (mainly of paranoid type) is at the end of the spectrum of heuristic thinking biases (in particular of social and attributional biases), rather than regard it as a discontinuity from the form of thought shared among people. The systemic interest of this hypothesis is that what we consider to be clinically more severe (delusions) may in fact represent only the tip of the iceberg in a series of sub-threshold thinking disorders, that, just because it is very common and socially accepted, represent a more serious kind of human miscommunication, also justify dangerous behaviour derived i.e. from moral disengagement. An unitary hypothesis that links sub-threshold thoughts disorder to delusions, is that, both, from a psychological point of view, serve to preserve our self-esteem.

3.

A SYSTEMIC MODEL OF METACOGNITION

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Metacognition is a capacity that allows us to represent ourselves as are associated with what surrounds us, or others, draw up hypotheses about the meaning of our conduct, and behaviour of others (or individually or in between them). Can also be defined as the ability to predict, explain or interpret actions of other people attributing to them resolved: beliefs, intentions, wish. Closely related to metacognitive ability, is empathy that it is more complete definition is conceived as: the capacity identification with moods and with the thoughts of other people on the basis understanding of their emotional signals, recruitment of their subjective perspective, sharing their sentiments. It is unclear whether metacognition and its deficits can be considered as a unitary phenomenon, or its dysfunction may depend on the cognitive deficits that may be easier its base (such as attentive, learning, perceptual, memory, problem solving strategies, and executive function deficits). Proposed here is a systemic model of metacognition.

4.

EMERGENT PROCESSES AS GENERATION OF DISCONTINUITIES

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In this article we analyse the problem of emergence in its diachronic dimension. In other words, we intend to deal with the generation of novelties in natural processes. Our approach aims at integrating some insights coming from Whitehead's Philosophy of the Process with the epistemological framework developed by the "autopoietic" tradition. Our thesis is that the emergence of new entities and rules of interaction (new "fields of relatedness") requires the development of discontinuous models of change. From this standpoint natural evolution can be conceived as a succession of emergences — each one realizing a novel "extended" present, described by distinct models — rather than as a single and continuous dynamics. This theoretical and epistemological framework is particularly suitable to the investigation of the origin of life, an emblematic example of this kind of processes.

Keywords: diachronic emergence, constructivism, hierarchy theory, non-algorithmic processes, origin of life.

"Order is not sufficient. What is required is something much more complex. It is order entering upon novelty; so that the massiveness of order does not degenerate into mere repetition; and so that the novelty is always reflected upon a background of system." (A.N. Whitehead)

5.

THE DYNAMICS OF KNOWLEDGE TRANSFER IN INDUSTRIAL CLUSTERS AN APPLICATION OF BOOLEAN NETWORK MODELING

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The analysis of industrial clusters has been carried on until now almost prevalently through the traditional statistical approaches used in empirical research. The growing and promising studies of inter-firm relationships stimulated the application of network methodologies, mostly confined to social network analysis. However, though this methodology gives a lot of interesting results, it suffers of the limitation of being static. In order to overcome this failure, this paper applies the methodology of Boolean networks, which allows a dynamic analysis. More specifically, the focus is on the knowledge exchanges flowing through the network of collaborations for innovation, which is indicated by current literature as a fundamental factor of competitiveness of industrial clusters. In particular, it has been studied the inter-firm transfer of managerial knowledge into the aerospace industrial cluster of the Lazio Region (Italy). Both the application of the Boolean network methodology and the content of the managerial knowledge network are traits of originality respect to the literature on industrial clusters and inter-firm relationships. Moreover, for it uses empirical data and introduces some innovative methodological devices this work can be an example replicable in other studies. The main findings are that the number of attractors are very sensitive to the threshold of activation of firms to transfer knowledge, and that even small changes determine the presence of key-players in the attractors (final stable states).

Keywords: absorptive capacity, aerospace industry, Boolean network analysis, industrial clusters, knowledge transfer, knowledge network, managerial knowledge, network dynamics.

JEL code: D83, L22, L23, L6, M15, R3.

6.

BERRY-LIKE PHASE AND GAUGE FIELD IN QUANTUM COMPUTING

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We show that global geometric properties and gauge invariance play a nontrivial role in quantum computing and in quantum optics. The covariant derivative operator is constructed and related to free energy. Global geometric (Berrylike phase) characterization of the system and its gauge invariant behavior are described as properties emerging from the collective behavior of fluctuating quantum phases of qubit states.

Keywords: qubit, berry phase, quantum computation, gauge theory

7.

TRANS-DISCIPLINARY INQUIRY THROUGH CONVERGENCE OF ARCHITECTURE, DESIGN, ART AND HUMAN SCIENCE

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One process of thinking collectively and systemically is trans-disciplinarity by means of human inquiry. Two dimensions complexity research process: Engaging other inquirers from other disciplines and utilizing those disciplines in furthering inquiry. Research Activity System is promoted as a conceptual framework to facilitate productive, collaborative inquiry. The convergence of architecture, design, art and human science provides fertile ground for research foci. Particular attention is given to the construct inducement and its relations to induction and emergence to illustrate purpose, meaning, and value of trans-disciplinary inquiry.

8.

MANAGING THE SELF-ORGANIZATIONAL DYNAMICS TO COMPETE IN COMPLEXITY

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Since the beginning of modern industry, the management's answer to the growing turbulence of the markets was the reduction of complexity through the institution of procedures, modelization and obsession for control. In this context organization shows a hierarchical-pyramidal organization featuring top-down functioning logics. This kind of management determines the arising of passive behaviours and dependency from the leader. In order to compete in a complex, discontinuous environment, companies must absorb complexity, enhance and govern the emergence of self-organizational logics inside the company itself, developing an increased resilience. This article aims at describing how companies can enhance self-organization and emergent strategic dynamics. After reviewing multidisciplinary studies in biology (autopoietic systems and genome redundancy), in physics (non-equilibrium thermodynamics), in cybernetics (self-regulation), in cognitive sciences (genetic epistemology), in the history of thought and after the evident affirmation of heterarchic dynamics in the market and in society, this work wants to present the bases for rethinking the management role and the concept of leadership, in order to be able to compete in complexity.

9.

ELEMENTARY PRAGMATIC MODEL

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A model of the human mind, its interactions and changes, called the Elementary Pragmatic Model - EPM, is presented. The model is a way of organizing thoughts; it is an entire mental construct that can be used in addition to the usual, natural way of working and using one's mind. The EPM derives from an interdisciplinary approach of psychologists, psychiatrists, physicists, computer scientists and mathematicians. Experimental data have shown that a specific sequence of a four-function procedure enhances the functional organization of the human mind.

10.

ARCHITECTURE AND DEVELOPMENT OF AND WITHIN SOCIAL SYSTEMS

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This paper concerns the modes of changing social (cultural, behavioral, etc.) models through architecture. It deals with the character of such changes, but not as the subversion of the properties and requirements (be they explicit, implicit or unexpected) of those social systems.

It defines the biunivocal, but non-linear, relationship existing (even in situations of equilibrium, incoherence, instability, or of a contradictory nature), between those social systems and the environments of their fruition. It illustrates the dual option of architectural design, as a modifier and/or transformer of inherited structures, clarifying their meaning, stressing the issue of the accountability of observer systems.

**DYNAMICAL SYSTEMS ON MONOIDS:
TOWARD A GENERAL THEORY OF DETERMINISTIC
SYSTEMS AND MOTION**

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Dynamical systems are mathematical structures whose aim is to describe the evolution of an arbitrary deterministic system through time, which is typically modeled as (a subset of) the integers or the real numbers. We show that it is possible to generalize the standard notion of a dynamical system, so that its time dimension is only required to possess the algebraic structure of a monoid: first, we endow any dynamical system with an associated graph and, second, we prove that such a graph is a category if and only if the time model of the dynamical system is a monoid. In addition, we show that the general notion of a dynamical system allows us not only to define a family of meaningful dynamical concepts, but also to distinguish among a cluster of otherwise tangled notions of reversibility, whose logical relationships are finally analyzed.

Keywords: Dynamical system, Reversibility, Irreversibility, Category theory.

12.

FROM PATTERN RECOGNITION TO IMAGE UNDERSTANDING

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To resolve the image search problem, an algorithm has to understand images, i.e., be able to describe their content using an adequate language. With that approach the comparison of images becomes comparison of descriptions. To accomplish the above goal the software was developed, which at the first step segmented the image. The segmentation is based on Dual Clustering procedure, which generates a limited number of segmentations and chooses the best according criteria. At the second step segments are recognized as notions “sky”, “vegetation”, “water”, “ground”, “mountains”, “buildings” and some more.

*“I stand at the window. Theoretically I might see there
were 327 brightnesses and nuances of color. Do I have “327”?
No. I have sky, house, and trees.”
M. Wertheimer (1923)*

13.

**INNOVATIVE USE OF SPACE
AND SOCIAL IMPLICATIONS OF COMPLEX SHAPES CONSTRUCTION**

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This paper tries to investigate the change of social use of space due to complex shape buildings design. The chances of conceiving free form architectural space in recent years have been drastically increased by the opportunities offered by the current means of digital design. The ultimate goal of this research, however, goes far beyond the intentions of the individual and his understanding requires collective forms of ownership. It is inevitable to ask what types of habitat could result from these scenarios, how are we changing social use of spaces? This paper tries to give some answers to these questions.

14.

ONTOLOGY EVOLUTION: HOW AN ONTOLOGY CAN CHANGE, AND HOW TO MANAGE INCONSISTENCY

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An ontology is a representation in a logical language of a domain. An ontology can change; a changing ontology can become inconsistent, thus preventing its further use for machine reasoning. We analyze what an ontology is from a computer science perspective, why it can change, and how to manage inconsistency in changing ontologies. The belief revision approach is not the only possible approach to maintain consistency during evolution: an ontology reengineering can rationally prefer to discard incoming information, or to refine the nature of conflicting implication axioms to derive meaningful answer from inconsistent ontology using paraconsistent logic.

REVERSIBLE DYNAMICS AND THE DIRECTIONALITY OF TIME

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The received view on the problem of the direction of time holds it that time has no intrinsic dynamical properties, and that its apparent asymmetry, to be understood in purely topological terms, is dependent on the directional properties of physical processes. In this paper we shall challenge both claims, in the light of an algebraic representation of time. First, we will show how to give a precise formulation to the intuitive idea that time possesses an intrinsic dynamics; this formulation relies on the fact that the algebraic properties of time can equivalently be understood in dynamical terms. Second, we shall argue that the directional properties displayed by the processes occurring in time depend on the directional properties of time, rather than the converse.

Keywords: Arrow of time, Dynamical systems, Time systems, Reversibility.

16.

**FIRST DRAFT OF AN EXPERIMENTAL PROTOCOL
FOR RESEARCH INTO META-STRUCTURAL PROPERTIES
IN SIMULATED COLLECTIVE BEHAVIOURS**

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We propose an experimental protocol for research into Meta-Structures in collective behaviours where measured values of the states adopted over time by all microscopic, macroscopic and mesoscopic variables are available to the researcher. The case considered is a simulated collective behaviour such as a flock of boids. Equivalent approaches may be adopted for non-simulated cases such as for Industrial Districts and Traffic where the same information over time is available contrary, for instance, to real flocks and swarms. We list the proposed variables and their measurements which, at a suitable threshold and level of scalarity, are to be considered for research into Meta-Structural properties in collective behaviours.

**THE SYSTEMIC NATURE
OF THE THEORY OF DIDACTIC SITUATIONS
IN MATHEMATICS (TDSM)**

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The theory of didactic situations in Mathematics (TDSM) has been proposed as a systemic theoretical model, designed to describe teaching and learning phenomena. This theory aims to become an experimental and application-oriented paradigm grounding the research activity within this domain. This contribution deals with an investigation about the occurrence, within TDSM, of the minimal conditions needed to qualify such a theory as “systemic”. In this regard it contains a discussion about the features of the elements of the didactic system, their usefulness to account for the typical characteristics of interacting agents, as well as the interactions between the features themselves. In particular, we will deal with the conditions which, within TDSM, allow considering learning processes as emergent from *situations*, that is specific didactic applications of mathematical objects or concepts, viewed under the form of a concrete implementation by an agent operating in an environment, and characterized by the effects produced on the environment itself by this agent.

**THE DISCONTINUOUS CONTINUITY:
A NEW PRINCIPLE OF PERCEPTUAL GROUPING
AND PART-WHOLE ORGANIZATION**

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Wertheimer (1923) in his pioneering study introduced the problem of grouping. The question he answered was: How do individual elements create larger (Gestalt) wholes separated from others? In a set of classical experiments, he discovered several grouping principles. The aim of this work is: (i) to introduce a new principle, called ‘Discontinuous Continuity’, based on conditions not considered by Gestalt psychologists, i.e. discontinuities within the same continuous edge; (ii) to demonstrate, through phenomenological and psychophysical experiments, the independence of this new principle from the known Gestalt ones; (iii) to introduce a new kind of perceptual part-whole organization, derived from the new principle, according to which discontinuous components are not only ungrouped (as the grouping principles can solely state) but assume the role of phenomenal ‘parts’ of an amodally homogeneous ‘whole’, that is the role assumed by the complementary continuous components.

Keywords: Gestalt psychology, perceptual organization, Gestalt grouping principles, part-whole organization, shape perception.

**TEACHERS AND THE EMERGENCE
OF MATHEMATICAL KNOWLEDGE
AGAINST THE BACKDROP OF SYSTEMS THEORY**

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The present study aims at singling out some distinctive aspects of teaching and learning elementary mathematics. We avail ourselves of the concept of *resonance* in order to make sense of regular and reiterated behaviour patterns observed in classroom practice, in teachers and students alike. By so doing, we try to describe some phenomena that characterise the emergence of mathematical concepts and skills in primary school. Embracing a systemic perspective, we suggest an account of the complexity of *didactic systems* that underscores the interaction between students' actions and teachers' decisions in the context of multiplicative problem solving. The ultimate goal of our research, therefore, is describing the constant and specific features of teachers' behaviour, as they emerge out of the mutual interplay among the various agents in a didactic system.

**INFORMATION AS ENVIRONMENT CHANGINGS
CLASSICAL AND QUANTUM MORPHIC COMPUTATION**

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The recent debate on hyper-computation has raised new questions both on the computational abilities of quantum systems and the Church-Turing Thesis role in Physics. We propose here the idea of “geometry of effective physical process” as the essentially physical notion of computation. A key element to understand the shape of the geometry in Quantum mechanics is the Fisher metric which meaning is connected with the stabilisation of the Classical mechanics by Quantum mechanics. Different researchers define the stabilisation as the manifestation of the dissipative process into the vacuum. We argue that no dissipation takes place, but a more general change occurs in Quantum mechanics. In Quantum mechanics we cannot use the traditional Euclidean geometry but we introduce more sophisticated non Euclidean geometry which include a new kind of information diffuse in the entire universe and that we can represent as Fisher information or active information. We remark that from the Fisher information we can obtain the Bohm and Hiley quantum potential and the classical Schrödinger equation. The bridge between Quantum mechanics and Classical mechanics is given by the Fisher metric in statistic geometry which value is obtained by Quantum mechanics. We can see the quantum phenomena do not affect a limited region of the space but is reflected in a change of the geometry of all the universe. In conclusion any local physical change or physical process is reflected in all the universe by the change of its geometry, This is the deepest meaning of the entanglement in Quantum mechanics and quantum computing. We stress the connection between metric and information as measure of change. We analyze how the standard form (quantum gates) and the non-standard form of the quantum computing can be seen as a particular case of the metric of the parameters space in the distribution of the probabilities. Because computation is not restricted to calculus but is the environment changing via physical processes, super-Turing potentialities derive from an incomputable information source embedded into the geometry of the universe in accordance with Bell’s constraints. On condition that we consider the formal concept of “universality” as a particular case of the universal geometry of the probabilistic space with its transformations we open the possibility that quantum oracles can be reachable. In this way computation is led back to the hidden universal geometry of the physical world. In the general relativity we define the geometry of the space time. In our approach quantum phenomena define the geometry of the parameters of the probability distribution that include also the space time parameters. To study this new approach to the computation we use the new theory of Morphogenic systems.

Key-words : Quantum Mechanics , Fisher Information , Morphogenic system , Statistic Geometry of Parameters , Projection Operator , Unitary Transformation, Quantum Statistics, Active Information and Quantum Potential.

**PICTURE BOOK READING WITH YOUNG CHILDREN:
A SYSTEMIC CONTEXT TO PROMOTE
THE CHANGE IN CHILDREN WITH AUTISM**

Dolores Rollo

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Picture book reading has been advocated as an important activity to promote children's language and literacy skills during the preschool years. In fact, picture book reading like a systemic context in which there are three fundamental components (a bookreader, a child and a book), has been linked to children's development of language, print concepts, emergent readings.

In addition to reading strategies, book choice by parents may be another way that parents continually challenge their children's linguistic skills during reading. According to Vygotskij's theory, books that are just beyond the child's current level of functioning, yet within their zone of proximal development, should be used for optimal language learning (1). The purpose of this study is to explore the effectiveness of the manipulative book to promote the change in the language of the children with autism.

**ENVIRONMENTAL CONFLICT MANAGEMENT
AS A SOCIAL LEARNING OPPORTUNITY**

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This paper deals with social conflicts, assumed as important development opportunities rather than as consequences to be avoided. Through the analysis of a frequent set of conflicts related to interventions on the built environment, some recurrent critical factors have been highlighted and discussed, in order to identify the learning potential that lies in conflict management processes. As the built environment is a complex system, the analysis adopted a systemic approach, paying particular attention to relationships and dynamics that develop between actors. The main cause underlying conflicts seems to be the use of an exclusive approach, consequently their management requires the use of inclusive tools, as participation. The development of participatory processes can help to manage conflicts related to interventions on the built environment by improving the effectiveness of communication between the actors, opening decision-making processes to different groups of stakeholder and contributing to better define the problems involving different and complementary knowledge systems. The development of a participatory approach is indeed a learning tool, since communities and groups involved can benefit from an increase in social capital.

A DYNAMIC “MODEL” TO SUPPORT THE ORGANIZING CHANGE DESIGN

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Henry Mintzberg, one of the founders of the modern organization theory, has studied the most suitable coordination mechanisms and planning parameters for an organization, according to the organization context and basing on the deductive analysis. Some years later, Peter Senge author of *The fifth discipline* through the concept of the Learning Organization, has created the necessary conditions to establish an organization, which will have to be sustainable in time and will have to include the systemic approach in itself. But, during these time of globalization and continuous increasing complexity, how can an organization be planned in order to be competitive while keeping surviving in the future and be adapted to fast and continuous changes of its environment?

In this article, we want to set the standard for an ambitious research project, addressed to the development of an innovative dynamic model to support the organizing change design. We have chosen to use the System Dynamics methodology for analyzing and creating a model, whose goal is to develop the five disciplines defined by Senge regarding the creation of a Learning Organization, by activating some strategic levers, which have been pointed out by Mintzberg in one of his five organizing models. The article highlights its development through a real operating experience in one of the most change-sensitive Italian government control companies (*Trenitalia*).

DESCRIBING CELL DIFFERENTIATION WITH RANDOM BOOLEAN NETWORKS

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Recent works have shown that the model of random Boolean networks, properly modified in order to take into account the influence of random fluctuations, can describe a set of phenomena which are related to cell differentiation. The main results are summarized here, and the methodological implications of this kind of models are discussed.

25.

SELFISH GENE OR ALTRUISTIC ORGANISMS?

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The paper presents an overview of works on emergence in genetic evolution of altruism and does some hypotheses, discussing the simulation approach to the evolution. After an analysis of various works, including approaches to Biology, Social Science and Simulation, some assumptions are made about the role of information and about some exceptional results of Game Theory. To confirm the hypothesis discussed analysis results of past simulations are reported in the appendix. It seems to emerge plausibility of cooperation, and then of altruism: contrary to the claims made by Dawkins and by other evolutionists. The question remains: this is just a simulation or the results, particularly those of Axelrod, and the theory of Trivers lead us to rethink what really is self-interest?

**USING VISUAL LOOMING METHOD
TO PERFORM A TURNING OF A MOBILE ROBOT**

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When a robot navigates in indoor environments must often identify and then execute a turning point. For this purpose our work intends to give a useful tool that allows in real time to individualize and to determine the distance from the end of a hallway and so from a turning point. The implemented system is based on the simple Visual Looming method known in literature to determine the distance from well-defined objects. In this context the innovative idea is the application of the Visual Looming as method to calculate the distance from a turning point, that is a not well-defined object but it is identified by the intersection of three lines in a particular form. Using a mobile robot that performs a turning point in a corridor, experimental results have demonstrated the efficiency of this method to detect the turning point and then calculate the distance from this.

**MULTIPLE NEURAL NETWORKS AND BAYESIAN BELIEF REVISION
FOR A NEVER-ENDING UNSUPERVISED LEARNING**

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We propose an Hybrid System for dynamic environments, where a Multiple Neural Networks system works with Bayes Rule. One or more neural nets could no longer be able to properly operate, due to partial changes in some of the characteristics of the individuals. We assume that each network has a reliability factor that can be dynamically re-evaluated on the ground of the global recognition operated by the overall group. Since the net's degree of reliability is defined as the probability that the net is giving the desired output, in case of conflicts between the outputs of the nets the re-evaluation of their degrees of reliability can be simply performed on the basis of the Bayes Rule. The new vector of reliability will be used for making the final choice, by applying two algorithms, the Inclusion based and the Weighted one over all the maximally consistent subsets of the global outcome.

**EMOTION AND ALEXITHYMIA IN EATING DISORDERS:
INDICATIONS TO PROMOTE A CHANGE IN THE FAMILY-SOCIAL SYSTEM**

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The family is the first context in which the symptoms assume a precise function for the relational operation. In addition, it's the social system of main reference in the emotional experience of a person.

The emotional competence is acquired inside of the familiar system through the verbal and not verbal communication. In some typology of families, the acquisition of dysfunctional familiar communication patterns generates symptomatologies also in the regulation of the emotions.

The alexithymia is a typical trait of various psychiatric pathologies, like the psychosomatic disorders, the eating disorders and the depression. The alexithymic trait can provoke in the child some difficulties to make experiences of self efficacy and knowledge of himself.

The aim of this study is to describe how the change of the familiar system imprints in the regulation of the emotions and in the development of some psychiatric pathologies and how much the emotional transform of the single person can change the same social system. Will be examined the nature of the alexithymia in subjects with eating disorders.

**THE EMERGENT POWER OF WEB-PLATFORM
FOR ENHANCING ECOSYSTEM INNOVATION**

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The growing symbiosis between the development of ICT and the development of innovation processes in enterprises is evidenced by the proliferation of a large number of websites based on the concepts of open innovation, collective intelligence and knowledge sharing. In this paper we want to suggest how the basic concepts of complexity theory and business and innovation ecosystem can inspire and guide the design of a web platform to support innovative and collaborative process of European SMEs. More specifically, we have highlighted the power of modularity (Baldwin and Clark, 2000) towards the design of new products, services and business models, which potential has been already only partially exploited. The innovation led by an eco-systemic vision and the systemic assumption of the modularity principle are therefore proposed as the self-organization and self-poiesis enablers of collaborative network.

**WORKING WITH NEW PARADIGMS AND CHALLENGES
IN CONTROL THEORY**

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In the last years, the development of automation and its pervasive diffusion in a large number of industrial installations and of devices of common use has given rise to control problems which do not fit perfectly with the classical paradigms of control theory. This has raised the interest in developing new paradigms, which can handle e.g. the inherent complexity of problems involving hybrid dynamical structures and/or distributed control/computational capabilities. In this paper, we briefly illustrate two areas of research in which new points of view, control schemes and models have been proposed for dealing with networked control systems, in one case, and with home automation systems, in the other. Although different in many aspects, the two situations we consider provide good examples of the work that has to be done, on one side, at a technical, operational level to find new design solutions to specific control problems and, on the other side, at a more foundational level, to provide comprehensive frameworks in which complex systems can be modelled and studied.

**THE ‘MAGIC EIGHT MODEL’
THE ENACTIVE APPROACH OF FRANCISCO VARELA
AND THE GENERATIVE LEARNING CIRCLE**

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In our work, we will focus our attention on what we define as 'personal learning' process, trying to answer the following question: how do we build a coherent meaning from our experience? Through the studies of Francisco Varela on the fundamental role played by the sensory-motor coordination in cognition, we propose a model called the 'Magic Eight', which we use to show recurring patterns in the learning process of the person, focusing on interdependent relationships among perception, emotion and action, which define a self-organizing system that allows the emergence of coherent meanings for the person. These relationships are based on the activity of the entire body, allowing the emergence of both the 'inner' world of the person and what she considers her 'outer' world, in a process of generating interrelated and consistent meanings.

**SYSTEMICS AND ARCHITECTURE - SETTLEMENT SYSTEM:
THE IMPOSSIBLE END AND THE POSSIBLE ROLES OF ARCHITECTURE**

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Humans build, along sequences of states and different emergence property conditions, multiple artifact systems interacting with any eco-system. Such networks and sequences of physical systems have different coherence levels – both internal and external – between themselves as well as with the settled human groups. We call Settlement System such a body of interactions. Architecture – that is, the whole of all the actions that modify human settlement - belongs to a settlement system. The perceptions of basic needs by inhabitants, their behavior as collective beings, the responses to such needs coming from the built environment, underline physical conditions and information flows that determine the actions of collective beings. A “cultural model” can be seen as collective thought, generating coherence in behavior.

**ORGANIZATIONAL CHANGE AND WORK STRESS
AMONG MENTAL HEALTH CARE STAFF**

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This study was conducted within a Mental Health Care Centre in Northern Italy, with the aim of investigating how organizational changes, due to a restructuring process, influences stress levels among workers. The Occupational Stress Indicator (Cooper, Sloan and Williams, 1988) and the Organizational Check-up System (Maslach and Leiter, 1997) were administered to participants (N=20): Executives (N=10) and Staff (N=10). Quantitative data were combined with qualitative ones obtained from two focus groups.

The OCS identified stressors related to Workload, Fairness, Work-group Cohesion and Leadership, whereas the OSI revealed sources of stress in Relationship with Others, Climate and Organizational Structure and Management Role. These results, consistent with the ones shown by focus groups and previous studies, are relevant in order to plan effective management change interventions and strategies to reduce the impact of stressors on mental health care staff.

Key Words: Organizational change, Work stress, Mental health care staff

**REDUNDANCY: BOUNDED OR GENERATIVE ORDER ?
CO-EVOLUTIONARY CHANGE MANAGER SKILLS
AND ORGANIZATIONAL WELL-BEING**

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The dominance of a reductionist approach in studies of managerial science has confined attention of researchers to the coarse aspects of the organization and its regularity. The method of analysis and solution of the problem has been to cancel interference generating unpredictability. The manager has been considered a major player in decision-making models based on the relationship between computational ‘facts’. The separation between the complexity of events and management skills has become increasingly wide. It is urgent to rethink theories and managerial skills that may consider human actions as carriers of meanings, the organizations as emergent relationships based on ‘values’ and organizational change as a permanent process of development and evolution of personal know-how. Our contribution to the role of redundancy is part of the mainstream studies of organizational change best practices. Our view is that change creativity is a property of ‘relational activity’ and that it is necessary that management is able to acquire those ‘subtle skills’, both in studies and in practice, to be a ‘co-generator of organizational values and well-being’.

Redundancy = fat in the meat of description (Heinz von Foerster)
Wisdom only exists in abundance (Raimon Panikkar)

**ORGANIZATIONAL CLIMATE FOR INNOVATION:
DEVELOPMENT OF A NEW THEORETICAL MODEL**

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Despite the concept of climate has received considerable attention from psychological research on creativity and innovation in the work context, current studies on climate for creativity and innovation still have some theoretical and methodological limitations which restrict systematic understanding of the role and functions of this variable throughout the whole innovative process. Based on fundamental theoretical assumptions underlying the conceptualization of other relevant facet-specific climates (e.g. safety climate), a new model of organizational climate for innovation is provided, in which climate is conceived as shared perceptions among employees on policies, procedures and practices for innovation as indicators of true priorities assigned to innovation at the workplace.

THE LOGICAL LEVELS OF CHANGE
NOTES ON THE EPISTEMOLOGY OF PSYCHOLOGICAL SCIENCES

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The thesis I intend to argue is that Gödel's incompleteness theorem may constitute a powerful metaphor for describing and modeling learning processes and, more generally, all mental processes that imply a change - a reorganization - in forms of behavior and thought. The argument is based on Gregory Bateson's systemic-relational theory of learning and change, which states that every learning process is also a process of deuterolearning, of learning to learn, that is to say a process that leads the organization of the individual who is learning to a different level of complexity. A consequence of Gödel's theorem is that the emergence of an undecidable sentence in a logical formal system could lead to the definition of a chain of formal systems, each one of which is defined by adjoining as axioms propositions that are undecidable at previous levels. In the same way, the emergence of an undecidable situation (a double bind) for a cognitive system in a context can favor the creative emergence of a new way of thinking and looking at the world, if the cognitive system is able to resist the pathological state created by the advent of an undecidable situation.

ON MODELS OF EMERGENT METASTRUCTURES

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The recent developments in mesoscopic physics, econophysics, and biological physics, as well as the systemic research activity in the domain of metastructures, call for a new theory of the emergence of metastructures able to generalize the already existing theory of emergence and the underlying theory of phase transitions. In this regard, it is to be remarked that a theory of emergence of metastructures must face four main problems:

- a) define what it is to be identified as a metastructure;
- b) specify the nature of the models best suited to describe metastructures (classical, quantum, semiclassical, etc.);
- c) find explicit models of emergence of metastructures providing well-defined experimentally testable previsions;
- d) find experimental criteria for detecting the occurrence of metastructures.

These problems are strongly interrelated and, so far, none of them appears to be easy to solve. In order to make some progress towards their solution, the best strategy appears the one of starting from a set of provisional definitions and hypotheses, and of using a methodology mixing mathematical reasoning with computer simulations. As regards the definition of metastructure we will start, in agreement with the framework adopted in the research on metalattices or superlattices, from systems in which some process of emergence (or a suitable phase transition) yet gave rise to the occurrence of spatio-temporally localized ordered (coherent) structures. We will then speak of the occurrence of a metastructure when each basic coherent structure can be considered as a single element and within the set of these elements a new process of emergence gives rise to a (higher-level) coherent structure. Here the coherence is meant in a generalized sense, so as to allow both static and dynamical structures. The provisory hypotheses adopted can be listed as follows:

- 1) the basic principles of traditional theory of phase transitions (like the divergence of fluctuations close to critical point, the scaling hypothesis, etc.) can lose their validity in specific situations; namely a number of theoretical results about the distribution of fluctuations in coherent condensates (like Bose-Einstein's ones) showed that the temperature characterizing this distribution is far lower than the one associated to system's environment, so that, practically, a coherent system behaves as if it would be at zero temperature; this allows to introduce the concepts of the theory of quantum phase transitions and of topological order transitions;
- 2) the formation of metastructures is made possible only in presence of two main ingredients: the presence of topological defects (walls, dislocations, vortices, etc.) within the original systems, and the establishment of long-range interactions letting each system element to be influenced by the average activity of other elements belonging to a given spatial region.

We applied these hypotheses to build a toy model of emergence of metastructures. Within the model the emergence is only of computational type, and this limits severely the generalizability of the obtained results. Moreover, it is based on a simple 1-dimensional toroidal lattice of trivial binary elements (spins). Computer simulations of the model allowed to detect the conditions on the model parameters granting for the appearance of metastructures. Though its artificiality, the model can be useful to test the methodologies of analysis and the hypotheses introduced within the theories of emergence of metastructures.

**ASSESSING SUSTAINABILITY IN URBAN DESIGN:
THE ANALYTIC NETWORK PROCESS APPROACH**

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Urban spaces represents the arena where sustainability principles challenge traditional design approaches and tools at most. Urban design needs to be re-conceptualized in order to respond to the sustainability challenge and at the same time, to keep a solid anchorage to local context identities and local cultures.

Many indicators have been identified and organized in diverse design guidelines or evaluation methodologies in order to address sustainability in urban design (examples: Neighbourhood LEED, PLACE3). These design guides or assessment methodologies are all managing the sustainability issue from specific points of view: the energy and the livability issues are two relevant examples. Indicators are used as they were independent from each-other thus making their interdependency ineffective on the design process.

This paper discusses the use of sustainability indicators in urban design. After a survey on existing urban design guide lines and evaluation methodologies, the paper discusses the criticality of interdependency among indicators in urban design. The core of the paper presents an innovative application of the Analytic Network Process (ANP) to a selected set of indicators as a methodological opportunity to make indicators interdependency operational. Finally, a case study is presented related to the regeneration of a social housing neighbourhood in the city of Milan where the assessment process has been considered as integral part of the design process and used to identify design opportunities.

**RE-TRACING THE SYSTEMIC APPROACH IN ARCHITECTURE
AND DEVELOPING WORKING TOOLS**

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A century ago, biologist and urbanist Patrick Geddes suggested the idea that cities, and human settlements in general, could be better understood resorting to the scientific approach of biological sciences. Today, the idea that the built environment is the peculiar eco-system of the human species is widely acknowledged in theory, though far from being put in practice. The built environment breaks down when the balance between its natural and human resources and the requirements of its inhabitants has been upset; in such cases, culture fails to play its role in mediating between society and environment, not being able to direct social behaviours as well as the actions of the political and administrative institutions. Human settlements, and cities as a peculiar emergence, are the product of human societies; they have been built up and developed by a huge number of interacting conscious and unconscious acts during a long time, rather than by purposely single designed acts, as Kevin Lynch and Christopher Alexander pointed out some 40 years ago. Such a point of view generates the idea of an “implicit project” that continuously modifies the built environment as a complex systemic entity, where processes of emergence occur. A few methods and tools, such as building environment evaluation based on performance assessment, which focus on the inhabitants’ and users’ perceptions of building and places, can help culture to regain such mediating role. This paper describes a number of research projects investigating landscape values “as perceived by people”, according to the European Landscape Convention.

INVESTIGATING COMPLEXITY IN ELECTRIC POWER SYSTEMS

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Large electric power systems, geographically extended and including a high number of generators, loads and interconnection lines, are characterized by very complex structures. In this regard we can take into consideration both static and dynamical complexity. The former is related to the structure of the electric network, while the latter is associated to the complexity of behaviours as revealed by time evolution of system's state. Forecasting the evolution of these systems is very difficult and often impossible. These aspects impact directly on the possibility of understanding their behaviour, especially in emergency conditions. Consequently, planning the operating condition for a real electric power system becomes a hard activity that only partially (covers and) assures really safe operating conditions. It is to be taken into account that the need for understanding complex systems faces with the difficulty in giving an effective description of complexity. Different metrics can be used in the attempt to describe complexity, but it is not easy to apply them to electric power systems on a mesoscopic scale. After recalling different approaches in describing complexity, some experiences and methods for investigating operating conditions of electric power systems are described. Finally the role of human operator in managing complexity in presence of critical operating conditions is discussed.

THE EMERGENCE OF PERCEPTUAL GROUPING ABILITY IN NEURAL NETWORK MODELS OF VISUAL CORTEX OPERATION

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Among the most important abilities evidenced by human (and animal) visual system there is the one related to grouping of spatially distributed image fragments into emergent entities, perceived as objects and associated with well defined boundary contours. This sort of perceptual binding operates on very short time scales, more or less of the order of the ones characterizing iconic memory (100-200ms). Its explanation is a challenge for all models of visual cortex operation, mostly because the perceived boundary contours, as shown by a huge number of phenomenological investigations, can be illusory, that is occurring in absence of a real physical stimulation.

Almost all researchers tried to account for these facts by resorting to neural network based models of visual cortex operation. In these models suitable computational units (more or less similar to biological neurons) are activated by the external stimulations and cooperate in such a way as to make emergent an activation pattern, in turn identified with the pattern of contours of phenomenologically perceived objects. These models have two advantages: on one hand they can be designed in such a way as to embody, as much as possible, realistic features of brain neurons, and, on the other hand, they can easily be simulated on computers, such as to compare directly their behaviour with behavioural data gained from human or animal subjects. Unfortunately they lack an understandable account of the emergence supposed to underlie the ability described above. The attribute “understandable” means that the operation of the models themselves should be derivable as a consequence of more general principles, such as the ones introduced, for instance, by Gestalt psychologists (like *prägnanz*) or by theories of emergence based on phase transitions (like symmetry breaking).

In more recent times (but relying on a long history of previously proposed models) Grossberg and coworkers introduced a complex model of visual cortex operation, called sLAMINART model, based on spiking neurons (so far the more realistic models of biological neuron operation), and able to account for all available evidence about perceptual grouping and illusory contours perception. The model, however, is characterized by a very large number of parameters and gives reliable results if and only if the values of these parameters are tuned in a suitable way. In other terms, the hypothesized emergence is nothing but a by-product of a special (and very complex) design of the model components and of their interrelationships. Such a circumstance prompted us to ask ourselves whether the performance of this model could be replicated by resorting to simpler neural network models, but based on more transparent general principles, allowing a more explicit comparison with the ones used in the theories of emergence. In this regard we dealt with this question by resorting both to computer simulations and to mathematical arguments. The obtained results can be summarized by saying that, while the role of general principles of emergence can better be detected within our models, only specific choices of some parameter values can give rise to biologically realistic behaviours of models themselves. We interpreted such a circumstance, however, not as an indication that visual cortex models require a very complex design, but rather that it is incorrect to deal with visual perception as if the latter were produced by a single brain subsystem (like the visual cortex). Visual perception is more a general affair of the whole brain, including emotional, motor, cognitive aspects and subsystems (if any). It is just this wholistic brain operation that imposes, each time, different parameter values to the models of visual cortex operation, as a function of the momentary context, goals, motivations, remembered patterns, schemata, emotions.

ENTROPY, STABILITY AND DISSIPATION

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The usual definition given for Entropy in thermodynamics leaves much to be desired, both from a mathematical as well as a physical point of view. Therefore, in this paper we intend to illustrate and discuss the issue in greater depth. To this end, we are introducing the concept of local entropy, which allows us to establish a direct bond with the stability theory as well as with the theory of energy dissipation. We shall show how this new concept is not only fecund under a practical and theoretical profile but explains, ex-post, the inadequacies and limits of the classical definition.

Although the classical definition does not explicitly identify function S , the second Principle of Thermodynamics tells us that the variation of entropy of any system, and of all the surrounding environment, is positive and tends to zero for processes that approximate reversibility conditions.

This principle does not appear to be either entirely clear or adequately “defined”. To elaborate on the issue further, we can start from the following point: reversibility should be reconnected to the absence of dissipation and, in that case, entropy should be granted as a constant. Furthermore, the property that dS is an exact differential is relatable to the property that for a conservative system the integral of S along a closed path in space Volume-Temperature is equal to zero.

On the contrary, for a dissipative system, the second Principle of thermodynamics results in $\frac{Q_1}{T_1} - \frac{Q_2}{T_2} < 0$. We explicitly reconnect such an inequality to dissipation without invoking an a-priori

Principle. In the next analysis we are calling upon the Stability Theory (Lyapunov Method) and the crucial extension introduced by Di Caprio to take into account Energy dissipations. We will also make a reference to noted thermodynamic cycles.

UNCERTAINTY PRESERVING

Giordano Bruno

ISIA Roma Design

“Uncertainty”, its epistemological valence, its role in change, the “measures” concern it, its impact in all problems about the “real” – economic, social, medical, psychological – and about the scientific applications – from projecting to modelling and realization – plays a part more and more significant in the contemporary knowledge. A “pseudo culture”, for a long time very pervasive, realizes strategies every day more sophisticated, that for simplifying we can call “by a statistic way”, for reducing the uncertainty to a minimum. We could say for “erasing” it definitively. The trend much more followed seems to be, precisely, the “elimination”, caused by the interest to transform what has to remain “prevision” in easier to use “prediction”.

Therefore the philosophical and epistemological problem I want to highlight is the following: this behaviour in all various systems, from learning and training – psychological also – to communication, from the request of political, social and economic change to the sustainable relation between humanity and nature, is it realistically the most “useful”? How much damage the old reflex and reflex of a culture that, for centuries, posed in its pre-eminent thinking the concept of the “truth” – then of certainty – as the founding paradigm of the knowledge? From my point of view we need to overturn the “program”: not only don’t reduce the uncertainty, but making it in a way to preserve it as the necessary “tool” for the observer, with the aim to maintain the systemic properties like coherence and openness, so needful in the fields we introduced before.

**MUSIC: EMERGENCE AND META-STRUCTURAL PROPERTIES
IN THE PRACTICE OF THE *BASSO CONTINUO***

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From a systemic point of view, Music can be considered as an ideal generator of complex systems. The high level of abstraction of related cognitive aspects allows processes such as the generation and representation of dynamic, symmetrical, reciprocal and non-linear structuring. It thus becomes a question of multiple and superimposed coherences which emerge through changes in collective behaviours. The properties of those processes will be called 'meta-structural', borrowing this term, only metaphorically for now, from a line of research in modelling complex systems and processes of emergence. In this paper we refer specifically to the practice of the *Basso Continuo*, an integral and characteristic part of late renaissance and baroque music. The peculiarity of the interactions produced by this improvisational and extemporaneous practice within the musical texture can describe, with surprising effectiveness, the characteristics and consequences of meta-structural actions upon the behaviours of collective entities, both in its direct production (execution) as well as in its architecture and semantics.

**A NEW APPROACH TO THE MUSEUM PROJECT
THE MUSEUM SYSTEM THROUGH THE DESIGN OF SYSTEMS.
A PROJECT FOR THE CULTURAL HERITAGE APPLIED TO
THE MUSEUM OF ROMAN CULTURE IN ROME**

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The aim of this work is to contribute to the development of a possible and expected path of design of systems well within the context of cultural heritage. Furthermore the goal is that of analyse the controversial relation between preservation and improvement.

A complex system as cultural heritage and especially the museum one - in which interact in a conflicting way cultural, emotional, economic and conservative values – needs a creative and planning effort, of systemic nature, able to avoid a complete paralysis.

In this way, it is possible –and in our opinion we have - to go over and to re-orient the perceptions of the museum analysing it as and connecting it with an organism, endowed with the aspects of a model-structure-process.

This necessary change of perception shifts the focus from the museum model to the museum process, allowing its structure to move towards a "dissipative structure"; able to keep steady his original form during his transformation.

The planning effort of systemic nature necessary for these reasons, creates some resonances, as it happens in music between self referential principles (keeper of the continuity art-past-memory) and innovative and integrative principles expressing the value of a socio-cultural ecosystem where the organism of the museum lives and keeps itself active.

It's just by this new approach that it's possible to tend to a synthesis of cultural heritage problem, with not distorting and economically paralyzing suggestions of a sustainable development (above all in the case of museums and public heritage).

It's possible to hope for a new vitality of this Institutes, just tending to the museum as "culture maker" in which steady elements (collections, archives,...) develop themselves according with internal and external elements, creating cultural connections.

In this way, the museum we are thinking about it will be able to reconnect to the society and to the actual culture, readapting itself to the various potentialities, composing new connecting webs and offering a new opportunity to the knowledge.

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**THE AESTHETIC OF DESIRE:
THE LANGUAGE OF THE SHOP WINDOW'S DISPLAY IN RETAIL DESIGN**

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Why can a shop window catch the eye of someone just walking around? In order to understand how to build a meaningful display, the Shop Windows has to be conceived as a complex system.

The “Aesthetic of Desire” is a Design System to be used by designers and design managers in the company to design the retail's communication strategies. It uses the System Theory to analyze and to model the interaction between the shop windows display and the “watcher”, and to offer a method to design a window display, or a retail communication campaign.

A company can use this Method to design the single Shop Window, day by day or, either it can use the Sytem's maps to analyze and verify the past retail projects and design the future communication with more self-confidence. The company can also analyze other companies' communication strategies.