

The Bioethism's transdisciplinary paradigm¹ approach shows how living systems' dynamic sustainability stems from a constant circular repeat of other "emerging and in-between convergent results", I named "Life's systemicity", as participating in all levels of survival needs.

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The Bioethism's paradigm, a systemic transdisciplinary approach of living systems, was developed towards a large understanding of their origin, natural structures, behaviors and evolution while permanently interacting with environmental events within their body, ecosystem and sociosystem statuses. At the Asilomar ISSS 45th conference, showing the indispensability to learn footbridges and links in between disciplines, I stressed that psychosomatics, usually a medical diagnose, was a one-way view on "the survival dynamics circularity", and on biochemical and information feedback effects that pertain to "life to exist". Such "glocal" retroactive phenomenon, as being fundamental to the system's survival dynamics and its sustainability suggest a general paradigm as essential for its observation. A paradigm that brings up the "environmental psychosomatopsychism" understanding (a J.-J. Blanc neologism and an abbreviation: "e-psop") and, which represents the central dynamics of interdependent forces providing for, at every flux levels, the specific systemic performance to individual abilities as surviving fitted. The globality of such "circular set of fluxes" induced to naming it the "Life's systemicity" in order to translate the permanency of these dynamics and naturally retroactive processes that manage survival.

Among different aspects of living systems' survival, consciousness, thinking (in terms of its biochemical information moves) and other metabolic emergence fluxes from inferred² representations, sensations and emotional fields, induce to understanding the building up of images (and/or sense given to things) as ending into behaviors. Emergent from highly complex neuronal processes, they occur according to survival needs as motivations of the moment. Therefore, the "environmental-psycho-somatopsychic" ("e-psop") and ago-antagonist information streams, within their permanency, have dynamics to give sense to emergent results in accordance with the physiological and psychological context status while vital needs and efficiency for survival are confronted with environmental changes.

Collective systems, like sociosystems (e.g.: a civic society or an enterprise), develop a collective consciousness relatively to from their environmental interactivity. Thus, "mental representations and ways of thinking", undergoing cultural and traditional neighboring influences, build up individual and collective mentalities with managerial survival abilities that emerge from specific traits and values proper to the endogenous and exogenous milieu. An emergent manifestation of Life's systemicity.

The "bioethismic transdisciplinary approach", referring to the actual XXIst century neurosciences in general, as well as the social psychology, the systems' thinking, the biological and cybernetic

¹ - Bioethism is a universal paradigm that I developed in 1996 and which proposes a transdisciplinary approach of any living system interactions within its environmental spaces, its body and ecosystem's niche, a behavioural representation in terms of "**Biology, Ethology-ecology and Humanism**". The presence of man stresses the necessity to approach survival fundamental values as common to all creatures and for the protection of life on Planet Earth.

² - Inference: constructed arguments from categorical propositions with one premise and at least one conclusion. By extension, an inferred representation, and/or an emotion, is the result of interpreting sensorial information that once treated are being stored in memories.

communication in tridimensional networking, finds itself concerned with a certain synergy with J.G. Miller's systems theory.

Consequently, the present work describes here some of the "ins and outs" of a general approach of living systems sustainability and adaptability processes, in terms of development and evolution of dynamic principles as building the bricks of "Life's systemicity", the major principle of survival management.

Keywords: transdisciplinarity, ecosystems, sociosystems, consciousness, thinking, ago-antagonism, survival, neurobiology, psychology, decision-making, project engineering, systemicity.

Le paradigme transdisciplinaire du Bioéthisme permet de montrer comment la survie des systèmes vivants se fait par résultats émergents, circulaires, convergents et en permanence au sein d'un phénomène global que j'ai nommé "Systémicité de la Vie"

Le paradigme du Bioéthisme dans son approche transdisciplinaire des systèmes vivants permet d'avoir une vision et une connaissance larges de leur origine, de leurs structures naturelles, de leurs comportements et de leur évolution tout au long de leurs interactions avec les événements environnementaux internes comme externes au corps et sociosystémiques comme écosystémiques. Lors de la 45^{ème} conférence de l'ISSS à Asilomar, CA., j'ai développé la nécessité qu'il y avait de connaître les liens et les passerelles trans- et interdisciplinaires des sciences y relatives. Au titre d'un raisonnement central, et partant de la psychosomatique dans son acception médicale, on montre que cette approche-ci ne reflète pas la partie des flux du vivant dans leurs nécessaires rétroactions circulaires et de la permanence des effets feedback sur les résultats biochimiques émergents. Il fallut en déduire que le phénomène global vital - "the environmental psychosomatopsychism" (néologisme de J.-J. Blanc en anglais et abrégé: "e-psop") - représentait la dynamique centrale des forces vives en formes interdépendantes de flux moléculaires et d'information indispensable, à tous niveaux de flux, à l'efficacité de l'individu à gérer ses capacités de survie. La globalité d'un tel ensemble de flux circulaires conduisit à le nommer "Systémicité de la Vie" afin de traduire le rôle dynamique permanent des processus naturellement rétroactifs qui gèrent la survie.

Parmi les différentes dynamiques de survie, la conscience, la pensée en son sens d'information biochimique et d'autres flux métaboliques émergents, sont des champs de représentations et d'émotions qui structurent la représentation d'images, de sensations et du sens donné. Emergeant de processus neuronaux complexes, ils apparaissent relativement calqués aux besoins de la survie dans le sens des motivations de l'instant. En conséquence, on peut dire que les effets dynamiques "e-psops" et ago-antagonistes des flux d'informations dans la permanence de leurs dynamiques, donne du sens aux résultats émergents en fonction du contexte psychologique et des changements d'états physiologiques, cela relativement aux besoins vitaux d'efficacité confrontés au changement.

Les systèmes collectifs, comme les groupes sociaux (une société, une entreprise en tant que sociosystèmes) développent leur conscience collective relativement à leur interactivité dans le milieu ambiant. Leurs représentations mentales et "manières de penser" sont, en conséquence, modélées par le voisinage traditionnel et culturel, structurant ainsi les mentalités individuelles et collectives et leurs capacités à gérer les éléments de la survie qui émergent des traits et des valeurs spécifiques à l'environnement endogène et exogène.

L'approche transdisciplinaire du Bioéthisme, se référant aux neurosciences du XXI^e siècle en général, de même qu'à la psychologie sociale, à la pensée systémique, et aux réseaux tridimensionnels de communication biologique et cybernétique, se trouve ainsi dans une certaine synergie avec la "Théorie des systèmes vivants" de J.G. Miller.

En conséquence, cette présentation a pour but de décrire ici certains "tenants et aboutissants" de l'approche générale du maintien et de l'adaptabilité des processus de survie des systèmes vivants, en termes de principes de développement et d'évolution des dynamiques comme structurantes du paradigme de la "Systémicité de la Vie", le principe majeur de gestion de la survie.

1 FOREWORD

Presently, thanks to Systems science global learning throughout "The Bioethism transdisciplinary paradigm" scientific approach of the living (J.-J. Blanc, 1996), it was postulated that deep and widened fields of life's laws and processes were to be inventoried³, as suggested in the head-title. This work is meant to show that Life's sciences, approached for in a transdisciplinary way, from bottom-up of Life's apparition on the planet, yield new insights into understanding the stem process that was called "Life's systemicity" that made up Life to exist, diversify and evolve. Important successions of new scientific discoveries and applications, such as neurobiology ones, have brought up large knowledge capacities that clarify theorization fields and their viabilities within multiple domains relating to living systems.

We will also refer to J.G. Miller's "General theory of living systems" as an evident and great part of a global theory on living systems then called by the author the "stem dynamic of life", or "*The Life's complex systemicity*". In this prospect, it is understandable that many theories, and particularly physicochemical ones, have now to be sorted and classified as to specify rigorously the domain where to apply in "Systems science of the livings and the artificial domains".

As for a mode of thought, it is aimed to be a controversial one, "calling into questions" scientific works and anthropocentric interpretation notions such as that of thought differentiating man from animal. Creatures' thinking ways, at their level of abilities to manage their survival, and the principle of the biochemical thinking processes are shown (J. Allman, 2000) as having permitted the unicell to exist, 750Mo. years ago!

Thus, such approach is meant to induce to new scientific disciplines "bringing" to numerous new research fields generally not yet developed. Moreover, it is oriented towards adopting and exercising a thoroughly appropriate descriptive language that integrates the "systemicity" of survival fundamental values and its dynamics in terms of managing "biops"⁴ and "e-psop"⁵ processes, and treating stimuli, signals, internal and external event changes. An exercise that integrates, of course in the background, transdisciplinary knowledge adapted to the development of theories and methods that made a creature to have the proper behaviors for survival.

This is the third part of the general work (after Asilomar ISSS 2004) introducing the "Theory of Life's systemicity" as being a complex transdisciplinary approach of living systems science (J.-J.B., 2004).

2 A SCIENTIFIC AND EPISTEMOLOGICAL TURN OF MIND

The backbone of the "Systems science of the living" is the general principle of "Life's systemicity", which is a universal "stem dynamic phenomenon" engendered by the specific physicochemical status and cosmic conditions of the planet Earth revolving around the solar system. It is not postulated as being "a system theory", particularly not a "general systems theory" that applies to all sorts of other systems and sub-systems that cannot possibly be defined as living creatures. "Life's systemicity" relies mainly on the interdependence of bio-psycho-physicochemical ("biops") interactions and the retroactive capacities for self-adaptation and reactive aptitudes as fitted behaviors towards in- or outside events. This systemic faculty concerns:

- **Openness:** a noun also used for an "open system" interacting with its external environment.
- **Non-linearity:** the notion of a thermostat with its feedback loop is clear or the state values of a set of variables at instant (t) of several components that relate to each other's.

"Whenever the controlled variable $y(t)$ is allowed to have large deviations from the steady state, the linear constant-coefficient model will cease to be accurate because of the intrinsic non-linearity

³ - **Inventory:** "a list of traits, preferences, attitudes, interests, or abilities used to evaluate characteristics or skills of things".

⁴ - **"Biops":** bio-psycho-physicochemical process.

⁵ - **"e-psop":** environmental-psycho-somatopsychical fluxes or streams.

property involved in most natural dynamical phenomena". This is a specific and important aspect of the living to mention while describing the "Systemicity of Life".

Theorization: Some Trees That Hides The "Forest of Life"

Within the scientific environment of the XXth century mid 60's, the notion of system was at the time mostly adopted with reference to mechanisms, processes and diverse objects. They were observed as being more or less complex mechanisms than single usual physical moves, and studied with simple mathematical models. It was the reign of engineers that were participating in the development of number of physical and chemical theories applied to mechanical, chemical and informational problems of engineering. Mathematical methods of calculation induced to amplify the toolbox of scientist in understanding physics and chemistry together with some notions of determinism and finalities, self-organization and efficiency traits. More complex systems turned out to the development of "systems engineering". Then after, biological dynamics of physiological networks were defined as "systems with statuses" controlled from outside, and more complex systems with an "internal control" introduced the notions of "servo-mechanisms" and deterministic behaviors. Cybernetics appeared as what Wiener called: "the science of control and communications in the animal and machine nearing the theory of automatic control. Along with physiology, particularly that of the cardio-vascular and then nervous systems", cybernetics became also close to regulations control. However, that scientific period, if parallel to important developments in physiology, biology, and biochemistry, had not envisaged considering the whole of the "forest of Life" as a particular systemic science. Theorization of systems was including all sorts of other mechanisms treating only part of Life's phenomena (e.g. Blood circular system, system thinking and system regulations). Many system theories were based on physical and technical substrates and were considered as "mechanistic schemes".

Some Of The Mid 60's Theorization Substrates

The "Gestalt principles of perceptual organization" and the notion of an organism was being a physical open system with physicochemical processes: phenomena then known as: open systems' thermodynamics (entropy, probability and equilibrium...), cybernetics (in terms of process regulations and commands, information and feedback...), organization (in terms of wholeness, growth, hierarchy, domination...),

An organism was then a cybernetic machinery with biodynamic processes that induced to develop such notions as: metabolism (in terms of equilibrium, homeostasis, constraints and stimulus-response...), mathematical formulation of life's phenomena (non-linear equations for physiological functions...), interactions (in terms of kinetic, thermodynamics...), equilibrium (open systems qualifications, adaptation, dynamics, catabolism-anabolism, feedback (cellular metabolism and regulations...) and also allometry⁶ of growth.

A systematic classification of such notions would produce an inventory of:

- Flux categories (regulation, homeostasis, growth...),
- Synergetic elements (allometry, adaptation...),
- Phenomena statuses (equilibrium, non-linear, entropic...),
- Organization structure (hierarchy, domination, frame, social body...),
- Organizational means (information treatment, regulation, feedback, social cooperation...),
- Energy processing (catabolism, anabolism, metabolism, eating, breathing...),
- Biological morphogenetic processing (growth, reproduction, ontogenesis, morphogenesis...),
- Biological properties (biochemical, physiological, hormonal, neuronal...),

⁶ - **Allometry**: the relationship of the growth of one part of an organism to that in another part.

- Etc.

In perspective, an important and necessary work would have to be undertaken to develop the coordination of new scientific learning and different means for observing and describing natural systems and as much as "what happens" when life's events occur. This present work describes the first bricks of it.

However, nowadays, the knowledge of living systems realities is beginning to be clarified in terms of emergent results induced to from new scientific orientations and technologies. They have increased the learning of complex statuses and emergent domains within developments in neuroscience, psychophysiology, ethology...that boosted up large biological discoveries enabling to "disanthropomorphize" many scientific notions (A. Damasio, 1999).

3 "THE SYSTEMICITY OF THE LIVING" AS THE STEM DYNAMIC OF LIFE

Properties Of Living System Individuality

The "biological uniqueness" and "fuzziness" (fuzzy values "in-between" two opposites or contraries; or discrete numbers for L.A. Zadeh, 1958,) are both some of the properties of non-linear living systems. Each individual is permanently confronted to *"specific and continuous adjustments of survival values assigned to events or stimuli effects" that surge ahead*. By learning from mistakes or neighboring events and the sociogroup behaviors, the creature improves its mental mimicry or "biops" potentialities with the help of the trial and errors process and adaptation to appreciating a value level. Psycho-physiological components of an adapted living systems to survival behaviors, the dynamics of its "3D regulation networks" for survival and the permanent change of non-linear microprocessors outputs are major obstacles towards drawing theoretical developments and conclusions that can be applied with sufficient accuracy nearing that of the reality of biological systems. Metaphors, though, are of help in some case.

A "Whole" In terms Of "Systemicity"

A "living whole" is the sum of emergent retroactive results from its interdependent survival dynamics issued both from its genetics and exogenous and endogenous environmental capabilities to cope with its milieu.

The notions of emergence, developed lately in our XXIst century and a more biological approach of the livings, has set up the obsolescence of the classical definition of "the whole is more than the sum of its parts", or " the whole of anything is greater than its parts" (Gestalt psychology⁷). Any living system is structured with organs and psycho-physiological evolving and intricate networks, within which survival dynamics fluxes are permanently and circularly running for *"a self-contained existence"*. An individual creature structured with organs (its parts) and "a body frontier or a boundary" (a skin, a carapace, a boundary membrane) as being a unique individuality or wholeness is surviving thanks to very diverse inside and/or outside emergent results: *"Its entity has to permanently manage "e-psop" fluxes within the dynamics of its psycho-physiological networks" (J.-J Blanc, 2004). There, unconscious and/or conscious retroactions and circularities are the main survival properties of biological moves and nutrients assimilation (information, biological matters and energy) and are sustained by the stem dynamic of "Life's systemicity"*.

"Life's Systemicity" And The Stem Dynamic Of Survival Motives

All living systems, for survival motives, are permanently confronted to number of moves, situations, conditions of exterior environments and symptoms from their milieu that result from phenomena of: *interaction - ago-antagonism interdependency - interconnectedness - circular redundancies as emerging from feedback influence - self-organization - self-adaptation to events,*

⁷ - **Gestalt psychology**: "school of psychology that provided the foundation for the modern study of perception. Its precepts, formulated as a reaction against the atomistic orientation of previous theories, emphasized that the whole of anything is greater than its parts. The attributes of the whole of anything are not deducible from analysis of the parts in isolation. The word Gestalt is used in modern German to mean the way a thing has been gestell; e.g., "placed," or "put together." There is no exact equivalent in English. "Form" and "shape" are the usual translations; in psychology the word is often rendered "pattern" or "configuration."

environmental situation change - etc. Individual and collective systems, in other words creatures and their species sociogroups, in this context, feel their personality being structured and evolving from the accumulation of experience from so diverse interactions and circular moves. Apprenticeship throughout "worlds of stimuli", the specificity of the species learning and individual abilities each "individual or community acquire "as a unique entity" solve survival problems in their own way, their own decision-making and project engineering, their own behaviors.

4 "THE SYSTEMICITY OF THE LIVING" AS THE LIFE'S DYNAMIC

The Feedback: Definition And Some Characteristics

Feedback is a process that enables loop controls to participate in the management of systems' regulations processes. In a closed-loop system, the feedback device has the property that permits an output (or some other controlled variable of the system) to be compared with the input to the system (or an input to some other internally situated component or subsystem of the system) so that the appropriate control action may be formed as some function of the output and input. More generally, feedback is said to exist in a system when a closed sequence of cause-and-effect relationships exists between the system survival variables. In parallel, an open-loop control function has a distinctive control action since it is independent of the output. (J. Distefano, L.A., 1967).

The most important feature a feedback imparts to a living system is in its comparison function that continuously compares difference existing between the inputs and the outputs and provides appropriate signals to manage the input-output difference. In a biological example, reaching an object requires eyes, some neurons in a brain that decides what to reach, position the hand within reach. At the different levels of the action, variable signals are piloted through from the sensitivity of the organs cells and the reactivity of "biops" drives.

The process might not have an accurate ability to reproduce faithfully an input. Then, also the reducing effect of non-linearity and distortion might drive to some oscillation or instability tendency. Then, the circularity of moves necessary to the maintenance of survival dynamics is of an infinite complexity for chemical cell receptors exchanges are generating feedback drives (e.g.: baroreceptors regulating blood pressure by inhibition drives) or interactive emergent "biops" results affecting the streams steadiness.

In order to describe a "systemic process", the specifications or description of the system configuration and of its components must be put into a form compatible to analysis, design, and evaluation of the structure and behaviors of any individual creature considered (e.g.: the neuronal functions of a jellyfish, the simplest organisms to have a brain as essential to its survival).

The "Psycho-Somatopsychic Process" Stream

The "psycho-somatopsychic processing stream" is postulated here as being the global dynamic for living systems to survive. A general circular "biops" flux permanently supports life to exist from systemic survival dynamic drives. The natural biological and psychical "flow-stream" and its "flow-chart" (the metaphor of a 3D graph) of biological networks is formed by the "brain-body-brain-environment-brain-body" interrelations of their components. All biochemical, physical and psychic are underpinning survival operations and are interacting in between the components of the organism through a succession of processing moves that percolates along. Interaction necessities of organisms induce to have a variety of sensory structures that respond to different stimuli, such as survival or vegetative needs, events, natural things, other species, light, pressures, or chemical product and phenomena while treating information-energy. Once excited, sensory or cell's receptors convert the stimulus energy into an endogenous and/or exogenous behavioral response at sub-level sets in the organism. In multicellular organisms, signals are transmitted from sensory organs to other parts of the body by specialized cells: then, animals with a neurons set, or just a "biops" systemic center, see their sensory means converting, or transducing a stimulus into an electrochemical activity of impulses percolating molecules of "emotional basics" together with

information-energy. These impulses and molecules are diffused within all parts of the brain-body networks, where they are processed and interpreted. The more evolved is the organism, more complex are its sets of "biops" emergent reactions from interactive factors that occur within its bio-specific networks. If empiricism⁸ may measure the system-environment interrelationships, then feedback, as emergent exogenous or endogenous results from circular interactions within individual systems, shape up reflexivity phenomena that participate in the innate structure of living systems (biological heritage) and in their species phenotypic traits, those of its evolution trends and acquisition abilities. A simple physicochemical reflexive reaction has, at such level, a dynamic status and provokes interrelations that may maintain, from feedback, the circularity of survival dynamics stability. "Life's systemicity" is here conclusive.

Psychosomatic And Somatopsychic Proceedings: An Ago-Antagonist Circularity

Neuropeptides and their cell-receptors are the substrates of emotions and are in constant communication with the immune system, the mechanism through which both health and disease emerge from changes of homeostasis degrees to sustain the metabolism. Such correlation is so relevant that it pertains to ago-antagonism proceedings that disrupt or not the tension between sets of causal links as in psychosomatic or somatopsychic proceedings. Candace Pert, when concluding her work, enhances that fact since *"there are four basic molecules that code for all DNA in living organisms, there is some given number, not yet finally determined, of informational molecules that code for communication, for the information exchange that runs all living systems around, whether that communication is inter- or intra-cellular; organ to organ, brain to body, or individual to individual"*.

Systems Science Pluralism And The Psycho-Somatopsychic Process

Pluralism induces to observe and discriminate different fields and levels of the bio-psycho-physiochemical streams ("biops") of the living:

- **a)** it is now assumed that no dualism exists between mind and body since Candace Pert, 1997, showed that psychosomatic behaviors were supported and sustained by the combined process networks of organs bodily functions as well as of "biops" functions (endocrinal, humoral, neural and immune...).
- **b)** it is, in some sense, "reflected in such occurrences as sensations, perceptions, emotions, memory, desires, various types of reasoning, motives, choices, traits of personality, in the unconscious" and consciousness.
- **c)** life's complexity emerges from intertwined networks of systems' natural faculties involved in "perceiving, remembering, considering, evaluating, and deciding".
- **d)** the circular percolation throughout the psycho-somatopsychic stream is sustained by a certain number of "synergetic moves" processing the different "biophysiological and biochemical fluxes such as: the emergent effect of the "cost-benefit game", "morphogenesis" and other "ago-antagonist biochemical and or biopsychological results".

Moreover, many sciences need links with disciplines such as neurology, psychology, sociology, history and others. Their relationships is conclusive with transdisciplinarity with the variety of footbridges and links as participating in and are explicitly illustrated by a certain number of mechanisms, or interactive proceedings (see above "**d**") that permanently occur during a living system's lifetime and their sociosystems', showing again the systemicity of these dynamics.

Psycho-Somatopsychic Reflexivity And Interactivity Of The Percolating Fluxes

The interconnectedness, interdependency and continuity of "behaviors and actions for survival" require millions of "biops" interactions of which emergent results moves percolate in "cascades" throughout the external and internal environments-brain-body-brain-environments. Their contexts require qualifications, or not, that ensure the circularity of survival dynamics fluxes. Endogenous

⁸ - **Empiricism:** "knowledge depending on trial or experiment, also knowing only by experience without a regular learning.

and exogenous process abilities induce to performing viable interactive moves from treating environmental stimuli, signals and internal and external event changes. The survival dynamic streams of molecules, organizing the connectivity of numerous interdependent mechanisms and processes, ensure such continuity participating in the perpetuation of life's sustainability and adaptability.

The environmental-psycho-somatopsychic ("e-psop"⁹) processing is to become a "generalized notion as of being the central circular flow procedures"¹⁰ that manages any level of survival fundamental values (major principles). Consciousness and awareness, emotions and thinking, intelligence, representation and abilities, as universal functions, whatever living system is concerned, are, at first, the genetic and learnt processing substrata that manages the different fundamental survival values. They are located into the primary brain areas, the different cortical levels (specially the limbic area functions as common) and memory basins (or their equivalent). In these areas, information and emotions stimuli are inferred and treated unconsciously and/or consciously, inducing to a "primary thinking" and to a silent speech, which, in physiological terms, participates in life's metabolic processes.

Emotions Are Bio-Psychophysicochemical Phenomena

Neurotransmission And Neuromodulation As Emotional Transducing

Candace Pert (1997) studied emotions in terms of their molecules substratum, and showed how neuropeptides were participating in emotional processes. The neurotransmission, or communication in between neurons, transducing information through an electric signal, is provided for only a few milliseconds by neurotransmitters (acting upon postsynaptic receptors). On the contrary, neuromodulation, affecting synaptic transmission of neuropeptides, then called neuromodulators, is provided for from several seconds to several days (e.g.: acetylcholine as activating muscles) that modify the state of the neuron receiving the signal. This occurs when signals are not inhibited (calcium ions Na⁺) when transducing through the synapse (cleft in between two connections). Neuropeptides have each a specific function corresponding to the maintenance of the endocrine process network and binding organs, as well as sustaining emotional statuses towards different levels of surge. Among them are: substance P, neurotensin, somatostatin¹¹, vasoactive intestinal peptide, cholecystokinin¹², and the opioid¹³ peptides.

Molecules Of Emotion Are Opiate Peptides Caught By Cell's Receptors

The Opioids or opiate peptides are those that permitted Candace Pert to demonstrate the properties of opiate neuropeptides as molecules of emotions ("opiate drugs such as morphine bind to their receptors and mimic their pain-killing and mood-altering actions"). Neuropeptides such as Opioids and opiate drugs have diverse effects on the gastrointestinal tract and the cardiovascular system, but also on pain, mood, sleep, sedation, and the cough reflex. Their action move is "captured" by specific receptors (binding) that are numerous seated all over the creature's cell boundaries; binding morphine, dynorphin, endorphine¹⁴, enkephalin...that in all parts of the body-mind.

Globally, when, in the brain, endorphins are involved with pain regulation (and pleasure), a "connection with "pleasure centers", which also relates to the appetite control, the release of sex hormones and the adverse effects of shock. They are also concerned with opiate addictions and chronic pain disorders."

⁹ - **e-psop**: here a 3D graph metaphor for the highly connected networks that represents the interdependent interconnected physiological and sensory and regulation networks.

¹⁰ - **Procedure**: "a particular way of accomplishing something or of acting and a series of steps followed in a regular definite order (surgical or biological procedure,)

¹¹ - **Somatostatin**: "appears to inhibit the secretion of certain other hormones, especially growth hormone".

¹² - **Cholecystokinin**: "appears as a neurotransmitter targeting the gall bladder that "stores and concentrates bile, and releases it into the intestine".

¹³ - **Opiate, or opium**: "a drug containing opium or a substance with similar addictive or narcotic properties; something which dulls sensation, physical or mental. Inducing sleep or slowness and somnolency". In other terms, opioid peptide induce to rest or inaction or quiets uneasiness.

¹⁴ - **Endorphine**: a group of opiate proteins with pain-relieving properties that are found naturally in the brain.

Regulation Networks Of Systems' Metabolism

Psychophysiology moves are relayed throughout regulation networks that are the neural, immune, humoral¹⁵ and endocrine regulation ones. They are "biops" processes.

The immune regulation network processing

For instance, the innate immune system provides nonspecific protection through a number of defense mechanisms, which include: a) - physical barriers such as the skin, b) - chemical barriers such as antimicrobial proteins that harm or destroy invaders, and c) - cells that attack foreign cells and body cells harboring infectious agents.

The endocrine regulation network processing

At any moment, the organism has multiples possibilities to store and convert the different chemical fluxes brought up by nutriments. The main role of the hormonal system environment is of bringing the best "homeostatic solution" as to cope with environment events (alarming at situation, nutrition, work...). According to the fall of glycaemia, appears, among other complex data, the feeling of hunger, followed by a feeding behavior (search of food, oral activity). From such perspective, and outside nutrition possibilities, the homeostatic activity, illustrate the relative ecological freedom that in fact man can rely on (cf. Homeostasis). Conversely, the perception of an alarming situation (asphyxia, emotion, effort) abruptly and shortly increases the glycaemia rate.

"Homeostasis, feedback controls and the "Systemicity of Life"

Any system in dynamic equilibrium tends to reach a steady state far from the simple equilibrium: a balance that cope with outside forces of change. When such a system is disturbed, built-in regulatory devices respond to deficiencies by establishing a new balance from the processing of a feedback control. All processes of integration and coordination of function, whether mediated by mechanical circuits or by nervous and hormonal systems, are examples of homeostatic regulation. For example, a region in the brain called the hypothalamus controls the body's temperature regulation. Feedback about body temperature is carried through the bloodstream to the brain and results in compensatory adjustments in the breathing rate, the level of blood sugar, and the metabolic rate.

5 FROM NEURONAL AND ENDOCRINE INFORMATION STREAMS TO AN INTERACTIVE "UNCONSCIOUS-CONSCIOUSNESS"

Globally, neuronal and endocrine information streams imply both functions and paths managed by the autonomic nervous system and the central nervous system. From circularity and retroaction moves, the general psycho-somatopsychic proceeding flows permanently carry data and signals that are principally emergent results of interactions between "biophysicochemical" agents, hormones, neurotransmitters and information. The preparation of behaviors (that of an organ or an organism) is supported by emotional substrates and statuses that, together with the intermediation of inferences, are participating in survival dynamics. "Fear facing a danger turning out into flight", or "anger out of aggression" are actions requiring extra "biops" needs and means that are strategically enacted to manage their apparition. Furthermore, the pleasure of an affective relationship induces to sustain it alive. As deeply anchored to biological survival dynamics, emotions require the intervention of complementary processes that contribute to evaluating stimuli, events or signals. An information evaluation that is pertaining to the system's individual personality and/or mentality is interpreted throughout its neural structures and representation of its survival dynamic worlds. These are the emergent result of apprenticeship, categorizing and memorizing ability as to store specific inferences within the different representation brain basins.

¹⁵ - **Humoral** : involving a bodily humor (as a hormone) and also relating to or being the part of immunity or the immune response that involves antibodies.

Consciousness And Awareness As basics To Survival Dynamics

Socio- and individual living systems have a consciousness and an awareness permanently acting for the permanent engineering and maintenance of their survival dynamic. Consciousness and awareness of e-psop streams are expressing self-requirements that process the sustainability and adaptability factors of survival. In such context, the "e-psop stream has a circular retroaction that produces emergent characteristics reinforcing the neuronal connections of apprenticeship and awareness. In the interdependence of neuronal areas, the pre-frontal cortex (basic to survival), receiving treated information from sub-cortical areas (limbic), promotes them to a certain consciousness level. Thus, consciousness is consubstantial to living systems' survival and is not the privilege of humans. Otherwise, no species would survive without an "unconscious/conscious sense of its self"! The central status of unconscious/consciousness, biochemical, is fed by cells' gene coding and memory fields (data from apprenticeship), and is where emotions moves representations participate in the structuring of reflexive behaviors as protection of the self.

"Unconscious And Conscious Thinking" as major keys to "Life's systemicity"

Many psychologists postulate that *"the thought"* (thinking) does not exist since it contains much of a set of different mental operations such as learning, solving problems, reasoning, memorizing, recognizing... However, there is a great difference between these "actions", as defined by humans, and the "biops" substratum that induces to the oversight of survival dynamics. Mental operations surge out from unconscious/conscious moves as psycho-physiologically combined while the creature is confronted with events occurring within its body-brain-body environment and milieu in the contextual moment. Operations are pertaining to the context usually motivated by survival needs and structure the reality of a behavior! The most relevant definition of the thinking process refers to "biops" activities as being "internally adaptive responses to intrinsic and extrinsic stimuli"; not only they express "inner impulses" dictated by the succession, or even the simultaneity of survival needs, and serves to build-up goal-seeking behaviors" as environmentally wise and effectively pertaining to current situation conditions. Memorized inference results participate in the quest for deciding of relevant solutions with survival behaviors and needs; therefore sustain unconscious and/or conscious e-psop streams from applying to an array of adaptive images, inferences and representations.

At diverse species levels, the interaction between emotions, implying the limbic system, the prefrontal cortex, cortex and specific memory basins inferences, is of an important effect upon the qualification of the "thinking" level as creatures' survival requirements are different. The unconscious, therefore "biops" process is largely intervening into the thinking process, and memory inferences have a large role upon the self-ability and self-adaptation of a living system while interacting with factual internal and external environments. It is assumed, and I postulate it, that individual living systems, as well as social communities, have different types and degrees of "thinking abilities and conformation", depending on species and type of community, and also on levels of unconscious thinking that participate in strategic decision-making, such as "fight or flight", since behaviors proceed from choices. Co-operation, sociality, projects engineering, e.g. choosing and building a habitat site or acquiring, and storing food, require both certain forms of unconscious thinking and reasoning. Animal and humans' thinking, behavioral mechanisms and their expressions, is basically supported by emotions and some degrees of mental and emotional intelligence (D. Goleman, 1995) as giving creatures a capacity to recall precise apprenticeship facts, inferences and souvenirs from the past (refer to the fact living systems have a history). A great part of such intelligence comes from unconscious thinking that participates in decision-making processes, facilitating a relevant evaluation of stimuli and events in their dimension of the moment. The understanding of "Thinking" is found into the emergence of interaction results that, integrating stimuli, signals and internal and external event changes between body and mind internal environments and exterior ecosystems and sociosystems, are in parallel confronted with the weight of unconscious processes. So is the set of processes that is giving consistence to the postulate of "psycho-somatopsychism" and its global integration networks and flux of streams. Such

understanding is a major illustration of those dynamics that participate in survival sustainability, and key to that global systemicity that makes life to exist.

6 "LIFE'S COMPLEX SYSTEMICITY" AS A SPECIFIC SYSTEMS' SCIENCE

The necessity of a "large clarification of systems science" history has induced to the emergence of "new fundamentals" as to build up scientific theoretical and realistic developments. In order to comfort the "Science of living systems" specificity as a global theory, I have called it the "*Theory of Life's complex systemicity*", that certain would probably like to read as the "*Theory of Life's systemic complexity*". The neologism "systemicity" I have *launched* (2002) as the way I felt "Life" through its approach with "The Bioethism transdisciplinary paradigm" refers to the universal specificities relative to life's complexity of phenomena, as being linked within interdependent, interrelated and interactive networks, solar system forces and planet cosmic constraints. Understood as a global terrestrial "ticktack" of ago-antagonist processed circular swings from birth to death, the Life's pendulum move, across interconnected networks represent the permanent "systemicity" of their percolation as determinant survival¹⁶ maintenance transactions since of their being permanently confronted with physicochemical and cosmic periodical forces and pressures. The Yin-Yang¹⁷ philosophy of two complementary forces, or "principle of contraries", that represents all Life's aspects and phenomena, rejoin my feeling, about Life, particularly by relating it to the role of space-time in the history of unconscious and conscious thinking and action. *The everlasting rustle sound of the planet "Gaïa's clock" echoes with creatures' behaviors for survival, and the permanent change of things builds up their genesis and environments evolution* (J.-J. Blanc, 2004).

Every biological process - from self-replicating molecules (DNA) to biotic communities - involves specific and "identifiable purposive survival functions", this is undeniable! On the other hand, the controversy between human and other creatures in terms of their having goals that are in some ways similar to human goals - e.g., a controversy about whether they are "programmed fact" or not stays in as an open discussion between when and where does Culture emerged before the humane one (cf. primates).

The emergent complexity of survival dynamics and of their systemicity

The ultimate determinant purpose is evidently that living systems have "a survival unconscious goal" in a limited space-time lapse since every living creature (individual as well as collective) is exposed to: *"a pattern of numerous events, each with a certain probability of killing the individual at any moment and, in the aggregate, causing a total probability of death or survival - climatic and other changes in the habitat, modifying the frequency with which the various potentially fatal events occur - progressive systemic change, inasmuch as growth, reproduction, development, and senescence are characteristics intrinsic in the organism and capable of modifying the effects of various environmental factors"*.

The word "survival" is the most important notion of self-maintenance and of a living system identity: not only surviving is "to overpass a possibly lethal event, leaving survivors that are better adapted", but also is expressing the permanent strive of the biological structure of a creature as to manage the diverse dynamics that maintain its **integrity** and its **"self"** as staying alive with a degree of consciousness.

Henceforth, living systems, for survival create reproductive sociosystems (family, group, local society, national society, human society,) are open-loops with internal and external behavioral processes that are never linear. Ecosystems (niche, local neighborhood...) are territories where cohabit along interwoven networks of predator-prey chains. Many creatures species, adapted to sets of niches (as composing a 3D space-time ecosystem's region), are also categorized as highly

¹⁶ - **Survival:** " the continuation of life or existence".

¹⁷ - **Yin-Yang:** between those two complementary forces, there are "in-betweens", e.g., there is a certain gap giving some distance in between the two opposites, and in fuzzy logic, it means that at a point in between, one can evaluate the value that separate the point to one or the other opposites. It induced to the development of fuzzy-mathematics (J.J. Blanc 1997)

complex living systems. They, at such level, require the use of pragmatic metaphors that help decipher complexity.

The study of dynamic systems revealed frequent periodic oscillations. It is probable that, in certain cases, the oscillations are produced by a phenomenon of fuzzy organization, implying the interaction of a metabolic process and its environment. If a metabolic cycle, for instance, proceeds with the interface of an aqueous medium and of a membrane or a charged wall, the phenomena of electric interaction, which are exerted between the fixed loads of the membrane and the ions present in the medium, are of nonlinear nature and can create dynamic periodicals. Many periodic phenomena were modeled, and it was shown what a local property could generate within a system in a total periodical "processing". These moves are part of the process that participate in the "Systemicity of the living", as much as circular and retroactive processing.

To-day, new Scientifics (Antonio Damasio, David Servan-Schreiber, Boris Cyrulnik, Daniel Goleman... as "psychos, meds and neurobiologists") postulate that the actual world academy must change of epistemological options. Neurobiology and new technological investigations, together with the existence of an infinite number of biological variables, conduce to consider that description and/or prediction are now to be stressed as but slightly probable as much the notion of emergence was stressed from neuronal behaviors.

A Living System Survival Is A Matter Of Emergent Behaviors As Interaction Results

Decision-making and project engineering

Local and regional living systems, as societal and/or individual actors, learn and adapt their survival abilities (particularly: decision-making and project engineering) in order to have access to an efficient management of their sustainability and adaptability behaviors and actions, permanently oriented towards their survival needs and means as well as towards their local socioeconomic fabric current situation at their different neighborhood level. Locally, they participate in maintaining their situation far from equilibrium, e.g. manage their survival by overpowering part of entropy surpluses, which, in terms of "liability and duty" is related to their capacity of reproduction and adaptation to evolution moves.

Schemes, Decisions And Projects Engineering Are Survival Dynamics Structuring Local Individual And Collective Consciousness

Schemes¹⁸, realized throughout the exercise of projects engineering activities are essential components of any individual or local collective consciousness qualification since they are survival preoccupations. They are complemented by global collective schemes of consciousness satisfying those feelings that each creature has facing a species group at different levels of societies it belongs to. A local collective consciousness is structured according to levels and cultural specificities of local social sub-groups and to socioeconomic schemes that foster the development and evolution of its ecosystem's fabric. Such socioeconomic processes condition the specificity of local collective intelligence (P. Levy, 1994). Correlatively, individual consciousness is strongly structured and influenced by the creature and other natural system's interactions with the collective environment. As belonging to a niche, and from such status, it develops its specific capability for survival from building up schemes and engineering them. Within the hierarchy of local sociogroups, each individual possesses a clan consciousness, of which elements are diffused among its memory basins of apprenticeship and other body-brain areas that complement the structure of its behavior essence. Sociogroups, as components of sociosystems are some of the social elements that interact in-between them and structure their global attitude by some sort of a "conscious whole", which is in relationship with the diversity of other individual and collective behaviors, according to the numerous activities they proceed to together..

¹⁸ - **Scheme**: "structure of an operating behaviour, of a process (action, intelligence...) that can be in the form of images or kinaesthetic sensations "(in the form of an interior move...). Then the set of shapes might be considered as contingent of the personality.

The Systemic "Required Variety" As Supporting Survival Dynamics: A "Required Systemicity"

Life's "required variety", also significant of the moves circularity qualifications, which as issued from feedback and reflexive actions of ago-antagonist loops, are emergent results. They echo with "Life's systemicity" background and, by inference, shape up the structuring of living systems' behaviors at every (t) instant. Their moving for survival according to the circular throughputs of their keeping on alive emerges from facing the predator-prey chain game; answering to all environmental events they are concerned with and search for energetic resources. Survival significant behaviors, as such, induce to a constant adaptation of adequate strategies towards the global entity of their mind-body-external environment and internal milieu metabolism. An indispensable bio-psychophysiological ("biops") fitness for the maintenance of their integrity and survival dynamics is vital. Their homeostatic¹⁹ autonomy and self-organization, as well as their maintaining an "external homeostasis" with other species creatures and the neighborhood wildlife context and/or human fauna is particularly significant of the "required systemicity" of the living.

Memory areas of a system: it has a history

A complex living system has a history (as long as it survives to "write or express" it!) and its current state and presence in a specific context depends partially of its anterior states context since it adapts itself to environmental present conditions. Because of multiple present "stable states", it shows phenomena of hysteresis (a "memory" of the phenomena undergone before) and some recurrent behaviors. A history emerges out of a complex game of interactions where survival motivations are very numerous and usually are a combination between needs, emotional statuses and hormonal expressions. Among hormones are the female and male sexual ones that have a deep influence from the start of ontogenesis to death upon individuals behavioral motivations, forcibly issued from the participation in from the nervous regulation network.

The Systemic "Ins And Outs" Of Complexity And Natural Transcommunication

Electrical impulses, biochemical energies and different "biops" matters, sustaining relevant processing of behaviors and actions, keep up with the "dynamic stability" of system's survival. As fitted in with the permanency of changes and the maintenance of moves fluidity, the system's viability is emergent from that percolation²⁰ surging along networks and "biops" exchanges, spot by spot, area per area. This vision and approach of survival moves is pertaining to any living system's level, from cells to supra-national societies. A homogenous approach of footbridges and links building up the connectivity of systems' survival needs and dynamics proceeds from the use of analogy and metaphors and there, it is interesting to use the J.G. Miller "operators metaphors". A major example of resides into the perfect "reversibility and circularity" of the psychosomatic and somatopsychic phenomena as interacting with environments. Their links and footbridges processes fit in with sensory information as treating environmental endogenous and exogenous events stimuli filtered throughout the "specific individualism of a brain" (personality of the system) at a central neural treatment center called the "limbic area" of which main components are the amygdala (emotions) and the hypothalamus²¹.

Percolation, amplification of disturbances, and transition from phase

The percolation is a problem of communication in an extended environment where in quite a number of "sites" are locally likely to relay information (physical, biological or of a fluid property: J Mr. Hammersley, 1957). They communicate with links whose effectiveness is random. According to whether the proportion of active connections is, or not, higher than that a threshold value, the information to long distance is transmitted. Percolation relies upon that critical phenomenon as phase transition: below the threshold, information remains confined in the spot where it originated; beyond the threshold, "percolate" the information and found far from its

¹⁹ - **Homeostatic**: "a relatively stable state of equilibrium or a tendency toward such a state between the different but interdependent elements or groups of elements of an organism, population, or group"

²⁰ - **Percolation**: "to spread gradually, see n° 24"

²¹ - **Hypothalamus**: "the hypothalamus contains a control center for many functions of the autonomic nervous system, and it has important links with the endocrine system".

starting point. The particular situation of transitions²² from phase is one out of many physical or chemical phenomena occurring to number of systems. Therefore, appearance conditions of highly sensitive behaviors are also observed in biological and social life and its organization. Disturbances permanently modify living creatures behaviors while interacting with environmental events and stimuli from their internal milieu, and as alike the butterfly effect, a small one can induce to important perverse effect in attitudes. Societies of creatures are meta-organizations, functioning at the verge of a lethal equilibrium as compromises between contradictory constraints that are not predictable and controllable.

The ever changing moves of biological conditions and behaviors

Living creatures are functioning wholes, organism that cannot be understood by means of physics and chemistry alone. Actually, described physiological networks, metabolic, neuronal, endocrine, humoral and immune processes are now understood as globally being biological parts of "a whole processing network" occurring both inside and outside the "system's skin" and called "*regulation networks*" (and not systems). Because of their interdependence and specific localizations, the information volume participates in that wholeness, even though it is much larger than that necessary to the synthesis of elements implied in the functioning of percolating moves throughout these networks. It is also assumed that complex biological networks answer general laws common to other "processes and their mechanisms" often incorrectly called systems.

The ever-changing statuses of life's environmental phenomena

Individual systems, sociogroups, societies, for functioning, require processes and mechanisms that induce to a permanent adaptation of their abilities to cope with natural, physicochemical phenomena and the management of its survival dynamics. The fact all survival moves are confronted to a constantly changing external and internal environmental status is raising their nomothetic validity. Psychological and physiological moves and their variables, are considered as being "*non-nomothetic*", meaning that the essential of the regulation networks that are the neural, immune, humoral, endocrine and "psychophysiological"²³ ones and other structures are participating in the homeostatic specificity of the biological "mind-body-milieu" of any living creature. Some physiological mathematical models have been set up and developed from chemical reactions sub-theories, but the ever changing stimuli and information data variability that induces to the permanency of chemical reactions along the processing flux within the regulation networks of the metabolism, as said being non-nomothetic, if possibly serving statistical charts and hypothetic probabilities, cannot be the subject of theorization.

"The Systems Science of living creatures", because of relaying:

- the ever changing conditions of individuals and communities socioeconomic and territorial current situation,
- the individual variability results of their specific behavior interactions towards the environment and their internal milieu,

is a science that must be completely separated and distinguished from other type of "systems, processes and procedures" in order to protect it from the perversity of the word "system" and application drifts.

7 PROVISIONAL CONCLUSION

A Living Systems' Global Theory And The "Theory of Life's Complex Systemicity"

Along these pages, though describing largely the different "fundamentals" (survival principles) that structure the "Theory of Life's complex systemicity", this work is part of a yet to be accomplished and finished development of the vast implication of neurosciences and "e-

²² - **Transition phase:** " a movement, development, or evolution from one form, stage, or style to another".

²³ - **Psychophysiology:** is a global discipline that studies the different flux moves that percolate throughout the "e-psop" behavioral structure of any living entity (e-psop = environmental – psycho-somatopsychism).

psop” processes in the management of the dynamics of those fluxes that, percolating throughout, support living systems survival. Complementing the scientific approach of the “Theory of Life’s complex systemicity” is of a great horizon further as understanding more about living systems structures and behaviors than the length of a purposely limited paper. It is of a particular must to now extend the work over to complement the behavior of sociosystems, ecosystems, and supra-societies learning as from the same thought process.

Life Is A Transdisciplinary Reality Of Interacting Systems, Then Relies Upon A Natural Systemicity

Thus, nowadays, progresses in "biology and complexity understandings" induces to clarify the scientific fields devoted to a clear description and theorization of "Systems science" through a certain number of epistemological²⁴ and paradigmatic actions:

- Separate "Systems science of the livings" from all other type of systems, since it is being an "hyper-complex" field (an adjective used by G. Donnadieu and M. Karsky, 2002),
- Adopt the concept of systems as the definitive and exclusive transdisciplinary paradigm²⁵ of life's individual and collective creatures' dynamics behaviors for survival.
- Try to change the word "system" for the word "process, mechanism or regulation", wherever those are obviously not compatible with the exact definition of living systems structure and survival behaviors,
- Define an updated list of physicochemical theories and sub-theories of matter, energy and information management that are common to all kind of systems, and sort out those sub-theories that are formalized as being realistically part of "the systemicity of internal and external living systems phenomena world" that participate in the maintenance of living systems survival.

In other terms, this work presents bases for a successive and sustaining development of the "fundamentals²⁶", as "*Life's survival principles*", that are structuring the "The theory of Life's complex systemicity ". Of course, it raises the problem of its nomothetic validity throughout the understanding of theoretical ways "life's systems" gets on surviving and evolving. Thus, the "principles of survival dynamics", common to all creatures, as maintained viable with the support of physical, chemical and bio-psycho-physicochemical principles, participate in the structuring of their viable entity, in terms of "*the personality of individuals, their species groups and societies*", as well as in the support of their abilities to get sustained by "keeping alive" from adaptive decisions.

Concluding here, from an epistemological viewpoint, it is to consider that many structuring parts or process functions and properties of living systems survival dynamics cannot be theorized, or even sub-theorized, because of their being non-nomothetic, and moved by "push-pull motives", that are ago-antagonistic, inhibitors and dynamic. Since thinking originated from survival principles, " the essence of cognition is "judgment" (the "biops" treatment of a stimuli or an information), in which a certain fact is distinguished from other ones and is characterized by some concepts or projects", and to be such "Systemicity is therefore the stem principle of Life's dynamics for survival".

8 BIBLIOGRAPHY

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