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Editoriale *(D. P. Errigo)*

Con questo nuovo numero rinasce "Nuova Atlantide", che col corrente 2010 festeggia il suo 25° anno. La nuova veste grafica, il nuovo Editore, i nuovi sottotitoli ed il nuovo Comitato Scientifico danno la caratura della Rivista che ha per i prossimi anni un ambizioso progetto. Non muta peraltro la filosofia che ci ha sempre contraddistinto: l'essere al passo coi tempi cercando di analizzare e di capire ciò che ci circonda e di raccontarlo, con l'aiuto di brevi Saggi o di Interventi in Convegni o Tavole Rotonde, nazionali ed internazionali. In linea con gli scopi dell'Associazione che l'ha scelta e la supporta, la WCSA, World Complexity Science Academy, Associazione che si propone di:

- *progettare, programmare, organizzare, valutare e promuovere la ricerca di base ed applicata, teorica e pratica, nonchè la sua divulgazione in ogni forma, specie nel campo delle scienze, interdisciplinari, sistemiche e della complessità affinchè la ricerca sistemica possa offrire importanti contributi scientifici ed intellettuali (esempio dall'ingegneria alla biologia, dalla pedagogia all'economia, dalla matematica alla sociologia, dalla cibernetica all'architettura, etc. (purchè operino attraverso un approccio scientifico di tipo sistemico) anche al problem solving strategico delle principali sfide evolutive che l'umanità sta affrontando ad esempio (non cogente) in ambito energetico, ecologico, biotecnologico, applicandovi su ogni piano della ricerca -dall'epistemologia alla tecnica- un pluralismo creativo ed inventivo;*
- *promuovere gli studi scientifici e/o umanistici di qualunque settore disciplinare e di matrice interdisciplinare purchè caratterizzati dall'approccio e/o dal paradigma sistemico in Italia e all'estero;*
- *promuovere gli interessi culturali e professionali dei suoi soci;*
- *favorire la costituzione ed il coordinamento di strutture istituzionali necessarie per la ricerca e gli studi scientifici e/o umanistici di qualunque settore disciplinare e di matrice interdisciplinare purchè caratterizzati dall'approccio e/o dal paradigma sistemico;*
- *promuovere la formazione degli studiosi, italiani o stranieri, di tutte le discipline afferenti all'approccio e al paradigma sistemico;*
- *promuovere ed attivarsi in proprio e/o conto terzi nei settori dell'istruzione, della formazione, della riqualificazione professionale e della ricerca in genere teorica e/applicata, il tutto con qualsiasi mezzo proprio e/o altrui effettuato, a livello nazionale, europeo e mondiale;*
- *incoraggiare l'incontro e la cooperazione tra studiosi, in particolare con l'organizzazione periodica di convegni a carattere nazionale e internazionale;*
- *esprimere un codice deontologico della ricerca e degli studi scientifici e/o umanistici di qualunque settore disciplinare e di matrice interdisciplinare purchè caratterizzati dall' approccio e/o dal paradigma sistemico e curarne l'osservanza.*

E tutto ciò che sarà ottenuto o che è in via di ottenimento, comparirà direttamente o indirettamente tra le nostre righe. Il nuovo Consiglio di Redazione è fiero di presentare questo esperimento per molti aspetti unico in Italia.

Editoriale *(M.R. Astolfi)*

*E' il tempo dell'ipercomplessità sistemica. E' il tempo in cui il furore del cambiamento tecnologico possibile invade tutti gli ambiti della conoscenza e della coscienza, nell'ottica di un futuro, insieme pressocchè infinito di possibilità, in cui il desiderio di un mondo altro si concretizza in una serie di immagini e messaggi virtuali che rimbalzano da un cervello all'altro che cerca di individuarne un il filo rosso che le trasformi in coscienza della conoscenza, ovvero in un unicum coerente e significativo. Dal caos dell'apparente non appartenenza, generata dalla rapidità del fluire e dalla difficoltà del costruire/ricostruirsi, esiste solo un afferrare randomizzato che altrettanto rapidamente lascia cadere in un circolo vizioso di un non esserci evidenziando una patologia organizzativo-strutturale del sistema. Le trasformazioni in atto sono prove di un' evoluzione a spirale che trae elementi ovunque in un progetto di crescita evolutiva che lievita in modo sempre più complesso e caotico in ogni direzione possibile a livello intradimensionale. Ecco che la scienza dei sistemi complessi propone punti di riflessione e strumenti per la comprensione e la strutturazione di un senso, di un significato, di coerenza, sottraendola all'emozionalità come catalizzatore di discriminazione e critica. Ri-nasce qui Nuova Atlantide con la sua nuova veste che la trasforma in una nuova pubblicazione dedicata non solo alla storia e/o all'evoluzione di concetti base e teorie, quanto alla narrazione di questioni derivanti dall'analisi e dall'applicazione psico-sociologiche nel campo dell'umano e dell'extra umano, di fronte alle sfide evolutive del knowledge Intensive System Society in cui l'ipercomplessità deve essere, sempre e comunque, vista come risorsa. Quindi si parte dall'apparente differenziazione generatrice di sistemi parziali interni al sistema generale per arrivare alla comprensione della complessità algoritmica della società della Conoscenza, per affrontare la ricerca della coerenza intra-dimensionale inglobante. E' così che si intende affrontare il world shift verso una nuova cultura sociale superando cioè la semplificazione delle ideologie, e riconfigurando la nostra epoca di conoscenza attraverso sistemiche evolutive armonizzanti. Il nostro proposito è di creare con i nostri articoli mappe strategico-evolutive, individuare strategie sistemiche multidimensionali, per orientarci nella complessità informazionale e decisionale in cui siamo immersi, per divenire coscienti e saper essere uomini liberi nella ricerca e sperimentazione dell'unità. E ciò attraverso riflessioni e teorizzazioni che, mettendo in luce i punti di forza e di debolezza di una società alla ricerca, incrociano diverse provenienze ma che sono unite strutturalmente dall'approccio alla ipercomplessità ed alla sua lettura e comprensione. Nel primo articolo "**Sistemi complessi costruttivismo e simulazioni L'eredità metodologica di Luhman"**, Pitasi, come analista strategico-*

*sistemico dei sistemi complessi a livello scenario globale, descrive ed analizza il proprio percorso di ricerca sul campo nella sua variante sistemico luhmaniana connessa a quella giuseconomica. Egli individua nella resistenza alla ipersemplificazione alla base della teoria sistemica luhmaniana, in senso lato olistica, un potente modello metodologico complesso, il solo attualmente in grado di confrontarsi con la complessità algoritmica della società della Conoscenza che viviamo. Da qui parte per darci il suo percorso di studio sulle raffigurazioni sistemiche e strategie evolutive multidimensionali della nostra epoca di conoscenza fino ad arrivare ad una proposta di policy making. Illustra i capisaldi del suo procedere per steps cruciali fino ad arrivare ad una teoria algoritmica-evolutiva della complessità informazionale e decisionale per l'economia della Conoscenza. Segue l'articolo di Astolfi "**Dalla complessità della Coerenza intra-dimensionale alle basi per una pedagogia olistico-sistemica. Il problema del divenire**" che affronta il problema del divenire dell'esserci in un contesto sociale-mondo in cui preconizza la possibilità di una armonizzazione intradimensionale tra interno ed esterno nell'attofatto di una psico-socio-pedagogia olistica applicata. La psico-socio-pedagogia diviene in sintesi, con una integrazione di più approcci in una visione di insieme, una Pedagogia aperta, traspersonale intradimensionale inglobante, e basata su valori di riferimento portanti in cui la dualità è impossibile. Indaga su metodi e modelli formativi che creino un interscambio formativo co-creante l'individuo. Costruisce anche in sintesi un ipotesi di percorso evolutivo didattico attivo per arrivare alla coscienza della conoscenza in una armonizzazione coerente dell'est-interno ovvero ad una coerenza intradimensionale nell'evoluzione e dell'evoluzione. Segue **"La complessità socio-organizzativa del mobbing"** di Pesa in cui **s**ono analizzati con approccio sistemico gli aspetti psico-fisico-sociali nel mondo del lavoro causati dal mobbing, atto di potere ripetuto nel tempo che crea malessere e discriminazione andando ad incidere sull'integrità psicofisica dell'individuo che perciò necessita di una forte tutela normata e di cambio di approccio etico-morale a tutto campo. L'autore evidenzia nel dettaglio come, nel sistema interrelazionale individuo-società, il mobbing venga ritenuto una patologia organizzativo-strutturale del sistema, in cui l'identità sociale derivante da una posizione di "potere "di alcuni viene ritenuta più vantaggiosa rispetto alla possibilità di una promozione al benessere globale di tutti. L'innalzamento degli standard morali di riferimento, il saper essere uomo libero, diventa legge generale per la tutela della salute e della produttività economico-sosciale per arrivare in sintesi ad migliore funzionamento del sistema globale. Errigo nella sua dissertazione "**Su ideologia, anideologia e potere**" analizza i labirinti delle possibilità di evoluzione dei concetti e dei comportamenti, di una società, come aggregato di individui mentalmente liberi, in cui la coerenza esteriore ed interiore si manifesta negli effetti benefici della libertà partecipativa libera da emozionalità istintuale. L'autore afferma che la lettura dei bisogni, attraverso un razionalizzazione economico-politico-selettiva, deve essere corrispondente alla risposta effettiva ai bisogni stessi degli individui. Sono tre i libri che presentiamo**: Il tempo del desiderio** di A. Pitasi ed E. Ferone, commentato da L.M. Girali che ci presenta l'evoluzione dell' Homo Oeconomicus di fronte alle sfide evolutive dell' knowledge Intensive System Society in cui l'ipercomplessità è vista come risorsa. Il libro si propone come una mappa strategica che sostiene i top browser nel procedere. M. Caputo sintetizza ne **Il mondo come catalogo globale** il libro "Sfide del nostro tempo" di A. Pitasi che, attraverso la scienza dei sistemi complessi, propone punti di riflessione e strumenti innovativi per la crescita evolutiva nell'ottica di un futuro che si rivela un insieme pressocchè infinito di possibilità. Identifica inoltre i punti di forza e di debolezza del sistema società in un continuo dis-equilibrio tra implosione ed esplosione alla luce del diritto di un futuro da affrontare. Mentre E. Cheli e N. Montecucco, nel loro **I Creativi culturali**, affrontano il world shift verso una nuova cultura sociale presentando, attraverso un panorama di ricerche internazionali e con la partecipazione di Ervin Laszlo e Paul H. Ray**,** i nuovi modelli del paradigma olistico. Essi si riconoscono in una nuova specie di individui, i creativi culturali, giocatori di un ruolo definitivo nel processo di cambiamento: **"***Persone nuove e nuove idee per un mondo nuovo" che attraverso la crescita personale muovono attraverso nuove esperienze significative diretti verso un'evoluzione spirituale che cambierà il mondo. Ogni percorso-articolo-testo presentato diviene una mappa strategica, intraconnessa con le altre, per orientarsi e scegliere per vivere consapevolmente ed affrontare le proprie esperienze di vita tra le pressocchè infinite possibilità che l'uomo, immerso nella complessità caotica dell'incompetenza continua, si trova ad affrontare. Superare la resistenza al cambiamento è il messaggio che vogliamo trasmettere. Prendere coscienza dell'ipercomplessità in cui siamo immersi è il metodo che scegliamo. Grazie di averci scelto. Non è un caso, ma siamo sicuri che questa Rivista diventerà un potente strumento funzionale per raggiungervi e costruire insieme una rete di interscambio comunicativo-informazionale che parli forte al mondo su sé.*

Sistemi complessi, costruttivismo e simulazioni *(A. Pitasi)*

Abstract
This paper deals with Niklas Luhmann's System Theory and tries to answer to two main questions: what lesson did Luhmann's work give to me? How can I was it possible to enhance his intellectual legacy during my growth as a scholar? The short answer to both the two questions is that Luhmann's lesson gave me the opportunity to live a powerful and fast evolutionary shift during my Bildung. Therefore, these pages do not represent indeed a biographical life story like witness or a critical review of the international debate about Luhmann's thought. This essay aims to present my research during the period 1998-2008 as an heterodox spin-off of Luhmann's System Theory and provides a wide overview of other luhmannian spin offs around the world some way mapping the global growth of this thinker's legacy all over the planet.

Una nuova psicopedagogia per il cambiamento *(M.R. Astolfi)*

Abstract
In this article I present a theoretical and experimental work concerning non traditional new systemic communica-

tive psycho-pedagogy models. The theoretical work is based on intra-dimensionality which is supported by the quantum mechanics and field theory. This is a ipercomplex system in which chaos , in spite of its depending from the boundary conditions, in reality can be "tamed" in practice. In particular I expose a research in the mathematical learning field about the acquisition of the concept of the "relative number" in adolescents with different levels of learning competences.

La complessità socio-organizzativa del mobbing *(A. Pesa)*

Abstract
This article aims to put in evidence a social problem which is very important nowadays. The first part is focused on the juridical and psychological aspects of mobbing, which are treated in a didactic way, trying not to overstep sectors that work in harness with sociology, but sometimes they result essential for the formulation of its theories. The remaining part is focused on the social dynamics which often can be found inside the organisation, pointing out how a bad management of human resources and a wrong concept of competition and valorisation of a person can turn into adversarial problems which easily lead to mobbing. All that implies costs and losses not only in terms of human potential, but also for all that concern organisation and society.

Riflessioni su ideologia, anideologia e potere *(D.P. Errigo)*

Abstract
This article deals with one of my research concerning an analogical analysis about a National Social Body as an ipercomplex system. I explain, in a wider way, my work presented at the II Mediterranean Laicality Festival in Pescara (Italy), in particular I describe some representative models in the light of the knowledge deriving from the Gnosis of Princeton global vision, from the Club of Budapest holistic vision and from the PNEI integrated vision. Here I derive some operative models which describe the actually worldwide situation at the light of the historic-social-political facts. All the models can be reconnected at a fundamental scheme, already described in another study, concerning the psycho-sociology of the "Power" as regards to an unitary global intra-dimensionality model.

Recensioni:

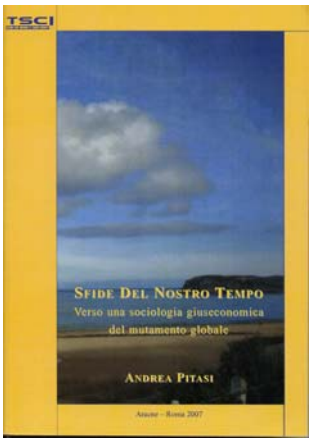
Il Tempo Zero del desiderio *(recensione a cura di L. M. Giraldi)*

Andrea Pitasi e Emilia Ferone
Con la collaborazione di Simone 'Alessandro

Il Tempo Zero del Desiderio
Una strategia evolutiva
per l'economia e la società della conoscenza

Mc Graw-Hill 2008
pp. 150
€ 15,00

Il mondo come catalogo globale *(recensione a cura di M. Caputo)*

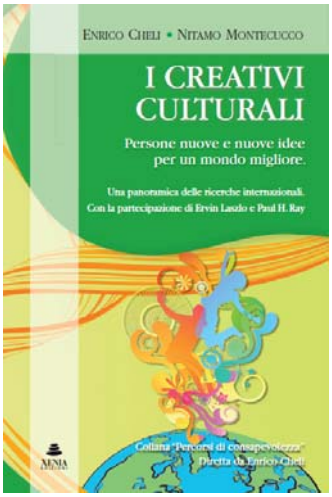


Andrea Pitasi

Sfide del Nostro Tempo
Verso una sociologia giuseconomica
Del mutamento globale

Aracne – Roma 2007
pp. 172
€ 10,00

Creativi culturali per un mondo migliore *(recensione a cura di E. Cheli, N. Montecucco)*



Enrico Cheli e Nitamo Montecucco

I CREATIVI CULTURALI
Persone nuove e nuove idee per un mondo nuovo.

Una panoramica delle ricerche internazionali.
Con la partecipazione di Ervin Laszlo e Paul H. Ray.

Xenia Edizioni
pp. 160
€ 10

NA 2-2010

Editoriale: Lo spazio-tempo delle scelte *(D.P. Errigo)*

Si è abituati ormai a considerare la microecoconomia come un sottoinsieme del grande insieme che si occupa di grandezze economiche aggregate, la macroeconomia. Insomma con una classica operazione riduzionistica in cui pare che la somma di tutte le parti fornisca il contenitore complessivo. In realtà, vivendo in un sistema globale e non un insieme globale, le cose cambiano radicalmente aspetto. Un sistema è un insieme strutturato di elementi e la presenza di una struttura è la causa efficiente affinchè qualsiasi mutamento, dovuto ad azioni perturbative, provochi immediatamente l'inizio di un tensionamento della struttura. Tensionamento, che più o meno velocemente (a causa delle inerzie), si ripercuote in tutta la struttura. Non solo: in un sistema quale quello sociale, complesso e regolato dalle leggi del caos, vigono norme comportamentali diverse da quelle usualmente ritenute. Ad esempio nella complessità esiste una circolarità tra causa ed effetto, e da questa circolarità nasce l'autorganizzazione. Con quest'ultima, dal punto di vista quantitativo il sistema complessivamente è più della somma delle sue parti ma nello stesso tempo è anche meno della stessa somma perché realizza solo una particolare organizzazione tra le tante possibili. Ed in ogni caso occorre considerare che le proprietà e i comportamenti presi singolarmente nel collettivo sono inattesi e sempre presi singolarmente gli elementi si comportano come se fossero soggetti al Principio di Indeterminazione mentre come Collettivo, cioè complessivamente, sono sufficientemente valutabili con l'analisi statistica, ma meglio con particolari analisi armoniche. Solitamente si utilizza il concetto di "Sistema" per descrivere i processi che non forniscono risposte immutate e univoche agli stimoli; le risposte vengono prodotte da trasformazioni interne delle configurazioni dell'"Insieme" che viene quanto meno perturbato. Attualmente stiamo vivendo, in ogni spazio, un tempo significativo dal punto di vista delle scelte opzionali da parte dei governi e delle forze che li muovono. E se queste scelte non saranno di aggregazione ma di tipo separativo, provocheranno dei tensionamenti più o meno evidenti. Specie se non saranno risolte le incompatibilità e le evidenti disparità sempre più lampanti tra i valori della "persona" e i "valori" dell'economia. La nostra Rivista tratta di "Sistemi", cioè di un concetto per la cui disamina sono indispensabili tre connotazioni epistemologiche e cioè che non esiste un tempo assoluto, che non esiste uno spazio assoluto, che non esiste un centro assoluto che possa essere top-sorgente o top-pozzo cioè un sistema in cui tutti gli elementi hanno pari dignità. Sistema in cui tutto è correlato, relazionato, dipendente da ed influente (perturbante) su. Sistema ricco di vari sottosistemi complessi e caotici, cui appartiene il nostro esserci ed il nostro prendersi cura.. Tale è infatti il sistema universo (magari a simmetria variabile) che ci contiene, e necessariamente tali sono i sottosistemi in esso contenuti, nella fattispecie quello fisico, quello sociale e quello biologico. In questo scenario abbiamo ritenuto opportuno collocare in questo numero della rivista l'inserto sul "Diversity Management" con l' aspettazione che una volta reso evidente un macropunto di equilibrio dinamico, questo ci consenta l'applicabilità di tecniche organizzative adatte al cambiamento radicale. E per gli stessi motivi, dopo l'editoriale della Dott. Maria Rita Astolfi, viene esposta la ***WCSA DECLARATION OF BOLOGNA, Dec. 4th 2010*** *che sarà presentata al Convegno di Bologna appunto il 4 dicembre p.v. e che è già stata firmata, oltre che da tutto il direttivo associativo, anche da numerosi Docenti Universitari di tutto il mondo che hanno espresso il loro entusiastico consenso.*

Editoriale: Il "Diversity Management e l'arte della comunicazione *(M.R. Astolfi)*

Il metodo migliore per arrivare al proprio obiettivo nel modo più efficace possibile è vincere senza arrivare allo scontro diretto ovvero vincere attraverso la co-costruzione del futuro, ovvero dei futuri possibili tra cui scegliere, armonizzando i valori etici e mantenendo salda la propria (ed altrui) integrità. In ciò è insita la capacità di vedere il quadro strategico individuando e padroneggiando strategie ad hoc per diventare creatori ed innovatori più flessibili ed in armonia con il mondo post industriale e post moderno. Dunque un processo evolutivo che di necessità deve essere legato a modelli di management coerenti con la valorizzazione e la gestione delle persone che ne fanno parte operativo-attiva. Il desiderio di rinnovare, arricchire e ampliare il nostro giornale ci porta allora a scelte forti e prese di posizione in favore di strategie e modelli di management che siano sincronicamente interconnesse con il benessere della persona inserita in un contesto lavorativo che la inglobi e la valorizzi. La gestione delle Human Resources in un coinvolgimento globale di partecipazione consapevole porta infatti a processi-percorsi di accelerazione sia di trasformazione che di innovazione in un' ottica di efficacia ed efficienza delle strutture. Un'organizzazione motivante di fatto porta al cambiamento del modello organizzativo quali-quantitativo di empowerment se ingloba strategie di diversity management che includano forti strategie di ascolto e di auto-organizzazione in funzione di una multiculturalità in cui i flussi comunicativi si muovano a livello sinergico e cooperativo in funzione di ridurre l'incertezza. Dunque un muoversi di concerto con aspettative ed interessi interni ed esterni in strutture a reti che prevedano la gestione della circolarità memetica con una nuova mission di inglobamento e valorizzazione dell'altro da sé. E' una continua esplorazione dello spazio delle possibilità in una economia di sistema sempre in equilibrio sul margine de caos. Si tratta di un laboratorio aperto in cui inviare segnali a distanze variabili per aderire alle complessità delle regole locali in cui la flessibilità diviene norma operante per l' auto-organizzazione di procedure e sequenze adattive e funzionali alla circolazione di informazioni, pensieri, emozioni. La dinamica interrelazionale porta ad istruzioni di contorno e struttura l'insieme di regole per la continua ri-configurazione (aperta, complessiva e complessa) di una comunicazione corretta, efficace e coerente, ma soprattutto creativa ed innovativa. Si tratta di una indispensabile innovazione manageriale che porta ad un radicale vantaggio, che proprio attraverso la ristrutturazione del networking comunicativo investe anche sul capitale umano quale intangibile asset per la creazione di valore per superare i ri-

schi e limiti in condizioni di incertezza di modelli. L'ampliamento del contesto di riferimento permette di integrare l'argomento in un ambiente sempre più vasto che lo ingloba e lo proietta oltre i confini della conoscenza di settore verso una coerenza sistemica che ci contraddistingue.

The best way to arrive to our own goal, and in the best effective way, is to win without arriving to a direct fight or, it is better to say, to win through the co-construction of the future, or better of the possible futures to choose, harmonizing the ethic values and keeping strongly solid our own identity. In such a way we have the possibility to perceive the strategic global situation finding and mastering pertinent strategies to become more flexible creators and innovators, harmonizing with the post industrial and post modern world. It is an evolutionary process that necessarily must be interconnected to coherent management models focused on the improving of people which are an operative-active part of it. The wish to renew, enrich and empower our review, forces us to make strong choices and take a definite position in favour of management strategies and models which are synchronously interconnected with the wellness of a human person who is part of a working contest that becomes really including and improving. In fact, in a global involvement of an aware participation, the Human Resource Management leads to paths and processes that accelerate both transformation and innovation from the point of view of structures efficacy and efficiency. A motivating organization leads actually to a quantitative-qualitative organizational empowerment model changing if it in-globes Diversity Management Strategies focused on a strong listening and self-organization strategies in function of a multi-culture in which the communicative fluxes moves in a synergistic and cooperative way in order to reduce uncertainty. So a moving according to internal and external expectations and interests in net structures which consider the memetic circularity management as an including and improving new mission. It is a continuous exploration of all the opportunities in a systemic economy always in equilibrium on the chaos border. It is an open laboratory in which sending signals to variable distances to agree to the local rules complexity in which flexibility becomes an operative standard for self-organization of procedures and sequences that become adaptive and functional to the informations, thoughts and emotions circulation. The inter-relational dynamics bring with a series of contour instructions and also structures the whole of the rules for the constant (open, global and complex) reconfiguration of a correct, efficient and coherent, but above all creative and innovative, communication. It is a radically advantageous necessary managerial innovation that, just trough the communicative networking reorganization, invests on the human capital as an intangible asset to create value to overcome limits and risks in condition of models uncertainty. The widening of the reference context places the argument in an expanding including environment which projects it beyond the sectional Knowledge boundaries towards that systemic coherence that marks us.

WCSA Declaration of Bologna, Dec. 4th 2010 *(A. Pitasi)*

Diversity: complexity and the speed of business evolution *(A. Pitasi)*

Introduzione all'inserto *(G. Porcaro Sabatini)*

Il Diversity Management: criticità e prospettive. La nuova frontiera per la valorizzazione delle persone nella relazioni di lavoro *(A. Cocuzza)*

Abstract

The author proposes an analysis of the evolutionary process of the organizations and management models, getting to the actual economic and social globalized context, that is deeply changing, because of the relevant pervasiveness of the technology innovation, a constant development of the organizational models as well as a deep transformation of the productive processes. It's widely accepted assumption that real competitive advantage for an enterprise is the adoption of integrated management policies aimed at offering equal opportunities in order to enhance the human resources, starting with the valorization of the differences and diversities that are typical of each person in workplace relationships. In this new scenery, in order to understand the high significance of the evolutionary phenomena it is necessary to shift from a concept of change, intended as a quantitative variation, to a concept of mutation, that is a systemic and qualitative variation that makes possible the shift from an organizational and bureaucratic model to a telocratic model (from the Classical Greek telos) oriented to the achievement of a goal/object. The real challenge for the enterprise in the post industrial era is the enhancement of the people through the empowerment of the talents and of the cognitive assets (competencies), as well as through the attention to subjective differences that there are in a "business universe". In fact, in nowadays economical and cultural context the political-social and working consciousness of the people made itself through the equality and the diversity, beginning from the recognition of the main differences as gender, age, ethnic and cultural origin, or of disabled persons. Today's process of "progressive dematerialization of the economy", forces the enterprises to reassess the investment strategies and the composition of the business capital in favor of a bigger incidence of the immaterial asset. In order to gain flexibility, the company starts a progressive outsourcing of processes, by either streamlining the productive structure or getting closer to an external network or through actions of delocalization. This determines an increase of the relationship with the "diversity" represented by the people that weather work in outsourced or delocalized realities. The directions literature gives about the diversity management have been summarized by the individuation of three ways through which the business organizations have chosen to face the "diversity" question:

- *Affirmative action: it is focused on the inclusion and requires a special action in order to correct the imbalances;*

- *Valuing differences: it emphasizes the relationships and how the people build relationships in the organizations;*
- *Diversity Management: aims to create an environment that is able to bring the talents of everyone out.*

Specifically, the diversity management is based on a holistic concept of the human resources. Moreover the author analyzes the management of the difference and its organizational benefits, and highlights the specific causes of the differences in the organizations. Actually, there are numerous structural factors that legitimate the organization to undertake diversities management policies. First of all, the qualitative rise of the needs that each person shows in the working universe. The number of the people that has surpassed the levels of the primary needs and moves towards the self-realization needs has increased. A further cause is the continue evolution of the organizational models and of the tasks within the organizations. The so-called cross-culture, intended as the co-presence of people that have different nationality in the working context, in consequence of the progressive internationalization and globalization of the trades. A further element of acceleration in the spread of the diversity management instruments is the feminization of the job market. A last important aspect that supports the policies of the differences management is the presence of disabled persons in the various working contexts. Towards them the contemporary society has individualized appropriate cultural and normative instruments in order to reshape their social placement. The organizational culture and the diversity evolve and determine themselves. To conclude, some business experience are reported by the author of DivMan in Italy through two case histories: Trenitalia and Trambus.

Diversity Management e comunicazione *(G. Gaddoni)*

Abstract

According to the systemic theory the differences are at the base of the systemic survival, until main is the complexity of the system, greater is able to be its stability. To adopt the perspective of the Diversity Management means above all to recognize these differences: not to ignore or to refuse them, but to manage them profitable, utilizing them to increase the competitiveness and the possibility of success; therefore re-introduce them in the system to improve the stability. All that it is even more true if applied to the communication process where the information is bound to a difference; what is perpetually equal to itself does not supply some information. Hence it come down the proposal of organizational analysis to improve the practices of Diversity Management based on the processes used in an optics of systemic circularity.

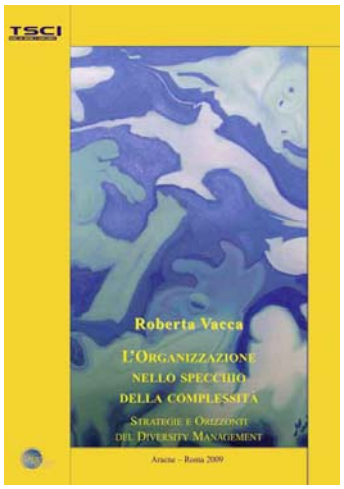
Diversity & Inclusion: un'opportunità da cogliere? *(R. Vacca)*

Abstract

The strategic goal of Companies is to transform product and service portfolio towards a specialty organization which cares about people, improves the planet and achieves sustainable profit. In this way, each company has to differentiate itself, since the world is commoditizing faster and faster due to globalization and information availability. The world is in motion and it requires different behaviours and subsequently different mindsets. This asks to Change Agenda, MOTION, is focused on three key themes (External orientation & Innovation, Accountability for Performance and Inspirational Leadership), enabling to become truly agile companies. These three themes can only be achieved, if the Management is able to create a culture, based on sustainability and diversity. Diversity is firmly anchored in the transformation of own culture and will (continue to) be one of the fundamentals of own values. Bottom line, diversity reduces myopia/ 'groupthink' and therefore stimulates creativity and innovation.

Complexity systemic science and the key global challenges of our times *(G. Marini)*

Recensione: L'Organizzazione nello specchio della complessità *(a cura di G. Porcaro Sabatini)*



Roberta Vacca

L'Organizzazione nello specchio della complessità

Strategie e Orizzonti del Diversity Management

Comunicato Stampa: La 1° edizione del "Festival della Complessità" *(Tarquinia luglio 2010)*

NA 3-2010

Editoriale: La comunicazione informativa bidirezionale/The bi-directed informative communication *(D.P. Errigo)*

Con questo terzo numero del 2010 si chiude il primo anno della Rivista come organo ufficiale della WCSA, durante il quale si è accresciuta in partecipazione sempre più evidente per il suo credito e il suo parterre scientifico, e che per il prossimo anno si presenterà ancora più attiva anche dal punto di vista dell'innovazione. Noi riteniamo importante una comunicazione ricca di contenuti che consenta lo scambio di idee nei vari rami del sapere innescando così anche dei contributi derivanti dai lettori che desiderano approfondire temi trattati. Questo ad esempio è il nostro auspicio e cioè che la Rivista diventi bidirezionale con i Lettori che discutono con gli Autori, innescando in questo modo quel processo di crescita comune, sistemica, che deve essere alla base di qualsiasi nostro riflettere. Il dibattito scientifico è sempre auspicabile perché inevitabilmente stabilisce e induce la crescita. Lo scambio delle idee innesca, come ha sempre innescato, quel processo onnidirezionato, autoconsapevole, reversibile e autopoietico, che serve sia alla comunità scientifica sia alla società e alle comunità in genere, nel suo complesso. Nella fattispecie i temi che trattiamo sulle nostre pagine, non sono avulsi dalla realtà: la sistemica porta infatti il suo valore aggiunto in qualsiasi ramo del sapere e soprattutto, come conseguenza, nella prassi (il sé versus l'altro da sé). Arriva così anche ad insegnare a mettere in pratica i concetti di "diritto oggettivo e soggettivo" e soprattutto di "libertà" e di "uguaglianza". L'analisi sistemica del sociale, dal punto di vista sociologico, psicologico, pedagogico, economico, finanziario e giuridico degli "ensemble" conduce necessariamente alla valutazione critica dei comportamenti sociali, con la stima anche dell'andamento del numero e dell'intensità delle richieste sociali sempre più pressanti e delle risposte politiche alle stesse, non sempre congrue rispetto alle richieste. Una valutazione - quella nostra, scientifico-sistemica - ottenuta con metodi rigorosi e con neutralità di pensiero, anche adottando le nuove regole mediatiche dell'eduinfotaintment, di cui si parlerà nelle recensioni poste alla fine di questo numero, e sempre ricordando le parole di N. Tesla: la scienza non è nient'altro che una perversione se non ha come suo fine ultimo il miglioramento delle condizioni dell'umanità. Infatti il compito precipuo, oserei dire il fine ultimo, della comunicazione informativa bidirezionale è quello di diminuire la non conoscenza di chi subisce il potere nei confronti della conoscenza di chi, invece, gestisce il potere.

With this third Nuova Atlantide number (2010), our first year as official WCSA review is completed.. We have grown up in participation for our credit and our scientific parterre, and next year the journal is going to become more and more active also from an innovative point of view. We think very important a rich in contents inter-communication, activating an interchange in various scientific knowledge fields with contributions from readers who wants to study the themes and arguments, we deal with, more and more in details. Our strong desire is that our paper becomes the privileged place in which a reciprocal and bi-directional discussion, among readers and authors, leads to that common systemic growing processes at the bases of every our reflecting. A scientific debate is always fundamental because it inevitably favours an evolutive growing. An ideas inter-exchanging gives rise, as ever, to that auto-conscious, reversible, autopoietic, omni-directed process that is useful and a strong need for either the scientific community, the society and each community in general. The themes and arguments, we specifically deal with, aren't far from real life: systemic adds a rising value in whatever knowledge branch and, above all, it has concrete consequences in praxis (the self versus other self). It arrives also to teach how to put in practice the concepts of "subjective and objective right", and above all of "liberty" and "equality". From the sociological, psychological, pedagogic, financial and legal "ensemble" points of view, the social systemic analysis necessarily leads to a social behaviours critic evaluation, also with the presumable trend rating of the number and intensity of social requests and the consequent, non always coherent, political answers. We apply our scientific-systemic evaluation with rigorous methods and neutral thought, always remembering N. Tesla's words saying that science is no more than a perversion if it hasn't as ultimate aim the improving of human conditions. In fact the most important task, I can say the informative, bi-directed, communication ultimate goal, is to diminish the Non-Knowledge of who is suffering Power towards the Knowledge of who manages Power.

Editoriale: The Challenge – Re-orienting Process: Order from Noise *(M.R Astolfi)*

We have to face a glocal and more and more complex, divided and differentiated reality, how can we manage nowadays the deriving enormous problems of choice coming from the consequent lack of sense and meaning? Have we to manage living in a continuous self adjustment or to survive and passively accept not to be thoughtfully actors of our life? Psychic systems, observed as individuals-persons, that is "collages of expectation"[1], in their human and individual behaviour desire to overcome the threshold of anxiety and avoid risks reproduction. But Reality is not knowable, calculable, and repeatable, nor only depends on natural laws. Reality, we have to face, is multiform, continuously changing, quite impossible to understand in its un-organized asymmetric flexibility. The difficulty to perform such unconditional certainty is connected to an orienteering process which can apparently adjusts sense and meaning which are continuously fading and wavering. The expectation is to negotiate the re-building, the reconstruction, in function of the coordination and the connection of standard social meanings(memes), as forms of a self-referential world, in a wide spreading of potentialities, probabilities, possibilities which differentiation arises within the pluri-formation of boundary lines. We have to grasp the

hinc et nunc of the situation. This concerns both social and psychic systems evolving together as each other environment, controlling their own structure and processes and regulating their own autopoiesis. Viewed from a perspective of reciprocal structural systemic changes, the works we present explain the basic concepts of the re-orienteering thought and strategies to act on distinction in the self referential system formation. We make efforts in this direction going into further details to negotiate meta-meanings to introduce and redefine what happens in a continuous communication flow, asking for meaningful interpretations. According to our hypothesis, each of these articles structure a fil rouge basing on systemic thought, consciousness, communication and strategies, in which complex psychic and social systems endanger each other to work together along their own intra-connected global evolutive line. We try to overcome the system's entropy, inevitably analysing their complex structure-net and elements-events reproduction from different points of view. From the WCSA Conference in Bologna (December 2010), in which WCSA expert members debated about complexity and the major challenge confronting contemporary systemic thought, we publish the abstracts, we have received, to give a synthetic panorama of the specific problems discussed, starting from the social complexity systemic analysis and reporting the conditions of possibilities deriving from the key global challenges which arises in a self referential glocal reality. We present here also three issue elaborated by the WCSA speakers (Pitasi, D'Alessandro e Germano) on the arguments and contents they debated during the IACR (International Association for Critical Realis) Annual Conference in Padua (July 2010). The specific aim is to provide epistemological, theoretical, strategic and methodological hints to organize a global governance toolkit strongly based on the most advanced frontiers of sociological theory. In ***Andrea Pitasi'*** *s work the author analyses the systemic and interdisciplinary approach advantages in managing complexity, and introduces an algorithmic forma mentis which is fundamental for its evolutive and adaptive plasticity in so reach in bifurcation actual scenarios. He also describes the Systemic Strategic Scenario Analyst, with intra-level and transversal competences, just to define steps and strategies following tunnel visions and strategic evolutionary maps to create viable futures in a self organizing and self reproducing Socio-economics Reality system. Considering ourselves in relation to our social context, on a methodological level, interconnecting critical realism, constructivism and new systemic theory,* ***Simone d'Alessandro,*** *moving from Archer' thought, analyses reflexivity (meta-reflexions) as a systemic function reducing complexity and helping possible choices. Social phenomena are ruled by meta- reflections, internal conversation and human reflexivity and changing internal meta-rules dialogue, on which we base our actions in function of our ultimate concerns, the social phenomena level and typology changes.* ***Ivo Stefano Germano*** *reflects on the concept of sense (emotional and highly improbable) and meaning (cultural elaboration) focusing on an individual in continuous environment self -adjustment. He considers the sociological critical realism as a tool to analyse society in its doing and, in its interconnected net, he tries, investigating the human relationship, to find exit strategies to derive order from noise and enlighten the life experience of people. The following two articles analyse social systems balancing between communication and action, both contributing to a strong self-referential system differentiation: "..through action the subject comes into the system"(Luhmann)*.* ***Michele Infante,*** *through the works and thoughts of Luhmann, defines either the nature of communication process, its dynamics and the enormous development of communication technology interconnected. He starts synthesizing the main traditional social approach to communication in which uncertainty and chaos are constant. He defines social systems as systems of communication and Media as living (cognitive organizations) communication systems. He considers the complexity of the communication processes and reports them into the frame of the social theory research. He also analyzes the Media Communication system as a system of reducing social complexity and he compares it to social systems in which social order is produced by the communicative process itself.* ***Giulio Marini*** *analyses and evaluates a particular social case: the Italian way to flexicurity. He relates about the self-employment and entrepreneurship programs, active measures and start up inceptives, to help new outsiders and week workers to find a job with the goal of gender equality. He starts from the interactional processes working in the current social labor dynamics. He doesn't deal with symbolic interactionism, but, on a more concrete level, with existing, with a personal and social identity, individuals living the most risks-taking labor policy in a complex context that outlasts the individual experiences and where the risk of fall is highly probable. A more intimate "set" which impact the social system own domine, in which intra-negotiation seem**s** potentially possible, just working on the formation of differentiated economic and politic social systems sectors, operating within boundary lines erected by their own world of meanings through the evolution of a possible improbable complexity. The two books, we present here, concerns creativity and 'eduinfotainment" as if connected in a systemic design, mirroring each other as the first was to be considered the meta-structure of the other. Within the theory of the Sociology of Knowledge, S. D'Alessandro strictly describes Creativity Processes as an organized system. Through an interesting series of rigorous comparisons, he finds the common meta (and meta-meta) rules in the creative processes, moving from the analysis of theories, models and techniques and identifying the recurrent concepts even if differently defined by specific languages in order to define creativity role and functions. The book edited by A. Pitasi is an enrichment of an adaptive lecture of integrated creative sociologic cultural processes. It is a complete interdisciplinary work about how Media "eduinfotainment", the strategic integration among education, information and amusement, create very likely detective stories and how it is supposed to reorient and change the social and psychic systems' rules and values, acting on and through the social actors behaviours, with hyperbolic plots and sets involving the most violent possible reactions to emphasise potential credibility of a "Medialized" Reality Re-construction in movie-action (serial) fictions. The systemic approach is a strong "trait d'union" between the two books. It helps the recognition and reproduction of both systems and subsystems, via their specific structures and elements, and gets the bases for further researches for a further functional environmental situation analyses.*

WCSA - World Complexity Science Academy: First Conference *(the WCSA President)*

WCSA - First Conference: Presentation

WCSA - First Conference: Abstracts

IACR (International Association for Critical Realism) - Annual Conference 2010: Presentation
La Sociologia come scienza sistemica complessa *(A. Pitasi)*

Realismo Critico Archeriano, Costruttivismo e nuova Teoria dei Sistemi: verso un linguaggio condiviso?/Archer's Critical Realism, Constructivism and new Systems Theory: towards a shared language? *(S. D'Alessandro)*

Abstract
Is it possible to offer a koiné between different paradigms? Can the rift between individual agency and structural dynamics be mended? Is it feasible to build a meta-reflexive bridge between micro and macro? Reflexivity and morphogenesis, two key concepts in the work of Margaret S. Archer, can become metaphorical pathways between Critical Realism, Constructivism and New Systems Theory. In Archer's thinking, "no reflexivity; no society", differences in people's paths through life derive from human reflexivity, a faculty which is realised through internal conversation, where people continuously think over their situation and redefine their interests and plans. Reflexivity acts as mediator between societal structure and personal agency, explaining the different ways in which we "make our way through the world" (Archer, 2009). Archer's reflexivity classification shares interesting points of contact with Luhmann's systems theory, which proposes its own reflexive sociology – here, of course, the term reflexive is used with other meanings – starting from a different path, but reaching conclusions analogous to those of Archer. Reflexivity and morphogenesis, albeit used with different meanings, characterise and substantiate a great many contemporary authors who are driven to a new conceptualisation of social phenomena, a need which consciously enters the same process of social theory revision that transversely involves other authors beside those already cited: Touraine, Giddens, Bauman and Beck. Reflexivity and morphogenesis seem, therefore, to be a hyphen which can hold together macro and micro instances of numerous paradigms: from Constructivism to New Systems Theory (Buckley, Luhmann), to the Deterministic Chaos theories (Prigogine), to Critical Realism.

Senso sistemico e senso relazionale: il contributo del realismo critico alla global governance *(I. S. Germano)*

Abstract
Globalization increasingly mobilizes the whole heritage of cultures in time as it no longer depends on the governance patterns and forces consolidated to reflect on the concept of meaning in sociology. The sense takes on a meaning, in some ways, the conventional focus on individuals more and more individualized in continuous self-adjustment of the system environment, such changes without order and cancellation of culture. The point of the caratterisrtiche a highly improbable event. The critical issue concerns the relational-posting from the set of relationships and ethical responsibility, aimed at the common good relationally generated, for which it can operate the way to investigating the human relationship, as an active agent, and reflective. The analysis tool will be critical sociological realism that puts the "why" of life experience of people, in light of ultimate concerns.

The «systemic communication» between Social and Media Systems – Theoretical aspects in the Niklas Luhmann's work *(M. Infante)*

Abstract
The communication process is currently invading and pervading the public sphere, the transmission of cultural models, the political participation and the relation between countries. Why are we registering this enormous development of communication technology? Which is the logic at the base of this social process? Through the works and thoughts of Niklas Luhmann, we define the nature of the communication process, the medium as system, the individual as a Psychic System, and their relation. We use the conceptual frame of cybernetics (observation of second order, cognitive construction), cognitive evolution biology (autopoiesis, double contingency, systemic evolution) and information theory concepts (information, code and encode, noise) in order to analyze the role and function of Media System. Finally, we show how the reduction of complexity operated by the Media System permits the communication between the Social Systems through Media System and his influence on society. Based on the last media research debates, this paper proposes a new lexicon (expectation, communicative event, social systemic meanings, self-observing) for understanding media.

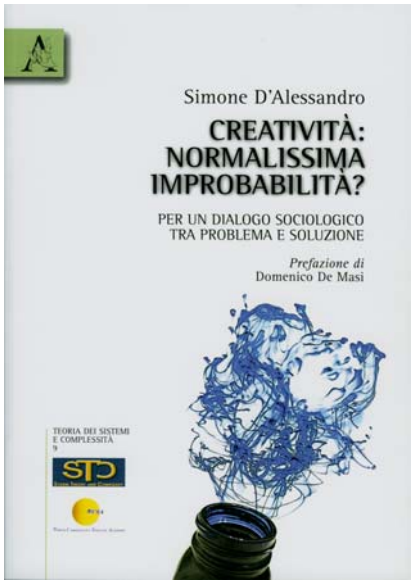
The self-employment programs and gender inequalities: the ambiguities of activation in Italy *(G. Marini)*

Abstract

The activation policies in Italy have followed a "substitution welfare" path. In the second part of the 90s Italian reforms were aimed to rise the employment rates, especially for women. By doing so the activation labour policies have been reckoned as the main way to help new outsiders and weak workers to get a job. As a result, the Italian way to flexicurity has been developed as a dual system based on strong employees from one side, and weak workers from the other side. Basically only the latter were asked to risk. This assumption of self-reliance justifies the choice of the evaluation of the self-employment and entrepreneurship programs (Measure7) as the most risks-taking policy. It is assumed that the Italian context cannot adopt the same policies of other countries wishing to have the same impacts and that similar programs foster totally different impacts: in favour or against the goal of gender equality. This new implicit contract between citizens and welfare state looks to be ambiguous and based on the commodification of labour force. Primary data concerning attitudes are discussed in order to understand if and how women are pushed to become self-employed.

Recensioni:

Creatività: normalissima improbabilità? *(a cura di G. Marini)*



Simone d'Alessandro

Creatività:
normalissima
improbabilità?

Per un dialogo sociologico tra problema e soluzione

Formato: 17 x 24 cm
Numero pagine: 296
Prezzo: 17,00 euro
Aracne Editrice, Roma 2010
ISBN: 978-88-548-3423-1

Regole e Finzioni *(a cura di G. C. Trofino)*

Andrea PITASI
(a cura di)

REGOLE E FINZIONI

Il sistema giudiziario nella fiction cine-televisiva

Editore: Franco Angeli
Collana: CULTURA DELLA COMUNICAZIONE
Pubblicazione: 03/2010
Numero di pagine: 176
PREZZO: € 19,00

Statuto attuale WCSA

NA 1-2011

Editoriale: The unveiling of a particular system path/Il disvelamento di un sentiero sistemico particolare *(D.P. Errigo)*

The search for the conditions to minimize the risks in individual assets and maximize the control intervention in all the activities certainly goes back to ancient times to Xenophon and Plato but it has evolved since the Second World War. It's a long historical theory that has been built around these two basic elements which are connected to the work of the individual. And they never had, as in these times, such a preventive and consumptive importance. With this number 1-2011, the first of the 26th year of New Atlantis editorial history, we are speaking about these topics, giving our contributions with the inserts "the Risk" and "CyberNeuro" here proposed. The Risk, inside a certain scientific necessary reductionism, shows how predictability may be the fundamental element in the specific economic choices and so operating both on the analysis and synthesis settled problems and on the decision making. CyberNeuro shows a simulation way to solve medical problems letting also see the social possibility of up to now scientifically unknown co- presences. The setting of all the here proposed debate is articulated in the "Lectio Magistralis", exposed in this issue opening which is dedicated to the Art of Art Communication: it shows how each, however targeted and sectional, activity may really be opened also to the outside world and to itself, whilst keeping clear its assumptions and objectives. A new number that certainly will not end the debate within this issue and will open roads that are still unexplored. Good reading.

La ricerca delle condizioni per rendere minimale il rischio nelle singole attività e massimale l'intervento del controllo in tutte le attività risale certamente a Senofonte e Platone nell'antichità ma si è evoluto dopo la seconda guerra mondiale. E' una lunga teoria storica quella che si è costruita attorno a questi due elementi fondamentali che si connettono al lavoro dell'uomo. E mai come in questo periodo fanno sentore la loro importanza preventiva e consuntiva. Con questo numero 1 del 2011, il primo del 26° anno della storia editoriale di Nuova Atlantide, desideriamo intervenire su questi argomenti portando il nostro contributo con i due inserti proposti, il "Rischio" e la "Cyberneuro". Il Rischio, all'interno di un certo necessario riduttivismo scientifico, mostra come la predicibilità possa essere elemento fondamentale nelle scelte specificatamente economiche e quindi intervenire sull'analisi dei problemi posti e sulla sintesi decisionale. La Cyberneuro indica una strada simulativa per la risoluzione di problemi medicali intravedendo anche la possibilità sociale di compresenze finora scientificamente sconosciute. La cornice di tutto il dibattito presentato è contenuta nella Lectio Magistralis, offerta in apertura, dedicata all'Arte di comunicare l'Arte: essa indica come ogni attività per quanto settoriale e mirata, in realtà possa aprirsi anche al mondo esterno e a se stessa pur mantenendo chiari i presupposti e gli scopi. Un numero nuovo che certamente non potrà concludersi con questa pubblicazione e che apre strade ancora inesplorate. Buona lettura.

Editoriale: Take the risk under control is "the Black Swan" nearer and nearer? *(M.R. Astolfi)*

We by now know that present and future trends may be connected to not so rare events, and moreover with exorbitant effects, whereas risks is strictly recombined with the acceleration of the fast growing technological development inserted in a configured high research environment at a super-systemic level with no adequate social and technical previsions and attempts to control. Uncertainty hangs over the global society's system whereas high technology has altered communication both in terms of differentiations of the system's elements and of the simultaneous differentiations between system and its own environment in tending to exhibit a special complexity reduction which doesn't mean reductivism. Until now the influence of a cultural tradition has emphasised synergic emotions like shearing, participation, strong individual-society interrelations inter-connected with religion and other ritualizations in "symbiotic mechanisms"(*) to neutralize external and internal uncertainties and the unpredictability of their effects. But there are differences in degree of risk's management if we distinguish simple from complex systemic societies. In the perspective of the articles in this issue, configurations of recombining dynamic networks systems lead to a selection and co-evolution often generated and meta-stabilized in a regime by high hierarchical centres of control: a complex super-system where differentiation and integration dynamics and their non-linear interactions are crucial on the market competition, on the institutional organizations and on the knowledge infrastructures innovative integrated perspectives. A technological regime in which different communication systems interact with diversified "knowledge flows" in which communication trajectories "makes the difference" and become strategic also in terms of economic choice. A new perspective would seem appropriate focusing above all on the risks, on the differentiation of expectation emerging from this innovation and recombination system in which market competition seems to be the only real final goal in a knowledge, science-based technological basin of attraction in which social public demand and consumer demand often coincide mingling with profit. A risk based technology simulation models should control, with a functionally necessary social general consensus, the organizational and operative levels in distributing risks and expectations. Study of basis and applied research becomes here allied for a sustainable technological development in which the potential options become part of a strategic plan to change the world economic behaviour and the top decision making under uncertainty and risks, in function of a coordinated selection plan for a sustainable future. It is a contract to be reinforced so that selection can determine the best possible life conditions to experience in every field. An accurate preventive reconstruction both of the interacting factors and the formulations and comprehension of new codes of communication become so crucial to configure and reconstruct each synergic state in order to reduce uncertainty and the complexity con-

nected with risks to be handled on several levels at the same time the problem could arise. As here shown in CyberNeuro Section, R&D selection and dynamics network growing knowledge control continually get on eliding boundaries in differentiating procedures and in connecting to a re-production considered as a constantly new production of potentially interconnected elements, structures and languages. It offers the possibility to found new highly technological emerging system's models that, at their turn, provides chances for further futuristic innovative technological and different social systems formation. High technology becomes as a fixed and concentred knowing in strong interrelation with science, politics, economy, environment ad even religion and moral. It is anyway balanced between conscience and consciousness and so it requires consensus. In a social environment's interpenetrating systemic complexity, the inevitable capacity for global social consensus for further technological possibilities depends on the basis of a possible schematization of elements interpreted as differences and is determined with references to the variation and the construction of an auto-referential risk events communication. Human being live together and socio-cultural evolution depends on the seeking and the finding new other communication social models inside the boundaries of an expanding experience, continually re-introduced in an entropy and uncertainty domain in function of a potentially diversified self-created reality. So a Social Pedagogy is connected with learning, freedom and social behaviour which are interpenetrating to contribute to the system's formation and are to be experienced as differently oriented communication processes, also to fight the creeping social Darwinism. As here stated, new technologies and their relationship to the global social system's conceptualized order have to move on in the light of an inevitably hyper-complex technological progress but attaining with the qualification of a better and surer everyday life experience.

The Art of Art Communication / L'arte di comunicare l'arte *(L. d'Alessandro)*

Abstract
The topic of communication between doctors and patients is acquiring an increasing significance in the domain of contemporary medicine. Therefore, several questions can arise and are here analyzed: how can it be possible to communicate the medical-surgical art? Who are the subjects entitled to receive the medical-surgical art communication? Is the art of communication part of the medical-surgical art or is it an art by itself? Moreover, how can a communication of the medical-surgical art be possible for those who had chosen to become doctors and surgeons? The answers are in The Art of Art Communication.

"SYSTEM THEORY AND COMPLEXITY" Book Series

La società del rischio/la società a rischio *(F. Vespasiano)*

Una riflessione sull'ipotesi di riduzione della complessità *(E. Martini)*

L'opinione di Loet Leydesdorff e Henry Etzkowitz *(a cura di E. Martini)*

Decision making under risk and uncertainty *(G. Marcarelli, M. Squillante)*

Abstract
The most common model used for decision making under risk and uncertainty is the Expected utility theory (EUT). It has been accepted as a normative model of rational choice and widely applied as a descriptive model of economic behavior. Despite its prescriptive and normative strengths, the principle of expected utility theory maximization has encountered many problems: experimental evidence as well as choice patterns observed in the real world suggests that individuals often do not behave in a manner consistent with this model; in other words, human choice behavior deviates in systematic ways axioms of that theory, as captured originally in two classical demonstrations referred to as the Allais (1953) and Ellsberg (1961) paradoxes. The limits of the expected utility theory have led many authors to search new models for the representation of decision making under uncertainty. A large number of models alternative to the EUT are proposed to try to bridge the gap between theory and reality. This paper supplies an overview of EUT, its generalizations and some hints for further approaches and it is organized as follows. In section 2 the principle of EU maximization is described; in section 3, after underlying limits of the EUT, some paradoxes are analyzed; in section 4, the SEU theory is presented; in section 5 the risk aversion is faced and some risk measures are described; in section 6 some models alternative to EU are showed by means of the Marschak-Machina triangle; finally, in section 7 some concluding remarks are provided.

Il newsmaking convergente: effetto speciale o di sistema? (TITOLO VERO DELL'ARTICOLO) *(I. S. Germano)*

Abstract
Globalization increasingly mobilizes the whole heritage of cultures in time as it no longer depends on the governance patterns and forces consolidated to reflect on the concept of meaning in sociology. The sense takes on a meaning, in some

ways, the conventional focus on individuals more and more individualized in continuous self-adjustment of the system environment, such changes without order and cancellation of culture. The point of the features a highly improbable event. The critical issue concerns the relational-posting from the set of relationships and ethical responsibility, aimed at the common good relationally generated, for which it can operate the way to investigating the human relationship, as an active agent, and reflective. The analysis tool will be critical sociological realism that puts the "why" of life experience of people, in light of recent Concerns, compared to which the constructivist sociological theories do not give answers and do not see education as a socialization genres people are more human, humanizing society.

Tecnologia e Futuro *(a cura di M. R. Astolfi)*

Abstract
This interview outlines the synthesis of a story of a meeting with the technology of the "beginnings" just to arrive, through an experimental and conscious way, to nowadays in which the electronic systems, with highly technological contents, produce strong expectations in the present society that are manifest in those biotechnological semi-futuristic hypothesis on the threshold of realization. It is a rapid excursus that sees technology as the starting and the arrival points which becomes either the barycentre of strategic personal choices and an evolutionary path vision.

PREMESSA

I due giovani imprenditori intervistati sono contitolari della AUTEC srl , società nata nel1993 a Fusignano (Ra) che fornisce oggi una avanzata tecnologia elettronica, anche di tipo sperimentale, sia nel settore dell'automazione industriale che nel settore "bioingegneria", offrendo soluzioni tecnologicamente evolute attraverso progettazioni di schede e software di cui non siano già disponibili sul mercato strutture elettroniche con le caratteristiche richieste. I due imprenditori sono a capo di un team di ricerca, eterogeneo ma sinergico, formato da giovani creativi di alta formazione specifica con i quali si confrontano e sviluppano le loro soluzioni avanzate. La motivazione ad una ricerca-studio appassionata e sempre più approfondita nel campo specifico della teoria dei sistemi e del caos li ha portati a scegliere di continuare ad implementare anche la ricerca speculativa divenendo soci fondatori della WCSA, membri del Consiglio Direttivo, e partecipi di un'attività di approfondimento trasferibile al campo dell'applicazione della tecnologia sperimentale.

Guglielmo Balsamini ***(G.B.)*** *inizia con la descrizione appassionata di un episodio fondamentale per il proprio procedere esistenziale e di lavoro: il primo suo vero incontro con una tecnologia sperimentale applicata, che oggi definiremmo decisamente primordiale, ma che resta all'interno e di base ad una rete tecnologica autoregolatrice di interconnessione sistemico-evolutiva a tensione altamente innovativa. Esprime emozioni vissute che portano ad una scelta di campo di studi e sottolineano un percorso di ricerca che, ripercorrendo il sentiero dell'evoluzione iper-tecnologica, aprono ulteriormente la mente a ipotesi di lavoro futuristiche, in cui tecnologia e biologia sono sempre più interconnesse e feconde. Egli si osserva alla ricerca di un risultato-fatto sullo sfondo della evoluzione tecnologica come simbolo di realizzazione globale che, prosciugata dall'emozione, appare un sistema dai limiti continuamente e celermente ridefiniti, e tesa a forme e strutture sempre più disparate e multiformi. Partendo dal proprio progetto di vita individualizzato, teso a cogliere le grandi opportunità evolutive nel e del contesto- ambiente, in un rapporto conscio- inconscio, accede alla costruzione di un nuovo sé stesso attraverso un percorso che coinvolge la trasformazione di conoscenze teoriche in competenze pratiche. Egli sottolinea la centralità di una comunicazione informatica globale, che viaggia con una pluralità di mezzi tecnologici, definendola una degli assi portanti nell'ambito dello sviluppo delle tecnologie nella cultura contemporanea. Attraverso rilevazioni dell'antropo-sociologo oltre che dell'imprenditore, evidenzia i conflitti e i mutamenti evolutivi nella tecnologia, che si strutturano attraverso interconnessioni basate su alcuni aspetti fondanti quali la dilatazione globale del mercato e la sempre più spinta tensione verso la ricerca di nuove forme e scenari.*

Luca Berardi ***(L.B.)*** *prosegue l'escursus soffermandosi sui tecnicismi dell'automatismo e creando scenari virtuali per un futuro apparentemente impossibile ma in realtà alquanto probabile. Un percorso che sfiora l'arte e la storia, che diventano un pretesto per identificare potenzialità future e trend connessi. Identifica meccanismi e peculiarità per soluzioni multifunzionali, le più ottimali possibili, a problemi tecnologici. E l'automazione viene vista come risorsa, una tecnologia per l'uomo in opzioni e rappresentazioni prima mentali poi come simulazioni virtuali di modello sino a diventare realizzazioni applicate. Tale sistema consente operazioni altissimamente probabili, a massimo livello di adattamento, in un contesto in cui la validità delle procedure rappresenta il risultato di un notevole sforzo applicativo, ma funzionale ad una intensificazione della tensione alla ricerca e verso un sempre più alto livello di complessità, in un collegamento a reti globali che apre ad ipotesi in cui informatica, cibernetica, automazione, biologia si interrelazionano per aprire nuovi orizzonti. L'uomo, in centro, é il fruitore dello spazio delle possibilità e annulla l'ambiguità che si rivela nell'irrequietezza del presente e nell'ansia del futuro, focalizzandosi sull'avanzare del progresso e rifugiandosi nella "modernità" derivante dall'applicazione del potenziale tecnologico in una linea di sviluppo sempre più specialistica.*

Entrambi gli intervistati caricano l'atto dell'osservare le regole del gioco del mondo digitale di significati sorprendentemente emozionali e sociali, portanti sia pur nella loro necessaria semplificazione, condensando esperienze vissute e culturali e penetrando nella sfera tecnologica come in un "paese delle meraviglie" aperto a probabilità possibili e potenzialità illimitate.

INTERVISTA A GUGLIELMO BALSAMINI

Si sa che l'esperienza del mondo e nel mondo crea a volte sperimentazioni nell'agire, così vicine a ciò che profondamente siamo e che partecipano alla costruzione della nostra identità profonda, che spesso particolari momenti restano come *turning points* in cui si deve ridefinire il proprio percorso strutturale di vita. Ci si trova di fronte alla scoperta di un nuovo traguardo-obiettivo che sembrava nascosto ma che è necessario perseguire in una fase di ri-organizzazione identitaria. È la fase della transizione sottesa ad un ordine più vero del modello interno anche se apparentemente non predefinito. Esiste allora un momento preciso in cui lei ha scoperto la sua vocazione alla tecnologia applicata? Quando ha deciso di accostarsi a questo mondo di ricerca e realizzazione

sperimentale?
(G. B.) E' profondamente vero se penso ad una notte piovosa di quasi 30 anni fa. Il ricordo è ancora così vivido che l'impressione è che sia trascorso solo un giorno. Tutto era pronto, la radio, la mia prima radio era su un tavolo accanto alla finestra aperta. Mi seguiva in questa avventura un caro amico che aveva qualche anno e più esperienza di me. Per far funzionare quella scatola trasparente per vivande dove all'interno trovavano posto due transistor al germanio -oggi sono una vera rarità- dovevamo soltanto collegare una batteria e un'antenna. Non conoscevamo ancora esattamente il motivo, ma ci era stato suggerito di realizzarla della massima lunghezza possibile. Nei giorni precedenti a quella sera avevo smontato un motore da lavatrice dal quale avevo prelevato il filo di rame smaltato con l'intento di utilizzarlo come cavo d'antenna. Abbiamo poi collegato la batteria e legato un capo della matassa di filo di rame ad un vecchio cacciavite e lo abbiamo fatto roteare come un lazo fuori dalla finestra per poi lanciarlo alla cieca. Nell'oscurità la sua parabola é terminata fra i rami di un albero che si trovava poco lontano. L'antenna era pronta. Abbiamo girato l'interruttore della batteria e d'incanto dall'altoparlante sono usciti suoni, crepitii, e non solo. Ruotando la manopola della sintonia si potevano udire voci in una lingua incomprensibile e finalmente anche la musica. Il rapporto segnale/rumore era pessimo ma l'emozione é stata grande, non perché non avessi mai sentito una radio, ma semplicemente perché era la mia radio, e stava funzionando. Devo dire che quello é stato l'inizio di una passione per la tecnologia applicata sperimentalmente che con gli anni si è trasformata in professione". Si è trattato di un cambiamento, non casuale, che ha mi ha aperto a nuove strategie di vita e di conoscenza specifiche in un campo in estrema espansione con effetti portanti sul sistema globale e sull'ambiente.

E' innegabile che almeno da vent'anni viviamo una sempre più intensa invasione di nuove forme di "razionalità" tecnologica che effettivamente coinvolge molti aspetti della nostra vita e di cui siamo utilizzatori, anche se spesso inconsapevoli. Si può dire che siamo arrivati ad un'alta capacità di generare complessità di funzioni, in tentativi ben riusciti di ordinare e semplificare il vivere quotidiano, e questo attraverso la tecnologia avanzata applicata. Questa vera e propria mutazione storica, quale tipo di realtà sta creando? Esiste un adattamento dei processi cognitivi e comunicativi connessi in tempo reale?
(G. B.) Oggi siamo circondati dall'elettronica nelle forme più disparate. Si parla di vero e proprio Know how strategico applicato proprio in quasi tutti i campi. Per entrare in un'analisi dettagliata, solo nel contesto dell'immediatamente fruibile, si va dall'Ipod, strumento di cui i ragazzi, compresi i miei figli, non possono fare a meno nemmeno, quasi fosse parte strutturale, integrante ed estensiva, del loro corpo, ai televisori 3D, ai cellulari di ultima generazione, per i quali la funzione di telefonare é diventata praticamente accessoria, se messa a confronto con tutto quello che possono proporre come servizio all'utente. Si tratta di un processo di organizzazione e di coordinamento di un nuovo mondo in cui esiste la necessità di far agire la tecnologia in funzione di prestazioni sostitutive che in effetti ri-costruiscono il sistema sociale nelle sue interrelazioni, in qualsiasi modo si intendano, e questo sempre più velocemente tanto da far pensare che non ci sia abbastanza tempo per l'assimilazione e la mediazione. Per questo è così importante che la persona sia sempre presente a sé stessa.

Possiamo dire che stiamo assistendo ad un passaggio ad un concetto di società radicalmente strutturata in termini ed in funzione di forti produzioni di strumenti amplificatori e dilatanti dei confini dell'umano e quindi che si muove anche nel campo della continua meraviglia, dello stupore per la raffinatezza tecnologica dell'oggetto?
(G. B.) Si è così. Eppure un proliferare così massiccio e mirato dell'elettronica, se dal nostro punto di vista non può che procurare soddisfazione, anche e soprattutto nell'ambito del lavoro tout court, dall'altro può far pensare perché lo stupore che, in effetti, l'utente prova non è legato al contenuto tecnologico ma spesso solo all'impatto estetico, direi quasi esclusivamente a stimoli visivi oppure uditivi che i devices o i gadgets sono in grado di produrre, al di là della funzione e della funzionalità. Se non si è del settore infatti, non si è minimamente a conoscenza di tutta la creatività, il lavoro, lo studio, la ricerca, e anche l'emozione, che c'è dietro alla realizzazione di un prodotto finito. Dall'idea al prodotto, il processo di creazione è basato su programmi interagenti e viene sempre supportato da cicli organizzativi continui, con attenti controlli di qualità progettuali ed esecutivi, proprio per trovare le condizioni utili a trasformare la teoria-ipotesi in un progetto concretamente realizzabile. E' significativo d'altronde che la tecnicità dell'agire sia indipendente dalla conoscenza della tecnologia specifica tout court. La complessità, infatti, dei micro o nano-circuiti, che creano poi *l'apparente magia* del processo attivo che sembra nascere da sé, è dovuta a investimenti in attività di sviluppo teorici e di ricerca ben specifici e molto complessi, per cui non è facile né sembrerebbe aver senso conoscerne i presupposti.

Ci muoviamo in un mondo i cui l'iper-specializzazione si muove attraverso lo "sfruttamento" e l' esplorazione di situazioni-percorsi-strumenti che si sviluppano, più o meno imprevedibilmente, attraverso possibilità infinite. E' attuabile una semplificazione rappresentativa della ricchezza dei modelli, cioè come avviene, se avviene, la divulgazione di conoscenze ad ampio livello generalizzato?
(G. B.) E' vero che la tecnologia si è nel tempo fortemente specializzata, in un ampio sistema di tecnologie attuabili tutte interconnesse, oltretutto ampliabili in una enorme rete di possibilità integrate, che solo divulgatori, come ad esempio un Piero Angela o David Bodanis, che si cimentano in lezioni di massa, riescono in qualche modo a rendere comprensibile alla maggioranza delle persone concetti particolarmente complessi, anche se non si può parlare di vero insegnamento scientifico. Potremo forse dire meglio che si muovono per esplicitarne almeno il contesto di inserimento globale. Per non parlare poi dell'interpretazione del linguaggio, termini, come ad esempio"accrescimento epitassiale, impiantazione ionica", necessiterebbero di una spiegazione così prolungata capace di stancare perfino la persona più motivata alla comprensione. E' comunque il vero sapere che garantisce un alta capacità di rielaborazione e di riutilizzazione e la conoscenza di codici altamente tecnicizzati portano all'efficienza nella sperimentazione potenziale. Come imprenditore voglio sottolineare l'importanza della capacità tecnico-creativa di strutturare e rielaborare in modi nuovi e/o imprevisti ciò che già esiste. Diventa facile percepire la potenzialità di una conoscenza applicata inerconnessa al valore aggiunto dato dall'introduzione di nuove combinazioni della stessa.

In un sistema altamente specializzato, dinamico, estremamente fluido e complesso come quello della tecnologia, come avviene l'individuazione del comportamento emergente, l'interscambio informativo per cogliere la direzione delle continue trasformazio-

ni- combinative in atto?
(G. B.) Nelle fasi del ciclo di strutturazione e di organizzazione intervengono dinamiche che sono spesso relative a speculazioni pilotate e crolli. In questo caso interviene, in modo olistico, il mercato attraverso il cambiamento, lo sviluppo, gli investimenti ed il lucro. L'evoluzione dell'alta tecnologica tout court è instabile ma continua e nasce, e nascerà sempre, dalla necessità di esplorare nuove soluzioni e proporre sempre nuove ipotesi funzionali alternative e adattive ai problemi. In particolare noi ci muoviamo attraverso simulazioni di nuovi potenziali modelli, ripetibili e rigorose, in cui sottolineiamo il valore di ogni singola azione, cercando di ottenere così un vantaggio sul mercato prima degli altri.

Lei conferma che il sistema tecnologico si sviluppa costantemente attraverso configurazioni e possibilità in un continuo ri-formarsi e ri-strutturarsi. I passaggi evolutivi diventano punti cardine attraverso i quali si accresce ulteriormente la forza di esplorazione delle possibilità di scelta, dilatando le possibilità di sviluppo di questo mondo nella sua complessità. Come si vive tutti i giorni la consapevolezza del suo evolversi nel tempo?
(G. B.) Voglio farle un esempio che parrebbe banale ma credo che lo sperimentino in parecchi che hanno vissuto gli albori della tecnologia avanzata. Quando mi aggiro oggi per i supermercati mi viene da sorridere nel vedere le calcolatrici esposte accanto ai detersivi o alle lampadine, e pensare che quando frequentavo i primi anni delle medie superiori, eravamo più o meno a metà degli anni settanta, le calcolatrici tascabili erano un'autentica rarità. Ci divertivamo a metterle in competizione tra loro facendo eseguire in contemporanea il calcolo del fattoriale di 69, un numero che nella rappresentazione in virgola mobile, quindi con mantissa ed esponente, raggiungeva il valore massimo rappresentabile. Erano così lente che potevamo apprezzare visivamente la differenza nei tempi di elaborazione e l'incertezza sul momento di inizio del calcolo diventava trascurabile". Quegli oggetti comunque fanno parte di quel settore di tecnologie che evoluzionisticamente, e vorrei dire in tempi estremamente rapidi ed in espansione sempre più ravvicinata, hanno portato alla creazione del sistema attuale di applicazioni vincenti sempre più complesse, che comunque dipendono anche da loro. Il processo di mutamento tecnologico nel sistema puro sceglie di accrescere la propria forza attraverso un comportamento- paradigma, un pensiero di consapevolezza di un nuovo ambiente, mentre in realtà, in questa logica di trasformazione, l'utente è visto come consumatore attivo, spesso é informato in maniera dubbia, e si muove, pressoché inconsapevole, e a volte attraverso conflitti di business.

Le dinamiche evolutive nella storia dell'alta tecnologia, dal sapere pre-scientifico a designare fenomeni nuovi e non ancora totalmente compresi, fanno pensare che esista una correlazione di fattori aggiuntivi in funzione di una riconfigurazione autoorganizzante della tecnologia potenziale come conseguenze di illimitate strategie di integrazione a ri-configurazione del ciclo vitale. Ma é possibile stabilire i limiti del "fino a dove" potremo arrivare?
(G. B.) La dinamica evolutiva che ha coinvolto l'elettronica prima e la microelettronica poi sino alle prime applicazioni nanotecnologiche, che ovviamente hanno permesso l'impennata nella rivoluzione tecnologica che stiamo vivendo, é connessa ad una logica di creatività ed estinzione in cui nuove tecnologie migliori e più sofisticate sostituiscono altre che spariscono, come nei sistemi biologici. Il tutto ha avuto un'impennata all'inizio del secolo scorso che è stato contraddistinto da sconvolgimenti enormi del pensiero teorico scientifico, mi riferisco ad esempio alla Teoria della Relativita e, alla Meccanica Quantistica, mentre la seconda metà è stata caratterizzata, proprio dalla rivoluzione in funzione evolutiva della micro e nano elettronica. Se pensiamo al primo computer degno di questo nome l'ENIAC con le sue migliaia di tubi elettronici, le decine di kW di assorbimento occupava locali interi, oggi una potenza di calcolo migliaia di volte superiore si trova in uno spazio talmente piccolo da richiedere l'ausilio di un microscopio ottico per osservarne i particolari come nel mio campo. Se poi si desidera esaminare i dettagli più minuti si deve per forza di cose ricorrere ad un microscopio a scansione. I transistor MOS (Metal-Oxide-Semiconductor,) largamente utilizzati nella realizzazione dei circuiti integrati, sono costituiti da pochi atomi in fila, il cosiddetto impianto di canale, le dimensioni sono quindi ridottissime. Come sa, è la microelettronica che ci ha permesso di realizzare i personal computer e come conseguenza potremmo dire che ne deriva la naturale possibilità di poterli collegare e far dialogare "autonomamente" tra loro. Il passo verso la realizzazione di strutture e quindi di reti ancora più complesse è altrettanto naturale. Oggi infatti basta possedere un P.C. con una potenza di calcolo, non pensabile fino a pochi anni fa, e un programma per la connessione ad una rete globale e ci si interconnette globalmente con INTERNET. Pensi all'ausilio dei supporti wireless che ci facilitano a tal punto che siamo addirittura sollevati dalla fatica di collegare fisicamente i dispositivi tra loro. Con un semplice click del mouse possiamo inviare, ricevere la posta elettronica. E le lettere, quelle tradizionali, pur nella loro indiscutibile bellezza sono oramai considerate preistoria romantica. Non ci stupiamo di poter inviare foto documenti a persone che si trovano in ogni parte del mondo. Ma domani potremo andare oltre e simulare e realizzare la complessità del cervello umano, che trasferita ad un computer, ci porterà a sviluppi e a svolte epocali. Sono già in atto modellizzazioni e simulazioni con impostazioni teorico-pratiche decisamente attendibili.

Una questione chiave diventa la consapevolezza delle implicazioni di carattere cultural-sociologico delle sfide evolutive connesse all'uso dei dispositivi tecnologici. Esiste un rapporto di stabilità e memoria per metter in atto il proprio volere di controllo della situazione come espressione di sentimenti e di processi autoreferenziali per procedere a scelte di vita ritenibili più coerenti?
(G. B.) Potremmo dire, senza ombra di dubbio, che la tecnologia delle comunicazioni ci ha avvicinati favorendo un interazionismo che, pur se soprattutto virtuale, è comunque percepibile e potenzialmente altamente consequenziale nell'agire l'inter-connessione. Per non parlare delle implicazioni di carattere sociale, economico, politico che questa rivoluzione sta comportando a molti livelli. Parliamo di un sistema di una continua estensione del sapere e del poter essere. Se la velocità con la quale si può accedere a informazioni di ogni tipo avviene in tempo reale, la realtà che ne consegue necessita di categorie interpretative sempre nuove. La tecnologia è infatti capace di modificare profondamente i nostri comportamenti, il modo stesso di rapportarci agli altri, le nostre abitudini quotidiane. Io credo che i continui e mutevoli cambiamenti possano allontanarci da un centro in cui ritrovare un senso-significato se non rapportati al confronto con gli altri su qualsiasi tema-problema. Poter esprimere la mutevolezza del chi siamo ci porta a marciare di pari passo con lo sviluppo globale del sistema. E' per questo che è importante che la tecnologia si muova al servizio dell'uomo e non viceversa, possiamo dire in una forma di "cooperazione" funzionale, e io credo che questo accada fintanto che riusciamo a stupirci di ciò che riusciamo a fare e diventare.

INTERVISTA A LUCA BERARDI

Le tecnologie si trasformano continuamente in oggetti che ci circondano e supportano, ed é l'automazione che attiva sempre nuove funzioni attraverso idee che si concretizzano attraverso percorsi di ricerca e sperimentazione. Come si integrano progettazione e valutazione per dare valore ai devices come risorsa e per farli convergere verso forme più utili di altre . Quale il percorso tecnico-operativo diventa più funzionale per trovare soluzioni applicative più efficaci?
(L. B.) Ormai viviamo in un mondo che concretizza sempre nuove idee che prima esplora e poi struttura ed applica. Se pensiamo che é sufficiente premere un pulsante per aprire il cancello di casa, un altro per accendere le luci, ne deduciamo in molti casi non serve nemmeno la nostra presenza per azionare o modificare qualcosa nell'ambiente che ci circonda. Gli interruttori crepuscolari sono il primo esempio che mi viene alla mente, accendono e spengono le luci del giardino sulla base dell'illuminazione solare presente. Siamo letteralmente circondati da automatismi: la cosiddetta casa "domotica" comincia già a diffondersi. Esistono d'altronde altri innumerevoli esempi di strutture pubbliche e private, parlo di aziende e ospedali per esempio, dove l'automazione ha raggiunto livelli molto alti in varie applicazioni, che oltretutto rappresentano parte del nostro campo di ricerca. Per quanto riguarda le invenzioni ad alto valore aggiunto bisogna creare anche nuovi modelli di relazione e nuove ipotesi di business all'interno di programmazioni strategiche di marketing oltre che attivare quel percorso di tipo tecnico applicativo che ci è più consono. Si tratta di un percorso organizzativo di tipo sperimentale che parte della necessità di operare semplificazioni e selezioni funzionali e in cui le macchine-devices da sperimentare sono da pianificare logicamente e trasformare in prototipo, da collaudare, smontando e rimontando, controllando e ricontrollandone le funzioni di ingresso e di uscita, calcolando tempo medio fra errori e adattando gli algoritmi in modo da risolvere i problemi di ottimizzazione interni/esterni al sistema. La sfida è coniugare tecnologia e strategie di applicazione e diffusione.

Siamo, ed in specie voi tecnici, stati a volte sottoposti a "colpevolizzazioni" sui rischi della tecnologia e si è sottolineato la necessità di una vita più semplice, correlandoci alla memoria del passato e all'età dell'oro perché si è attraversata la sfera dell'immaginabile come viaggio nel tempo, e messo in luce la velocità di accelerazione che subisce la conquista degli spazi vitali da parte dell'automazione, ritenendola in competizione con il naturale. Possiamo dire che in realtà desideriamo, o meglio non possiamo fare a meno di una tecnologia "trasparente", pur altamente strategica e funzionale?
(L. B.) Non c'è bisogno di recarsi al centro Pompidou di Parigi dall'aspetto estremamente futurista o visitare una casa di Frank Lloyd per assaporare appieno lo slancio verso concetti moderni di architettura e tecnologia apprezzati già presente agli inizi del secolo scorso ed in ambiti non sospetti.
D'altra parte è anche trascorso molto tempo da quando Jacque Tatì nel film "Mon Oncle" raffigurava i vantaggi della vita semplice della periferia francese rapportata alla modernità esasperata dell'abitazione nella quale viveva il nipote, la famosa villa Arpel. La pellicola, un capolavoro, voleva metterci in guardia sui rischi derivanti da un approccio smodato alla modernità in tutte le sue forme tecnologiche, architettoniche ecc. Probabilmente era l'inconscia paura del rapido mutamento e del successivo sconvolgimento che ne sarebbe derivato che si viveva allora come un tentativo di rifiuto di modelli nuovi di una socialità basata sul prolificare della tecnologia e quindi sempre più complessa. Questa era l'apparente irrazionalità del comportamento umano che si vedeva in bilico tra scelte che sembravano (im-)possibili. In realtà non c'è stato un passaggio repentino e traumatico, non un salto nel futuro, che ci avrebbe disorientati, ma la continuità del tempo e delle azioni ha fatto si che tutto fosse progressivo. Spesso non ci rendiamo conto, ma già l'automazione nelle sue varie forme ci circonda, anzi ci avviluppa in modo sottile, quasi a dire proprio trasparente e tendenzialmente "indolore".

Quale sviluppo allora per un'automazione che comprenda un'evoluzione di macrotendenze strutturali di processo e di percorso, in funzione di una visione specifica globale dei problemi evidenziati e che preveda l'assorbimento di incertezza spostando i confini del sistema entro ed oltre l'autodescrizione della tecnologia stessa?
(L. B.) Ogni device che utilizziamo quotidianamente è il risultato di processi industriali il più delle volte molto avanzati, ma sempre e comunque anche strutturalmente interconnessi. Ed è in questa direzione che continuiamo ad avanzare sempre di più. Ad esempio lo stesso stampaggio, l'assemblaggio, la creazione di parti meccaniche è oggi eseguita da altre macchine, più elaborate, che lavorano instancabilmente e con una precisione e ripetibilità umanamente non raggiungibili. Il contributo dell'uomo, in questo mare di complessità tecnologica, è quello di ideare, controllare, modificare, revisionare e supervisionare. Alle macchine, adeguatamente progettate e programmate, è lasciato il compito di portare a compimento un progetto, e di tradurre in realtà un pensiero-immaginazione, partendo da idee specifiche, rendendole rigorose e precise e realizzandole in una molteplicità di strutture diverse. E così che la nostra civiltà, a partire dalla prima rivoluzione industriale, ha conosciuto la possibilità di creare beni di largo consumo su vasta scala caratterizzati da un livello tecnologico evolutivamente crescente, in un bilanciamento di equilibri multipli che hanno sempre tenuto conto di emergenze e anche di apprendimento e quindi con un processo di adattamento continuo.

Si può dire che l'evoluzione nel tempo della tecnologia presenti condizioni precedentemente delineate, impregnate comunque di ciò che concretamente viene considerato passato e dunque funzionalmente e strutturalmente obsoleto. Per cui contemporaneamente all'estinzione di queste strutture a ogni nuovo livello si creano altre strutture emergenti che si dilatano in nuove altre funzioni emergenti. In questo contesto, la dimensione di un sistema organizzativo automatizzato viene regolato e si costituisce con componenti intercambiabili attraverso variazioni importanti. Vuole farci un esempio di questa cooperazione e sviluppo che emerge all'interno questa rete di interconnessioni del sistema?
(L. B.) Il tempo e l'avanzamento tecnologico evolutivo sono di fatto interconnessi ed il processo in avanti è inevitabilmente inarrestabile. E' stato sospinto e sostenuto, non tanto e non solo dal profitto generato dai beni prodotti, ma anche dal servizio alla persona, non solo funzionale, ma anche nell'ambito delle scelte potenziali dei beni e servizi, che coinvolge poi la ricerca. La tecnologia stessa è diventata un sistema interagente complessivo che sviluppa una serie di invenzioni che si implementano in modo non casuale ma in espansione selettiva. Se ricostruiamo i modelli di sviluppo storico allora, dobbiamo considerare prima di tutto (e nel campo industriale) le linee di produzione dove a tutt'oggi da un lato entrano le materie prime e all'estremità opposta escono i prodotti finiti. Da queste macchine automatiche

si passa ai bracci robotizzati in grado di effettuare movimenti precisi ad alta velocità nelle tre dimensioni. I primi in ordine cronologico sono stati i robot cartesiani. Il nome deriva dal vincolo che hanno queste macchine di seguire negli spostamenti solo linee tra loro ortogonali. La generazione successiva è stata quella dei cosiddetti bracci antropomorfi. Il nome particolarmente esplicativo sottolinea l'analogia stringente che c'è con un arto umano. E' affascinante osservare questi robot al lavoro. I movimenti sono quelli di un balletto armonioso e al tempo stesso rigoroso come la matematica che è alla base di ogni spostamento. Sono macchine che operano spesso all'interno di aree protette da cancelli o gabbie proprio perché, a meno che non sia presente un sistema di telecamere e sistemi esperti di visione, la macchina non ha "piena coscienza" dello spazio in cui si muove ma soltanto della traiettorie da seguire. Di conseguenza l'ingresso di un operatore sarebbe completamente ignorato con ripercussioni potenzialmente molto gravi. Tutto questo parte da progetti di specializzazione sempre più spinta ed in funzione di sempre nuovi problemi emergenti, in modo da trarne il massimo vantaggio possibile, anche per lo sviluppo del progetto stesso, verso un'espansione continua che dilata ed implementa sempre di più il sistema dell'automazione tecnologica, ma certo non in forme stabili e durature sui piani strutturale e funzionale.

Il processo di invenzione e di scoperta oggi arriva ai limiti dell'immaginabile, ed il campo della bioingegneria è quanto oggi esiste di più avanzato tecnologicamente. E' chiaro che lo sviluppo e la diffusione di tecnologie a supporto di tipo così invasivo possono anche incidere sugli elementi del profondo costitutivi della persona e della sua rappresentazione, anche se l'ambito di rilevanza del problema non è specificatamente vostro come ricercatori. Per voi non esiste l'applicabilità delle teorie ad un modello unico, ma la vostra ricerca è basata su un processo in avanti che prescinde dalla morale per procedere su percorsi di specializzazione sempre più spinti, in funzione di una stabilità dinamica evolutiva più che focalizzandosi sulla contemporaneità delle conseguenze. Come conciliare queste opposte tendenze?
(L. B.) Se ci spingiamo sempre più avanti nell'ambito dell'automazione più avanzata emergente, troviamo applicazioni (non già più futuribili, ma già immersi nel nostro next), ancora più vicine all'uomo, e fra queste spicca proprio la bioingegneria. Alcune strutture che si pensava fossero riservate alla fantascienza sono diventate una realtà coerente e applicata. Ad esempio si trovano già in commercio protesi uditive che si innestano direttamente nella coclea bypassando l'orecchio esterno e le patologie di cui può essere affetto. Addirittura persone completamente non udenti dalla nascita possono interagire col mondo esterno, ascoltare una conversazione, rispondere al telefono. Ma ciò che ancora affascina è che sono in atto esperimenti per portare l'immagine fornita da una microtelecamera al cervello e i risultati sono incoraggianti. D'altronde, microtelecamere costruite appositamente per essere ingerite, oggi possono scorazzare indisturbate nel nostro corpo a caccia di immagini per la diagnostica ed alcune avanzatissime protesi, che sostituiscono arti amputati, ricevono direttamente dal cervello il comando per eseguire movimenti, prese e anche rotazioni. Anche il nostro laboratorio si cimenta nella ricerca di nuove soluzioni negli elettromedicali e nel settore della microscopia. E quindi, se ci muoviamo nell'ambito del servizio concreto e funzionale all'individuo non ci inoltriamo in ambiti così emotivamente ed eticamente complessi e superiamo, anche se parzialmente, il problema connesso. E' chiaro che la ricerca tecnologica di necessità accelera i propri processi creativi e questo partendo da visioni contingenti integrate in un contesto di problemi, riconosciuti come risolvibili seguendo un'immaginazione, come si diceva, fertile e mai ferma. In realtà il limite è continuamente superato e presumibilmente si arriverà molto presto ad affrontare problemi esistenziali ed il processo di conciliazione sarà oltremodo complesso.

Ci rendiamo conto che per quanto riguarda il "problema della moralità della ricerca", questo sia un problema giuridico ed etico, non certamente della Scienza, ma eventualmente dello scienziato come attore sociale. Pensiamo però al come si può far interagire la tecnologia fondendola con la fisicità dell'individuo sino ad arrivare ad una modificazione psico-fisica che può portare ad una multi o pluri-dimensionalità dell'esserci. Parliamo di complessità "pura", ovvero dell'essenza della complessità. Se sovradeterminiamo gli esiti di questa integrazione uomo-macchina in un ambito futuribile, che funzione avranno le nanotecnologie come sistema di riferimento, quali le previsioni valide nel mondo reale dell'applicazione?
(L. B.) A questo punto potremmo proprio dire che le macchine stanno per diventare parte integrante non solo della nostra vita, fino al punto da compenetrarsi con essa, ma anche del nostro esserci, e quindi diventa assolutamente inevitabile rispondere alle domanda su quali scenari di applicazione tecnologica ci riservi il futuro. Le nanotecnologie hanno di fatto aperto un nuovo capitolo anche se oggi siamo solo all'inizio di una generazione di macchine che operano a livello molecolare e quindi totalmente invisibili ad occhio nudo. La sfida maggiore, quella più intrigante per uno scienziato, è quella di poter agire sul cervello, la macchina elettrochimica più sofisticata che si conosca, ma anche il poter "riparare" parti compromesse o letteralmente sostituirle con l'ausilio di nanorobot. E' un momento evolutivo di grande portata che porta all'uomo bionico, interpretazione di una complessità che porterà a forme di integrazione che rappresenteranno il nuovo in assoluto. E' una grande sfida aperta dal punto di vista della ricerca, un'ipotesi, oltretutto forse nemmeno troppo avveniristica, che presuppone ovviamente la rimessa in gioco di tutta quella serie di opzioni socio-psicologiche e politiche portanti cui si accennava, ma che non potranno impedire che ciò prima o poi avvenga.

Indagare le forme di interazione del sé con la macchina e con il tutto diventa una sfida ancora più portante e globale, forse apocalittica, per l'individuo. Per lo scienziato la bionica investe in un tecno-individuo per moltiplicare le dimensioni delle configurazioni possibili. Ma è possibile riprodurre la ricchezza fenomenica delle strutture mentali, far eseguire ad un computer simulazioni di ordine così elevato, riprodurre lo stile umano di ragionamento? Si ritiene che l'intelligenza possa capire la macchina ma non il contrario, e se non fosse così?
(L. B.) Diceva Asimov, parlando della vita aliena nell'Universo e già comunque esplorando la sfera dell'immaginabile nella tecnologia più spinta, che le capacità di una civiltà che fosse più progredita rispetto a noi di solo qualche centinaio di anni ci apparirebbero come magia pura. Ma già da ora le nostre realizzazioni future probabilmente supererano la fantasia più lungimirante. La bionica, sintesi di cibernetica, teoria dei sistemi e del controllo, ci fornisce l'idea di quando sarà l'uomo in parte o quasi completamente composto da parti "bio-sintetiche" per necessità, o semplicemente per il desiderio di essere "più performante"? Con ironia potrei affermare che sicuramente ci sarà chi vorrà fare un "upgrade" della propria memoria o della forza fisica o di non so cos'altro. A questo punto, prendendo in prestito sia la letteratura che la cinematografia, si prospettano scenari apocalittici, ma per quanto mi riguarda penso sia meglio considerare il bic-

chiere mezzo pieno piuttosto che mezzo vuoto. In altri termini le simulazioni dei fenomeni di autonomia cognitiva ed emotiva di un essere vivente non sono imitabili e/o riproducibili, e sono convinto che i sentimenti le emozioni sempre e comunque prevalgano. Ma non posso escludere che ci potremo trovare di fronte ad altri modi di "essere vivo". Comunque io sono convinto che il problema-persona-essere vivente emerga e in ogni caso e ciò che è biologico possa e debba sopraffare, in un attuale e sempre valido ordine gerarchico, le entità tecnologiche in qualsiasi modo organizzate.

The development of a neural simulation *(D.P. Errigo)*

Abstract

The object of this study has a systemic content and contributes to Systemics in general and, in particular, in the following sectors:

- *Cybernetics, Automata, Robotics*
- *Systemic and medicine*

The object of this study was to create an elementary electronic circuit which can produce signals that are similar to those produced by intracellular and extra-cellular circuits.

The results, obtained in the course of several experiments of ***necessarily here simplified*** *computerized circuit simulations, are comparable to those produced by neural circuits that are described in the literature. Based on these results I think that we can create bionic (artificial) cells which can functionally act like stem, glial, or other kinds of biologic cells.*

General Purpose

In this essay I want to show how I can produce physiological signals and, obviously, therapeutic countersignals. The purpose is to assert that we can act in an invasive way at an almost cellular level, with replacements, or by-passes, on clusters of neurons, that are damaged or blocked by internal or external causes. The installation of artificial nervous cells, mainly produced with nano-technology methods, can be a new way to regenerate nervous faculties which can be compromised in various ways: a localized injection of opportunely programmed nano-bionics cells, to restart the circuits, all or in part blocked, would be adequate. I think that, in this way, we can obtain the same effects of traditional medical treatments, with the knocking down of direct and indirect costs, due to the management of ready interventions and of the following phase of specific pathologies.

Possible application of the research

Here I present a project which deals with the realization of:

- *an artificial brain, or its principal components, and the various peripheral nervous components, in order to contribute to the cure or the recovery of some invalidating diseases like Tetraplegias, Parkinson, Alzheimer, Stroke, Epilepsy and other;*
- *and a parallel super computer, whose basic structure is the modified human brain;*

In several years of research, after having calculated the gamma of the interconnecting frequencies of a lot of neuron-conductors and determined the general proceeding, I have ideated and realized an inedited and revolutionary model for the mathematics and informatics simulation.

Starting from this I have realized the electronic-informatics simulation of the first 17 prototypes.

The assumption is that a particular double face device has to be realized:

- *from the point of view of the computer and telecommunications, it has to function as an extremely powerful super parallel computer;*
- *from the point of view of medicine, it has to work as an external (and-or internal) by-pass which can activate the biochemical interconnections among the deficient neurons.*

Successively, the realized devices can be also subjected to a process of nano-technology in order to obtain a central nucleus with ramifications, which leads to:

- *from the point of view of medicine, the realization of a whole nervous bionic system to use totally or in part (at a biologic speed and with biological parameters). We can easy think to medical solutions and above all to a synergy with the actual proposal of stem and glial cells;*
- *from the point of view of the computer and telecommunications, the realization of a real artificial brain with branches which can be connected either by the artificial or human user parts (a real artificial nervous system which can work at the speed of light).*

I must add that this project leads to the complete upsetting of the actual operative philosophy in the realization of computers and in the realization of bionic elements, which are manageable and interchangeable. I assume the point of view of pc and telecommunications too, because the projected electronic-informatics modules have analogical-digital converters, and they can be also configured exactly like Chips. From this, the possibility of tele-control. The device is projected to cure and/or manage (i.e. tele-cure and/or tele-managing) the interested pathologies.

INTRODUCTION - ZERO

For this research it was previously necessary to hypothesis a new neural model that could evaluate the inertia of the transmission and/or reception of the two or more neurons (or parts of) involved.

Hopfield's complex model[(1)] seemed to give exhaustive answers mainly to what regards artificial structures that seems to simulate biological structures rather than the biological structures themselves.

In *Tab. 1* the principal differences between the two models are showed:

HOPFIELD'S MODEL

1. The time and neural activity are non-continuous.
2. The neurons are geometrically arranged in a reticule form and are connected to each other.
3. To the **m-th** neuron a variable $\sigma_m = +1$ is assigned if the neuron is active or $\sigma_m = -1$ if it is passive.

1.1 NEW MODEL

1. The time and neural activity are non-continuous.
2. The set of **2n** neurons is subdivided into two subsets: **n** transmission (**j** neurons), **n** reception (**m** neurons). Both neuron subsets are connected between them by unidirectional reticule connections.
3. To each neuron a variable $\sigma_j = +1$ is assigned if the neuron (of subset **j**) is active (in transmission) and $\varepsilon_m = +1$ if the neuron (of the subset **m**) is active (in reception). To each neuron a variable $\sigma_j = -1$ is assigned if the neuron (of subset **j**) is passive and $\varepsilon_m = -1$ if the neuron (of subset **m**) is passive (in reception).

The reception frequency is determined by induction from the transmission frequency.

Tab. 1

These hypotheses have brought to a mathematical construction of a temporal appropriated model, whose results (with the same Hopfield's terminology) are illustrated in Zero-1 Figure.

TIMES, ACTIONS AND REACTIONS TABLE	$t_1 = t^*$	$\sigma_{ij} = -1$	$\varepsilon_{lm} = -1$
	$t_2 = t^* + 1$	$\sigma_{ij} = +1$ if $K_{lm}\varepsilon_{lm} > \Theta_{lm}$ $\sigma_{ij} = -1$ if $K_{lm}\varepsilon_{lm} < \Theta_{lm}$	$\varepsilon_{lm} = -1$
	$t_3 = t^* + 2$	$\sigma_{ij} = -1$	$\varepsilon_{lm} = +1$ if $H_{ij}\sigma_{ij} > \Theta_{ij}$ $\varepsilon_{lm} = -1$ if $H_{ij}\sigma_{ij} < \Theta_{ij}$
	$t_4 = t^* + 3 = t_1$	$\sigma_{ij} = -1$	$\varepsilon_{lm} = -1$
TIMES, ACTIONS AND REACTIONS TABLE	$t_1 = t^*$	$\sigma_{ij} = -1$	$\varepsilon_{lm} = -1$
	$t_2 = t^* + 1$	$\sigma_{ij} = +1$ if $K_{lm}\varepsilon_{lm} > \Theta_{lm}$ $\sigma_{ij} = -1$ if $K_{lm}\varepsilon_{lm} < \Theta_{lm}$	$\varepsilon_{lm} = -1$
	$t_3 = t^* + 2$	$\sigma_{ij} = -1$	$\varepsilon_{lm} = +1$ if $H_{ij}\sigma_{ij} > \Theta_{ij}$ $\varepsilon_{lm} = -1$ if $H_{ij}\sigma_{ij} < \Theta_{ij}$
	$t_4 = t^* + 3 = t_1$	$\sigma_{ij} = -1$	$\varepsilon_{lm} = -1$

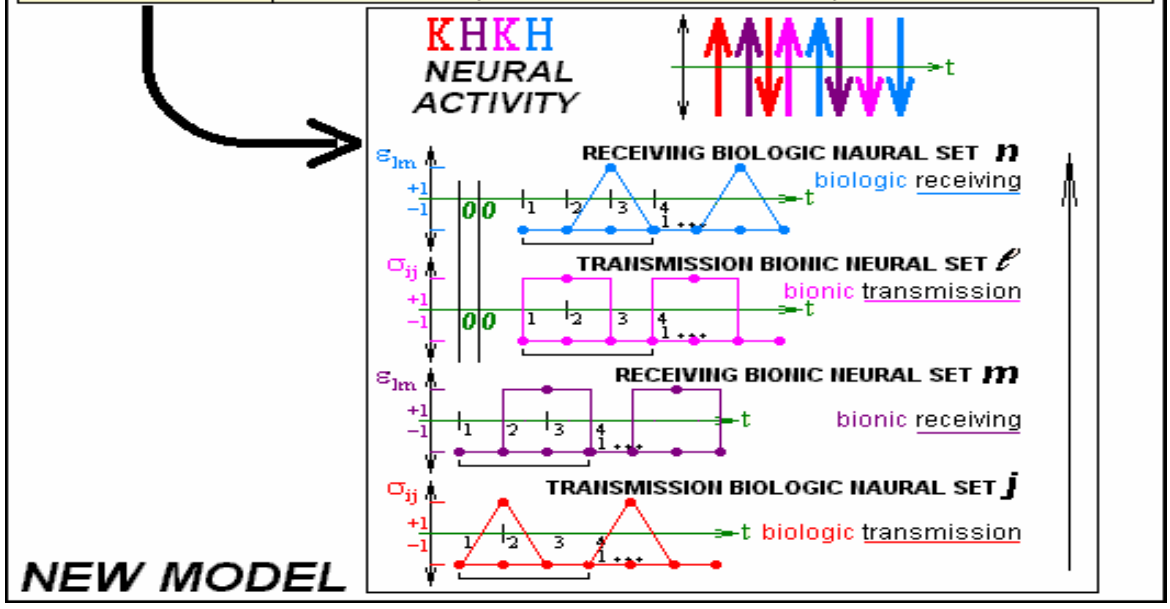


Figure Zero-1

Starting from these considerations I have planed an elementary circuit that, at its turn, can generate circuits like the biological ones (Figure Zero-2). I have noticed, in facts, that the sodium/potassium pump (Na-K pump), normally simulated but successively modified with suitable changes, could give me what I wanted to obtain. That is, I have noticed a production of analogical signals, easy to measure and to compare among them, and above all, that the cells, with which I fixed a contact, could easily understand. In conclusion I created and sent information, whose energetic quantitative was thermo-dynamically like the one of the messengers, which, obviously, could not be created by an artificial structure. Since what is important in the synaptic interchange is the thermodynamic energetic quantitative transmitted, that is the informative quantitative (Shannon's Theorem), this one is transmitted through an electrical–vibratory change, that can give the right impulses on the receptors. In such a way we can realize a bionic interface, which works both reversibly (in function of the equation of waves) and irreversibly (in function of the equations of matter and energy interchanges). According to statistics, the system is structured in various opened under-systems, in which a partial dissipation, that is transformed in an informative flux, is produced. The Na-K pump can be represented at equilibrium, when it produces a current passage, just in one mesh. But if we artificially insert same switches in it, we can obtain values of non-equilibrium in both of the two meshes and this brings to the generations of various kinds of signals, which are those ones reported on the next pages. (*)(†).

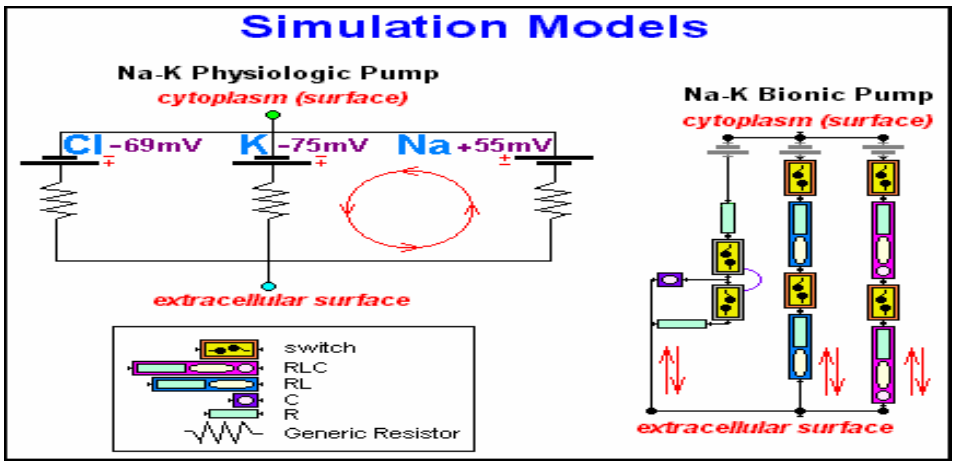


Figure Zero-2

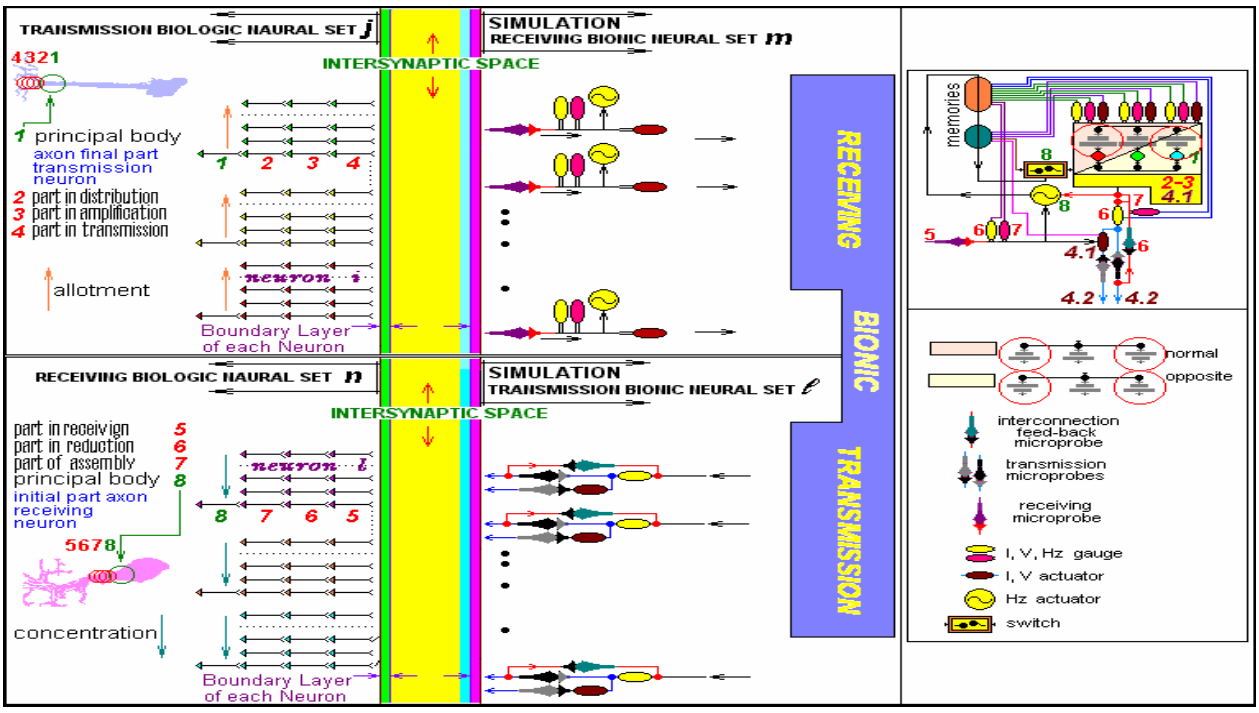


Figure Zero-3

Figure *Zero-3*, moreover, shows a simulation of natural neurons groups, and also how the artificial circuit is connected for the reception and for the following transmission. Definitely in this circuit, the probes in transmission, and the feed-back ones, bring to the frequency (Hz) actuators (consequently modifying the active values), which at their turn act on the switches, from these ones then the process is transmitted to the probes in transmission. For the moment the experiment just concerns the transmission, and the Hz actuators are set up in a preliminary way. In the same picture we notice how, in a steady state, the circuit can function even in a closed ring: the impulses in reception from 5 go to 8 which, guiding everything, give origin to signals which go up to 4, that could coincide with 5. The scheme on the right simulates what we can see as a peak on the left. At this point there is just a fundamental question to ask: what are those universal model and elementary circuit which, working together, are enable to help or replace a neuron or a cluster of neurons which are "inactive or damaged, or however distressed by irreversible pathologies"*?* The answer depends on a series of new approaches to Math, or it is better to say, on a new algebra coexistent with more diversified algebras[(6)], and it is also connected with magneto-flow-dynamics, the Aristotelian logic, fuzzy logic, informatics, electronics, statistics, biochemistry, biophysics, bio-regulation, the retro action chains, the connecting nets, with the models for analogical simulations and other. There was a series of different and interdisciplinary approaches that had to be harmonized. So the first step was to structure a new Math in order to realize a really human intelligence. It should have been completely innovative because it would have permitted to resolve systems of systems of equations. I called it "cubic matrix algebra" and it was a really important result, a fundamental conditions for the realization and the functioning of the circuit I wanted to realize. I had later an important intuition that led me to the formulation of a new neuron transmission model. I realized that there was evident analogies between the relation dendrites-axon and the relations finger-button-hole in a sax (Figure *Zero-4*).

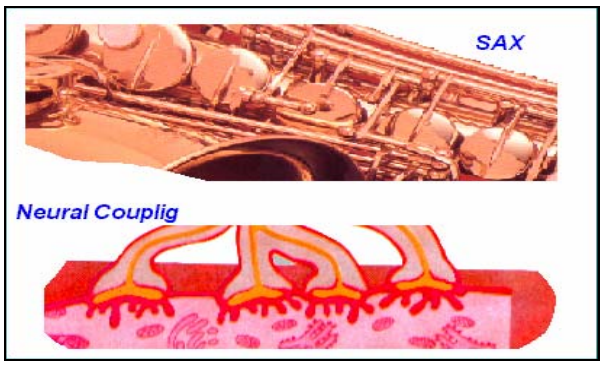


Figure Zero-4

At this point, I can only say that I was working with a transmission model which considered obsolete the traditional model, which was better for rigid, asceptic and digitals tele-communications. This new model was otherwise more suitable to the reality because it was valid for bio-communications which are provided with inertia in transmission and in receiving, and which are above all analogical. In this new model, the neurotransmitters flow is the same as a plasma–jet flow cone in physic-mathematics simulation (Figure Zero-5).

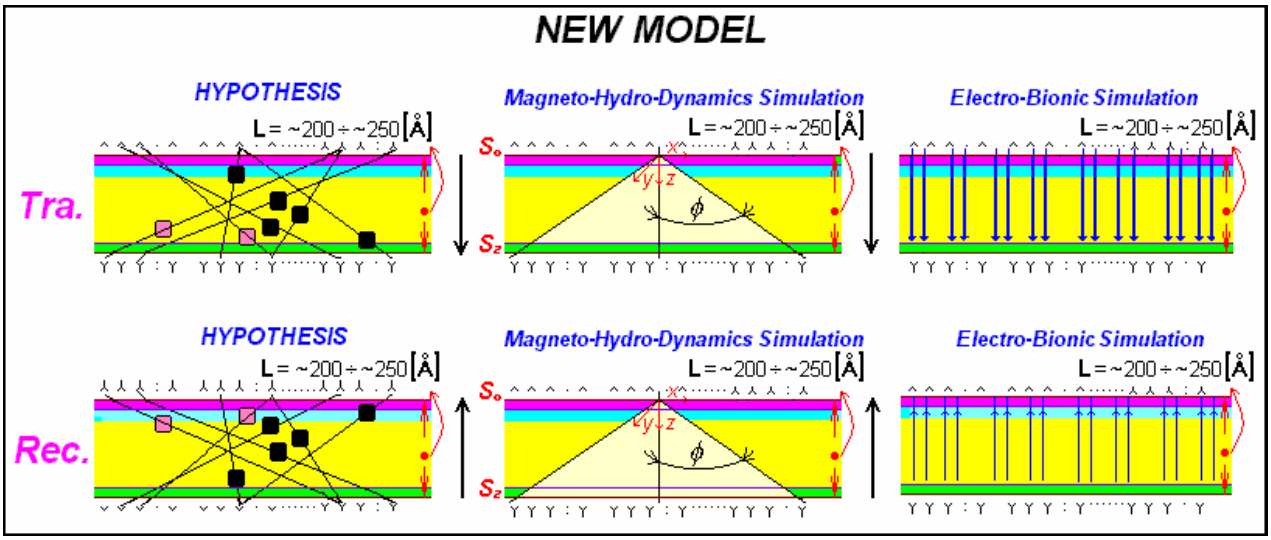


Figure Zero-5

In Zero-5 figure, (in the Hypothesis column) the black rectangles represent the messengers, while the colored ones represent their absence; in the column Magneto-Hydro-dynamics Simulation I show the flow cones in transmission and in receiving, assumed for the messengers movement from a transmitter towards several receivers: the messengers trajectories in iso-frequency are formed in these cones; in the third column (Electro-Bionics Simulation) we notice the produced transmitted or received trajectories in iso-frequency.

INTRODUCTION - ONE

In this study I describe the simulation of a very simple electronic and informative elementary circuit, a circuit that is extrapolated from a group of circuits which are supported by a universal model[(2)]. This circuit is enable to assist or replace a neuron or a group of neurons which are inactive, damaged or distressed by irreversible pathologies. This circuit is presented in Figure 1, sub-figure A. This simplified structure is able to furnish intracellular and extra-cellular signals (Figures 2, 3, 4 and 5) similar to the signals produced by physiologic cells.

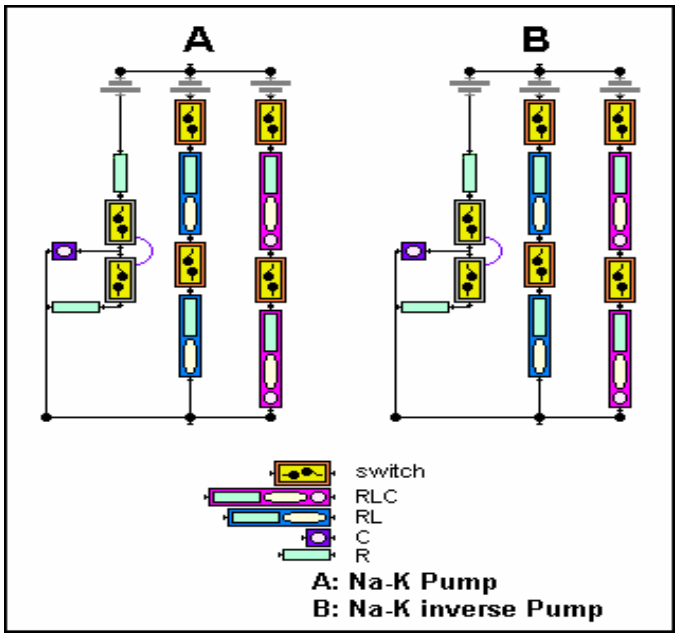


Figure 1

In Figure 1, the oscillator C ***is responsible for discharge and the oscillators RLC and RL are responsible for late-time, inertia emulators. The circuit, which is similar to a sodium/potassium (Na-K) pump, is derived from a new model of neural transmission which states that the difference between tele-communications and bio–communications consists in the fact that tele-communications are rigid and aseptic, while bio-communications are provided with inertia in both transmission and reception. Sub-structure A (Figure 1) is an extremely simplified module of the whole circuit. Through opportune microprobes, the circuit can receive from biologic cells signals which interfere with commands of new signals, which can, at their turn, be transmitted to new biologic cells. Sub-structure B (Figure 1) is its opposite variant. Structure B works with negative feed-back. It can receive, from cells above, signals, which interfere with commands, to form new reversed signals in order to return to abnormal transmitting upside cells or to be sent to other abnormal cells farther downstream. As a matter of facts the components of the circuits, as they are showed, are a noteworthy simplification of how they really are (see Figure 6). While the natural model has no structural interruptions that the artificial model has. In the artificial model, the nets are opened and closed in an opportune way and the derived disorder gives origin to energy emissions as those seen in Fig. 2 and 3. I have examined and considered some experimental tests, which reports intra and extra cellular signals, concerning particular pathologies. Opportunely choosing the frequencies of the switches, I have obtained some artificial emissions curves, showed in Figure 2 and 3. The comparison*** **(Figure 4 and 5)** ***has confirmed the hypothesis of the circuit construction.***

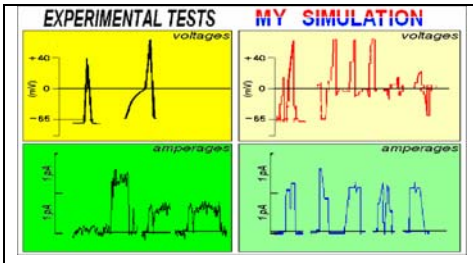


Figure 2. Intracellular Signals

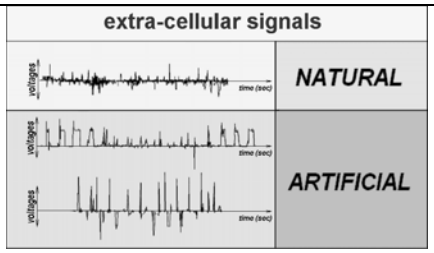


Figure 3. Extracellular Signals

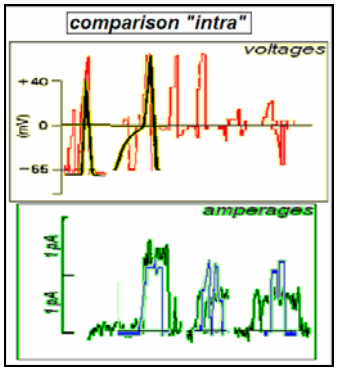


Figure 4. Intracell. Signals comparison

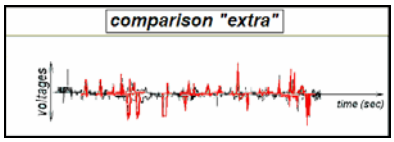


Figure 5. Extracell. Signals comparison

How we can notice in Figures 4 and 5, the curves are – at intervals – superimposed and this led us to think that, opportunely applying the switches frequencies guide, we can obtain waves totally superimposed.

HYPOTHESIS[(3)]

I propose the following hypothesis that neurons:

- *Behave in analogous but not identical ways in both reception and transmission;*
- *are subdivided into modular and more and more specialized parts; and*
- *transmits and receives with lags only in iso-frequency trajectories, in cones of flow or fluid, which have the characteristics of ionized gases.*

I also propose that, in any bionic synapse, messengers in, from all possible, directions can be received and transmitted and that any specific kind of messenger is accepted only by one particular type of receptor, or forwarded only by one particular type of transmitter.
Specifically, the receptor must utilize the same frequency of the transmitter.
To create this bionic structure, I am convinced that:

- *lag is created by inductance;*
- *switches provide transient conditions and produce opening and closing extra–currents;*
- *charge and discharge condensers determine the threshold signals; and*
- *only analogous signals have then to be compounded and modulated to create a direct wave caring also digital information.*

A particular clock value, which can also be variable, corresponds to every switch.

As we can see in Figure 1 the switches are inserted in the circuit nets with different clocks.
If they were absent the structure would be in equilibrium and we would follow the usual signals composition logic.

The introduction of these switches, out of phase among them, causes a dis-equilibrium, which continuously alters the logic combinations of the signals themselves.
So the switched input oscillators become the cybernetic equivalent of tout court logic, changing it from not-temporal to a temporal one.
I. e. it is as if logic, which is of a prefixed kind, definable not-temporal and static (logic tout court), transforms itself in a logic that depends from the switches phase differences and so from time (Figure 6).

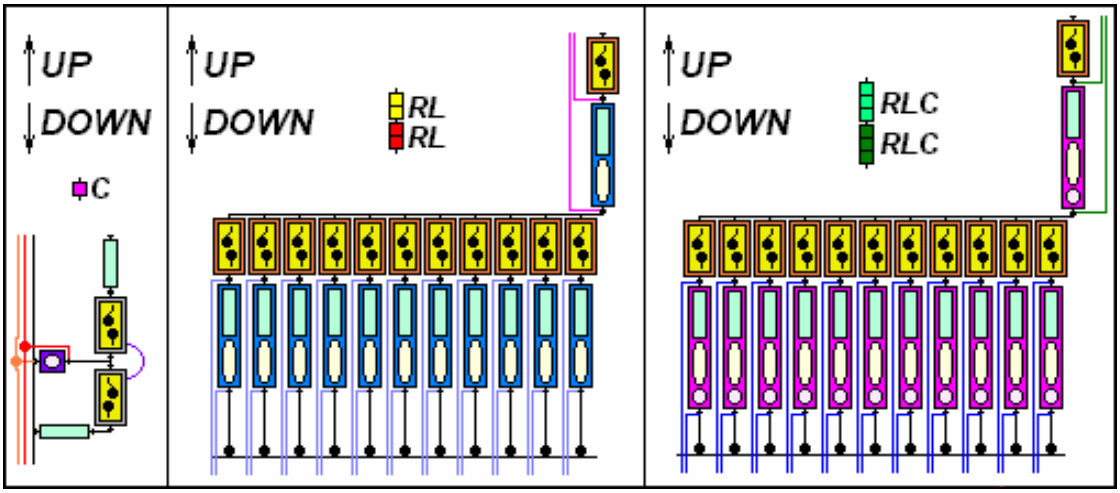


Figure 6

In this figure we can also notice the simplifications (R, RI, RLC) which are in Figure 7. In this figure we see the signals points of the sample. The RLC or RL combinations can be in series or in parallel, in function of the kind of circuit that is simulated. The input oscillator can then create a transition among objects (in this case: neurotransmitters) and connections, establishing, for example, the direction for interconnections among elements which then become interdependent from each other. I have considered three elements of a circuit that, when combined, provide 36 different possibilities (some are repeated) to construct 27 different Na-K pumps (See Figure 7). I have observed that, by varying the configuration of the Na-K pump simulation electronic device we can obtain a series of signals which are comparable to intracellular and extra-cellular signals. It is well established that the Na-K pump is adenosine tri-phosphatase dependent since ATP is directly responsible for the two ion exchange mechanisms. ATP is, in fact, their energy source. But, ATP is also, at the same time, indirectly responsible for concentration gradients of glucose, amino acids, calcium ions and hydrogen ions at the proton level. We know that these concentration gradients between the cell interior and the cell exterior are the base of all physiologic functions. For example, the rest membrane potential of muscular and nervous cells is due to K^+ ions, the peak potential of the same cells is due to Na^+ ions, the excitation/contraction coupling is due to Ca^{++} ions between the cell membrane and the sarco-plasmatic reticular membrane, and the absorption of essential nutrients is due to the maintenance of Gibbs-Donnan plasmatic equilibrium conditions. What I refer to above is natural and physiologic, however we are able to produce the same artificially by altering the ideal pump equilibrium model, transforming it into a pump that uses different energy contributions which produce the same results as those ones produced by ATP. We can further observe that the 27 combinatory possibilities of the base electronic components of the artificial model, represent, in simulation, at least 27 ATP action possibilities or resonance hybrids. (See Figure 7).

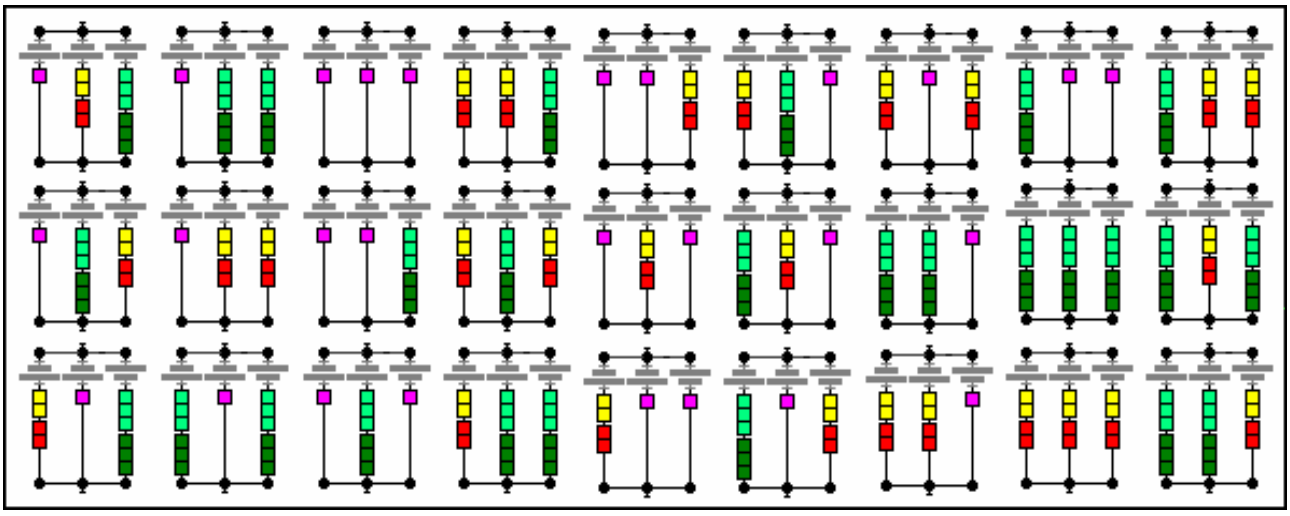


figure 7

THE STRUCTURE

The projected and partially created final structure (from 80 to 960 circuit-cards: i.e. small devices containing electronic circuits, enabling them to perform particular functions), in 27 different configurations, with different combinations, in double logic and every single one subdivided into 64 strata, to form 8 under-stratums (See Figure 9), even if it is only partially active (with a field of imposed frequencies by **1** to **2*10^{4} Hz** opportunely combined and permuted among them), in its whole, can provide at least **10^{45}** interconnections, at various frequencies and wave-forms. In both structures, the signals are combined among themselves through two kinds of logic, Aristotelian logic (**0–1**) and fuzzy logic (**0↔1**), to emulate the functioning of the two cerebral lobes, the right and left brain. The circuits are joined in multi-cards, which contain them in groups from 1 to 12 (See Figures 8, 9 and 10).

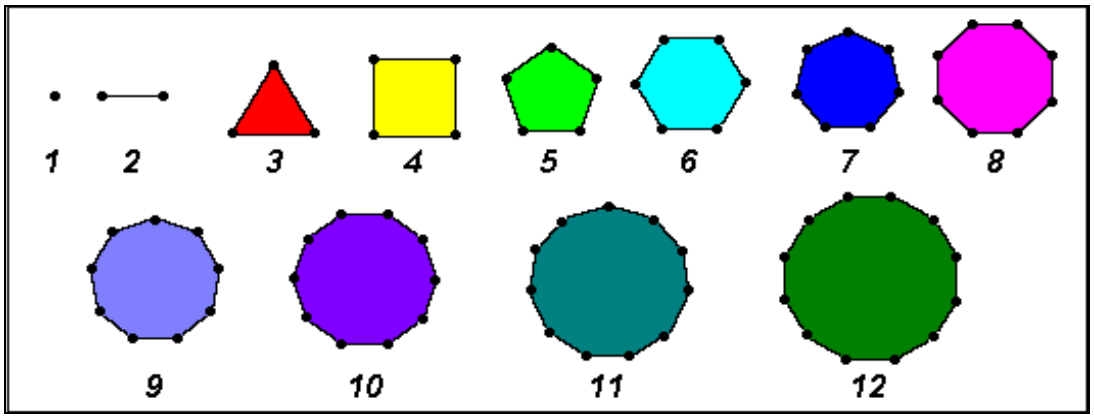


Figure 8

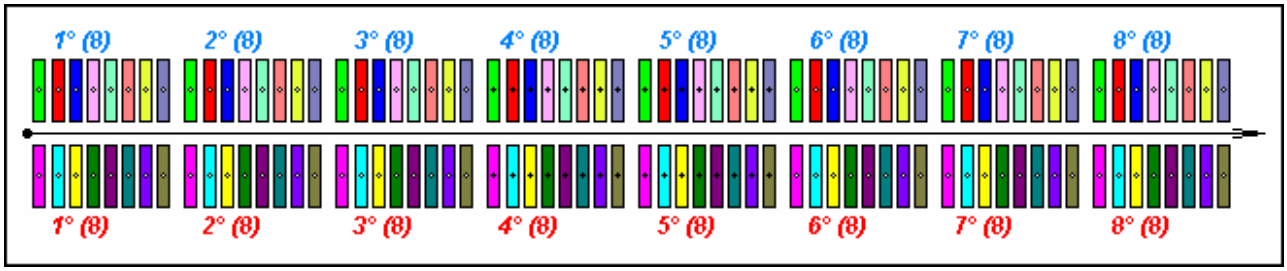


Figure 9

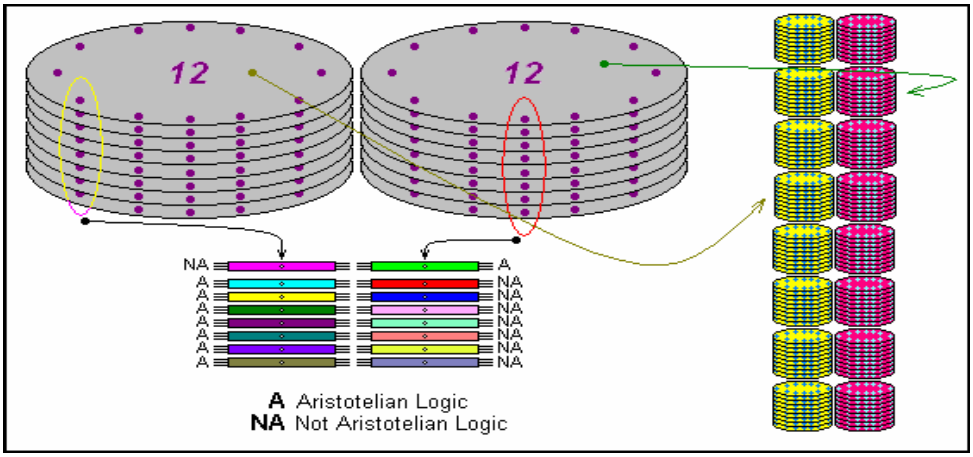


Figure 10

Figure 8 shows the 12 possible configurations of each multi-cards and figure 9 shows the prototype, here considered in its whole: in particular the rectangles represent the multi-cards; the numbers and the direction show the generation flow of the subsequent signals, which will structure among themselves, according to the dispositions theory. Figure 10 shows how the under-stratums are composed and how we can randomly choose the sets of circuits among the multi-cards. Using Fourier's analysis, in series, we can demonstrated that, for e-

very sequence of bionic emission, there are various harmonics which are similar to those deriving from natural neurons. Figure 11 and 12 show my results concerning the ***C*** component (condenser) of the A and B patterns. The ***C*** component (condenser) is the one component in which all the other simple intracellular signals, defined by their resemblance to physiologic intracellular signals, are combined in order to produce extra-cellular signals. It is so the fundamental component for the neural simulators charge and discharge. Potential and intensity current development is noticed in Figure 11 and the development of the Fourier series of the same component, is noticed in Figure 12.

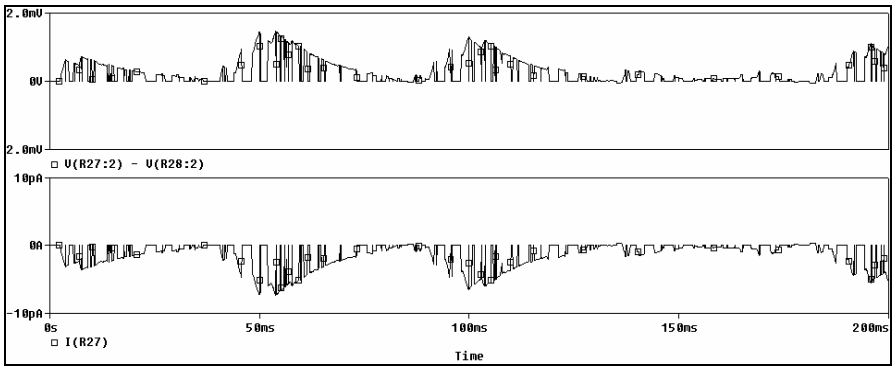


Figure 11

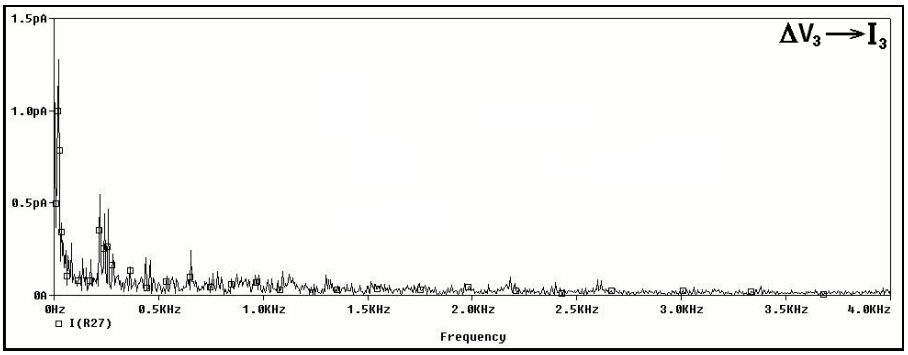


Figure 12

The frequency distribution is clearly optimal for bionic dialogue among, not only the neuron, the signal target, but also among all the other cells nearby, creating, in this way, a synchronicity among the interconnections. But other waves can be noticed in this circuit: for example the values we obtain are similar to the intracellular signals and to those which, opportunely combined with the discharge element (condenser, *C*), have similar course to the extra-cellular ones (see Figures 13 and 14). Some waves have been chosen among these for the comparison you can see in Figures 2,3, 4 and 5.

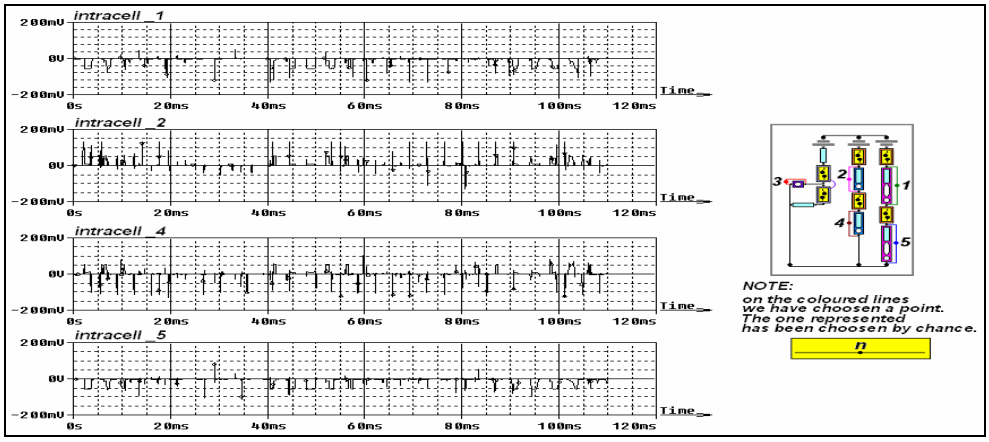


Figure 13

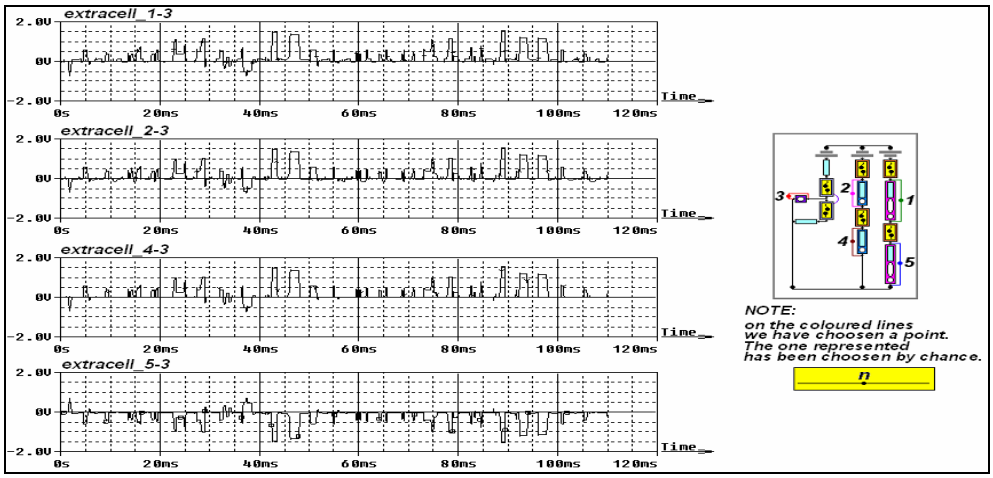


Figure 14

1.2

1.3 RESULTS

I have obtained, for one single complete element of this structure, the theoretic simulation of at least $\mathbf{10^{52}}$ messengers, with molecular weight units (m.w.u.) between 10^2 and 10^3, which produce al least $\mathbf{10^{57}}$ informative signals. For the structure, I have used a three values logic, that by the further formation of tissues **(§)** of bionic elements, will increase to seven. This is an ideal situation for a planning, because, though it may be impossible to create biologic messengers, they could be replaced by their energetic forms, transmitted or received through microprobes. Moreover, considering the automatic energy transfer, we can deduce that it is possible to by-pass, exalt, or eliminate the activation or inhibitory mechanisms, for example, those of monoamine oxidase (MAO). What I project here is an emulator system that is a quasi-Boolean, functional-only net, because the omni-directional reaction to an operative at a perturbation action level gives origin to different possible functionalities in a similar structure, existing in a non-digital way. Or, it may be better to say, a quasi-Boolean system living in an analogous, quasi-digital way with molecular code and decode factors, to which, at present, we approximate in an incomplete way. On the basis of theoretical calculus, every single stratum of oscillators creates energetic and frequency forms for neurotransmitter emulation, so we can have:

- *for each neurotransmitter, a quantum cloud equal to $3x10^5$ quanta, i.e. an informative unit cloud equal to $1.5x10^5$;*
- *for each m.w.u. 10^2 messenger, an association of at least 3 virtual masses, identical among themselves and to the real mass;*
- *for each m.w.u. 10^3 messenger, an association of at least 30 virtual masses, identical among themselves and to the real mass.*

All this happens either in *reception or in transmission* distances to the maximum of 500 times the Böhr ray, close to the length to a Debye wave, and with frequencies up to a thousand times smaller than the Larmor electronic frequency.

CONCLUSIONS

Like previous prototypes I have set up, also with the 12th (the object of this study) my work is derived from a series of assumptions:

- *we know the configuration of balance for the Na-K pump;*
- *we can insert into it switches and replace generic resistances with appropriate resistors, which run in fixed frequency-fields;*
- *opening and closing the circuits, we can create the conditions of dis-equilibrium, which produce differing currents, which, each in their turn, generates various signals in transmission. This various signals must then be assembled, placed, enlarged and transmitted.*

With these assumptions in place, I propose, here, a very simple model (with the object of creating bionic, biologic simulation), which consists of :

- *a single substrate of 64+64,*
- *a single element of a hexagonal group; and*
- *of this single element, 5 signals instead of 25.*

Using this model I have obtained an almost perfect correlation between signals that are generated in nature and those that I have artificially produced. Analyzing my data, I have also noticed that these equal signals, may be compared, for values and development, to pre and post-synaptic signals (from –65 mV to +55 mV volt agent, and inferior to 2 pA currents, see Figures 2 and 3). In fact, this bionic structure proves to be also analogous to a set of **stem** cells, and moreover, with opportune modifications of resistance elements, even analogous to a set of **glial** cells.

In conclusion, I have demonstrated that, at present, we are able to:

- *create signals similar to physiological signals;*
- *create a bionic dialogue; and*
- *build 3 dimensional structures that are more and ever more complicated (Figure 15)* **(§)**.

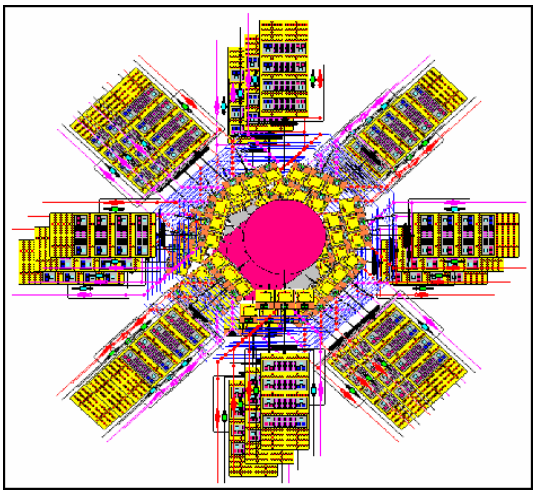


Figure 15. Example of simple structure with 7 multi-cards in 3 layers, each of 40 sub-layers

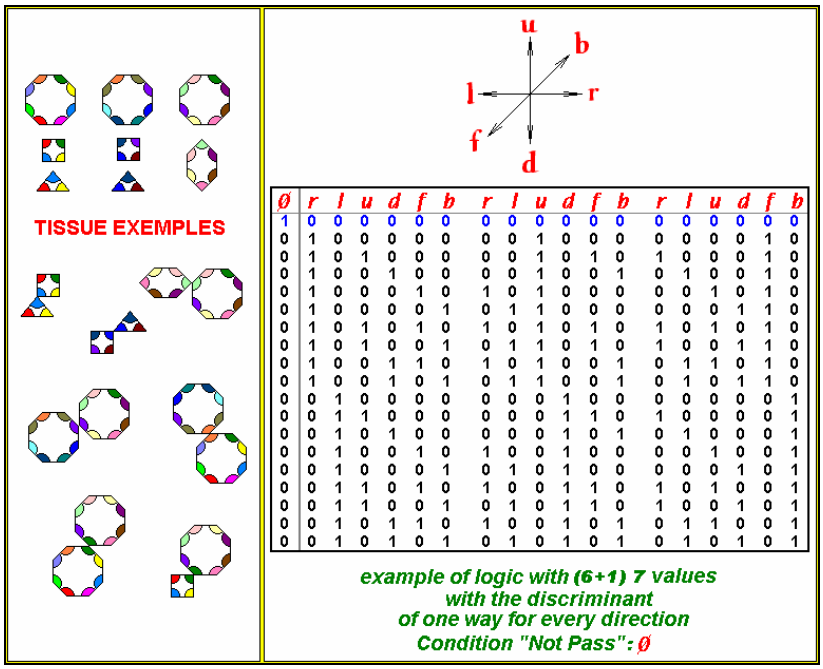
I have also demonstrated that, to build a real and working artificial intelligence, or a particular part of it, we must preliminarily plan an "opposite engineering" system that, starting from the biologic, and not "vice/versa", can define the "how", hoping to, at some later time, define the "why". We are, thus, able to obtain a system (math-inf-el) simulating cerebral structures or cerebral under-structures, or simply neural or a cellular structures. This system allows us to use inserting probes (in receiving and in transmission) which do work, presently, in relatively small spaces and, also in inter-synaptic spaces **(†)(**)**.

NOTES

(*) These here presented circuits derive from the 12th, 13th and 14th prototypes, which at their turn are based on the author's Italian patent, dated on 2 august 2001, that is referred to the 8th prototype. Without a secret agreement, the author can't give either the circuit simulation program, or the switches exact inputs and outputs connected to the results which are in all the Figures. Obviously this prevent the possibility to reply without the author's permission. Anyway the author is willing to show, to whom it may concern, the running principles with the actual informatics models. The author communicate that, being over the 12th model, he has already arranged 4 more oversimplified prototypes of the 13th, and 4 more of prototype 14th. Moreover he has worked to 2 more prototypes of an oversimplified 15th

and to 2 prototypes of the 16th (these ones in order to simulate protein and/or not protein peptides) and others. These works have been elaborated at an informatics level. He is at the moment studying some more prototypes (21-1 and 21-2) for the simulation of a complete circuit in 2 logics: they are both structured by one elementary circuit with (12x27x64x2=) 41.472 under-circuits, to insert, from one to twelve times, for each multi-cards. (†). At present the prototypes are 21 with 36 releases and some circuits behaviours have been augmented to obtain more globalizing results. Also the number of the exchanged signals has been augmented and is over 10^{100}.

(§) As for the tissues, all the plates combine together in complex structures with a thickness which depend by the multi-cards number and with simple, triangular, quadrangular, hexagonal, octagonal geometric forms. The author informs that he will deal with these kinds of tissues and the consequent 3D cerebral structure in a next article. For the moment (Fig. 16) he show some examples of how the tissue originates itself and an example of a 7 values logic for the information transfer that is at the base of the construction.



ø	r	l	u	d	f	b	r	l	u	d	f	b	r	l	u	d	f	b
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
0	1	0	1	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0
0	1	0	0	1	0	0	0	0	1	0	0	1	0	1	0	0	1	0
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0	1	0	1	0	0	1	0	1	1	0	1	0	1	0	0	1	1	0
0	1	0	0	1	1	0	1	0	1	0	0	1	0	1	1	0	1	0
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0	0	1	0	1	0	0	0	0	0	1	0	1	0	1	0	0	0	1
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0	0	1	1	0	0	1	0	1	0	1	1	0	1	0	0	1	0	1
0	0	1	0	1	1	0	1	0	0	1	0	1	0	1	1	0	0	1
0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Figure 16

In figure 16 each geometrical form highlights one of his angles in color, that is a kind of circuits among the ones seen at the beginning. The same circuit can occupy whatever angle of the structure examined and this brings the possibility of the repeatability: in fact the same circuit can take part of at least two adjacent geometric figures (Fig. 17).

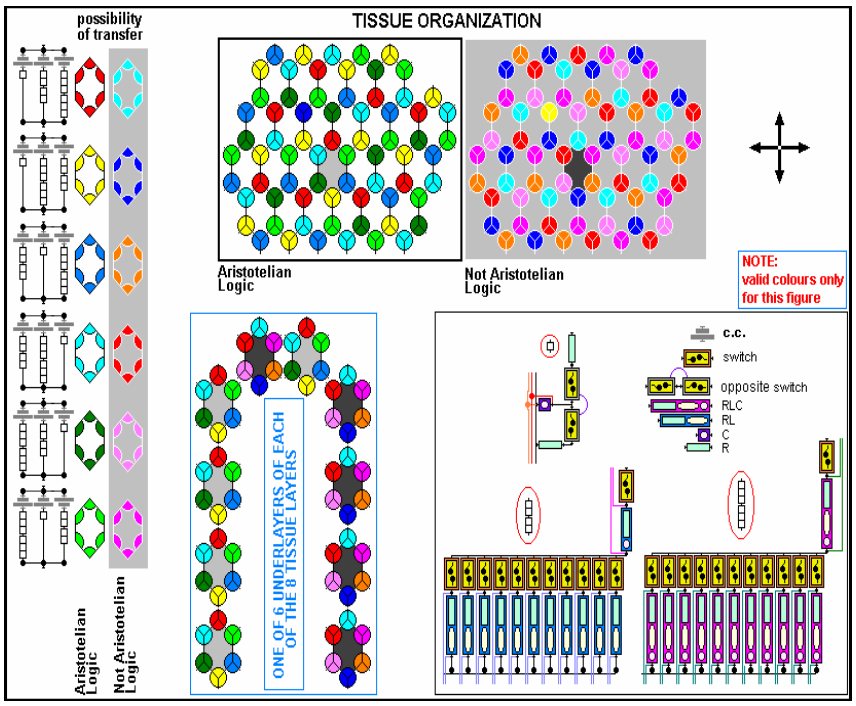

Figure 17

(†) The circuit which has been projected to be created through nano-technologies (for internal use) can now be produced, in macro, with simple, available components. This creates problems with input and output probes that presently work on small spaces transmitting and/or receiving neural, or in general cellular impulses of medium values, while the circuit presented has been projected to work at the maximum efficiency in the field of the inter-synaptic space: i.e. at a dimensional difference level of at least $10^{4.}$ (Figure 18).

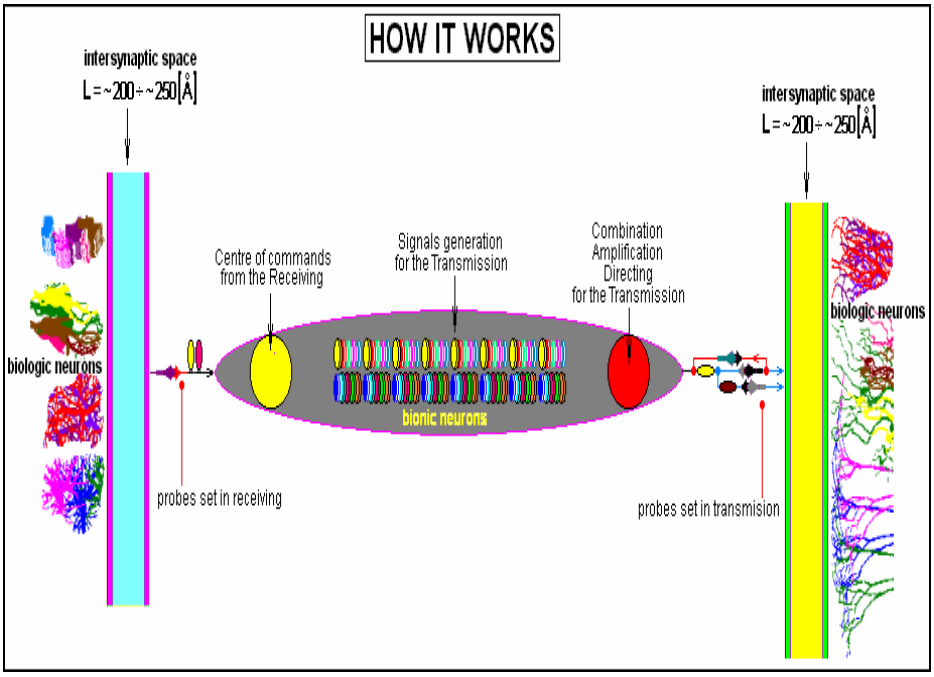

Figure 18

The fundamentals ideas that lead to the new electro-informatics model construction:

A) From the point of view of the structure realization:

1. the artificial neural structure is composed of interconnected modular parts;

2. each interconnected modular part is composed of clusters of oscillators with variable resistance, inductance and capacities characteristics, settled among them in under-sets, ordered with permutation, disposition, and combination criteria;
3. each interconnected modular part is formed by a variable number of sets of plates of which there is just one with central link characteristics and at least another one working in non-Aristotelian logic and/or at least another one working in Aristotelian logic;
4. every plate is composed of an optimized number of oscillators (with appendages) which transmit with several different wave forms;
5. each oscillator acts in a field of intensity current, potential difference, wave form, frequency, intensity and signal typology, in a receiving conditions dependent way;
6. each oscillator behaves as an autonomous component of a neural simulation net that is assumed as a dynamic interface either towards a natural neuron or a single set or several natural neuron sets, and establishes, reciprocity and reversibility relationships in resonance;
7. each acting at Quantico level oscillator transmits informative bits in function of the quanta issue (1 bits = 2 quanta).
   The natural neurotransmitters are artificially replaced by the associated generic energetic forms.
   As in the natural model, in the artificial one the chaotic through a nutation cone information dispatch is selectively absorbed by the receptors which have the same frequency as the various transmitters under-stratums: the transmission and the receiving take place in iso-frequency; that is it exists just an only receiving point towards which the neurotransmitter, issued by the transmitter, will be directed;
8. any neuron acts, in his completeness, <u>simultaneously</u> interpreting both the cerebral lobes influences;
9. The bottom noise determines the inertia to the answer and masks the synchronicity. Every oscillators' combination or permutation or disposition issues, are disguised as radiation, information in iso-frequency: the emission takes place in a simil-digital form on an analogical carrying wave;
10. for every plate the feed-back is also of a "Petri's Nets" kind and the serial and the parallel ones are also of a "Markov' s Chain" kind; we know that we are dealing with exclusively analogical signals which respect their being digital only for the fact that they are present or absent. In order to respect this pseudo-digitalism, the switches give the emission cadence restoring or changing the immediately preceding conditions: in such a way they contribute to the formation of several serial and/or parallel kinds of feed-backs, emphasizing or decreasing the number of virtual "Petri's Nets" and of virtual "Markov's chains", which have origin: and this happens with repeatable logical sequences;
11. for each plate the oscillators set is structured and fed in Sodium-Potassium pump (and Chlorine) simulation;
12. the natural neurotransmitters are artificially replaced by the associated generic energy forms.

B) From the theoretical point of view (that is the basis for my researches which describe the production and the direction bus of the informative signals):

1. The new transmission neural model characteristics presented in Introduction-Zero.
   <u>Observation 1:</u> These assumptions introduce a new transmission neural model from which we deduce that the neurons, even if they structurally and functionally looks like the same among them, if they are considered isolated, at the very the moment of the their inter-relations, assume diversified characteristics in function of their intrinsic structures.

In particular the neurotransmitter transit from a point to another of the inter-synaptic space must follow determinate quantum laws which involve the isofrequency both in the trajectory and the initial points and conclusions of the trajectory itself.

There is, in other words, the presence of the "Feynman path integrals" associated to particular "extremes" of the path itself; this gives origin to a succession of times which apparently does not explicitly provide the contemporaneity.

<u>Observation 2:</u> We know that the stability properties of the open systems which are far from the equilibrium (and in the neural rice-transmission we are involved in this situation) can be formulated in terms of thermodynamics quantities, which present themselves as state functions. On the basis of what I say in the previous note, an integrating factor, such as to turn the "Feynman path integrals" into a state function, will have to exist, just to respect the minimum production entropy theorem;

2. in the trajectories in iso-frequency, the absence of the neurotransmitter is equivalent to the inhibition;
3. ***the neurotransmitters and in general of the messengers flow, is equivalent, in physics-mathematics simulation, to the flow cone of a plasma-jet;***
4. ***in the neurotransmitters and messengers study, a not classical statistical distribution function, obtained by the combination of the Fermi-Dirac function with that one of Bose-Einstein, is valid;***
5. ***two synaptic systems connected with neurotransmitters (or however messengers) sends themselves information through undulatory representations which are antecedent the arrival of the masses transmitted with quantized value on the wave lengths;***
6. ***a Not-Aristotelian new logic is obtained applying the "de Morgan Theorem" with the exclusion of the combinations " all zero " and "all one", de Morgan Theorem "Plus": in Figure 19 we show an example of the circuit deriving from the new theorem;***

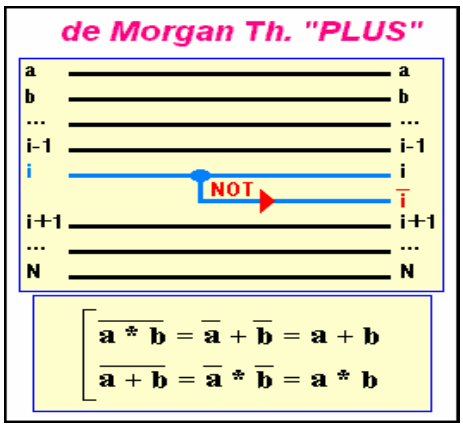

Figure 19

7. ***the Lie algebra is functionally able to represent the synaptic micro-cosmos;***
8. ***the cubic matrixes algebra is able to solve the holomorphic "minimum distance" function obtained with the Lie algebra;***
9. ***the cubic matrixes algebra does not admit the "transposed" and therefore, as regards the neurotransmitters in their hole, gives us their behavioral indeterminateness.***

(**) There is no other people's literature on this specific argument except my own studies, in particular, my new algebra coexistent with more diversified algebras (the Cubic Matrix) and my new Informatics Theorem. I have published all the mathematics, logics, informatics and physics basis of my studies from 1994 to 1999. Moreover:

- in may 1999 (Bari) and in July 1999 two very simplified prototypes (hardware) have been officially presented to the press and in two national networks (Italian Patent Request Aug 02 2001)
- For the model 8th, Italian Patent Request Aug 1 2001
- I presented some of these results at the 1st Neuromodulation Congress (Rome, December 2002) and at The Stroke Congress in Spoleto (May 2003).
- For the last model (21th), European Patent Request Oct 14 2004.

REFERENCES

The References from 6 to 8 are in D.P. Errigo, Cyberneurophysiology, NEI Roma 2004

1. Hopfield J.J., 1982, *Neural networks and physical systems with emergent selective computational abilities*, Proc. Natl, Acad. Sci. USA, 79, 2554.
   Hopfield J.J., 1984a, *Collective processing and neural states*, in Nicolini C. ed, Modeling and Analysis in Biomedicine, World Scientific, NY.
   Hopfield J.J., 1984b, *Neurons with graded response have collective computational properties like those of two-state neurons*, Proc. Natl. Acad. Sci. USA, 81, 3088.
   Hopfield J.J. and Tank D.W., 1985, *Neural computation of decision in optimization problems*, Biol. Cybern., 52, 141.
   Hopfield J.J. and Tank D.W., 1986, *Computing with neural circuits: a model*, Science, 233, 625.
2. D.P. Errigo: *Cerebral simuilation* – Abstract (1st Neuromodulation Roman Symposium, Roma 13-14 Dec 2002), Neuromodulation, Volume 6, Issue 3, 204 -206, July 2003.
   D.P. Errigo: *Towards a new neural transmission bionic struccure*, (AAVV: Stroke Today, International Congress Acta, Spoleto, May 5-8 2003, 402-407) (in Italian language).
3. D.P. Errigo: *Un nuovo modello di trasmissione neurale – 1: le differenze tra il modello tradizionale ed il nuovo modello*, Nuova Atlantide (1997) Suppl. 1, 3 – 9 (in Italian language).
   D.P. Errigo: *Un nuovo modello di trasmissione neurale – 2: Magneto-idro-dinamica di un ipotetico gas di neurotrasmettitori*, Nuova Atlantide (1997) Suppl.2, 3 – 11] (in Italian language).
   D.P. Errigo: *Un nuovo modello di trasmissione neurale – 3: Per il nuovo modello di trasmissione neurale*, parte *I°: Ricerca delle frequenze rispettivamente di trasmissione e di ricezione e conseguenze; appendice alla parte I°: Un'unica funzione di distribuzione statistica non classica; parte II°: Ancora sulla teoria delle perturbazioni; parte III°: derivazioni dalle Parti I° e II°*; Nuova Atlantide (1997) Suppl. 3, 3 – 13 (in Italian language).
   D.P. Errigo: *Un nuovo modello di trasmissione neurale – 4: parte IV°: Uno studio su di una frontiera discontinua: Il cosa (ed il come) sembra accadere all'interfaccia tra due sistemi sinaptici in collegamento tramite neurotrasmettitori*, Nuova Atlantide (1997) Suppl. 4, 3 – 10 (in Italian language).
   D.P. Errigo: *Un nuovo modello di trasmissione neurale Un nuovo modello di trasmissione neurale*, Nuova Atlantide (1999) Suppl. 1, 3 – 5 (in Italian language).

D.P. Errigo: *Un nuovo modello di trasmissione neurale – 6: Modalità di trasferimento in una simulazione neurale: Parte 1°: verifica di massima delle strutture, Parte 2°: l'emisfero destro: il secondo modulo universale e le sue connessioni con il primo,* Nuova Atlantide (2000) Suppl. 1, 3 – 12] (in Italian language).
D.P. Errigo: *Un nuovo modello di trasmissione neurale – 7: Modalità di trasferimento in una simulazione neurale: Parte 3°: il modulo universale definitivo, Appendice 1°, Appendice 2° alla parte III°: una breve considerazione sulla metrica del micro-universo sinaptico,; appendice 4° alla Parte III° : il Modulo universale che sarà oggetto di brevetto: verifica della struttura,* Nuova Atlantide (2000) Suppl. 2, 3 – 10 (in Italian language).
D.P. Errigo: *Un nuovo modello di trasmissione neurale – 8: Trasmissione artificiale operata in simulazione cerebrale: paradigmi ed analisi: le implicazioni Bio-Cyborg-sociologiche di un modello di trasmissione neurale,* Nuova Atlantide, (2000) Numero Unico, 3 – 13 (in Italian language).
D.P. Errigo: *Interazione di raggio laser con campo elettromagnetico ortogonale in regime di variabilità - premessa - le basi fisiche – I° Cap. 1 un'ipotesi su particelle elementari, atomiche e nucleari,* Nuova Atlantide, (1996-'00), passim, 3 – 6 (in Italian language).
D.P. Errigo: *Interazione di raggio laser con campo elettromagnetico ortogonale in regime di variabilità - premessa - le basi fisiche – I° Cap. 2 " In uno spazio definito come bosonico-fermionico è possibile isolare un pseudo-volume elementare in cui la misura della probabilità di un evento, in termini di coordinate canoniche, sia esprimibile come funzione della metrica e/o del tempo, parti I°, II°, III°, IV°*, Nuova Atlantide, (1995-'00), passim, 3 – 23 (in Italian language).
D.P. Errigo: *Interazione di raggio laser con campo elettromagnetico ortogonale in regime di variabilità - premessa - le basi fisiche – I° Cap. 3 Sulla trasformazione di coordinate, appendice, appendice al Cap. 3: riflessioni sull'equazione (13),* Nuova Atlantide (1996-'00), passim, 3 – 9 (in Italian language).
D.P. Errigo: *Interazione di raggio laser con campo elettromagnetico ortogonale in regime di variabilità - premessa - le basi fisiche – II°: Cap. 1 Sulla Sin.-Gordon ed altro,* Nuova Atlantide (1996-'00), passim, 3 – 8 (in Italian language).
D.P. Errigo: *Interazione di raggio laser con campo elettromagnetico ortogonale in regime di variabilità - premessa - le basi fisiche – II°: Cap 2: matrice di spin e carica, Cap. 3 sulle orme di Yukawa,* Nuova Atlantide (1996-'00), passim, 3 – 6 (in Italian language).
D.P. Errigo: *Interazione di raggio laser con campo elettromagnetico ortogonale in regime di variabilità* – Accadimenti fisici, Nuova Atlantide (1995-'01), passim, 3 – 12 (in Italian language).
D.P. Errigo: *Interazione di raggio laser con campo elettromagnetico ortogonale in regime di variabilità – ancora sulle orme di Yukawa*, Nuova Atlantide (1996-'01), passim, 3 – 11 (in Italian language).
D.P. Errigo: *Elementi della teoria ingenua delle matrici cubiche,* Ratio Mathematica , 8 (1994), 9 – 14 (in Italian language).

NA 2-2011

Editoriale: I diritti ed il Rischio *(D.P. Errigo)*

Credo sia importante per questo numero di Nuova Atlantide, iniziare con il Preambolo della Dichiarazione dei Diritti dell'uomo. Essa recita:

- *Considerato che il riconoscimento della dignità inerente a tutti i membri della famiglia umana e dei loro diritti, uguali ed inalienabili, costituisce il fondamento della libertà, della giustizia e della pace nel mondo;*
- *Considerato che il disconoscimento e il disprezzo dei diritti dell'uomo hanno portato ad atti di barbarie che offendono la coscienza dell'umanità e che l'avvento di un mondo in cui gli esseri umani godano della libertà di parola e di credo e della libertà dal timore e dal bisogno è stato proclamato come la più alta aspirazione dell'uomo;*
- *Considerato che è indispensabile che i diritti dell'uomo siano protetti da norme giuridiche, se si vuole evitare che l'uomo sia costretto a ricorrere come ultima istanza, alla ribellione contro la tirannia e l'oppressione;*
- *Considerato che è indispensabile promuovere lo sviluppo di rapporti amichevoli tra le Nazioni;*
- *Considerato che i popoli delle Nazioni Unite hanno riaffermato nello Statuto la loro fede nei diritti fondamentali dell'uomo, nella dignità e nel valore della persona umana, nell'eguaglianza dei diritti dell'uomo e della donna, ed hanno deciso di promuovere il progresso sociale e un miglior tenore di vita in una maggiore libertà;*
- *Considerato che gli Stati membri si sono impegnati a perseguire, in cooperazione con le Nazioni Unite, il rispetto e l'osservanza universale dei diritti dell'uomo e delle libertà fondamentali;*
- *Considerato che una concezione comune di questi diritti e di questa libertà è della massima importanza per la piena realizzazione di questi impegni.*

Al Preambolo seguono gli articoli. Allora quali sono questi diritti di chi spesso, come i bambini, non ha voce? I più importanti: alla vita; alla salute; al necessario per vivere; all'amore; alla comprensione; alla conoscenza; alla istruzione; alla libertà; alla dignità; all'uguaglianza; alla pace; a vivere in un clima sereno; al gioco; a non essere trascurato o maltrattato; a non essere oggetto di mercato; ad una vita soddisfacente anche se fisicamente o mentalmente svantaggiato; ad un nome; a una nazionalità; al primo soccorso in situazioni di emergenza. E quali sono questi diritti di chi spesso, come gli anziani, non ha voce? I più importanti: di sviluppare e di conservare la propria individualità e libertà; di conservare e veder rispettate, in osservanza dei principi costituzionali, le proprie credenze, opinioni e sentimenti; di conservare le proprie modalità di condotta sociale, se non lesive dei diritti altrui, anche quando esse dovessero apparire in contrasto con i comportamenti dominanti nel suo ambiente di appartenenza; di conservare la libertà di scegliere dove vivere; di essere accudito e curato nell'ambiente che meglio garantisce il recupero della funzione lesa; di vivere con chi desidera; di avere una vita di relazione; di essere messo in condizioni di esprimere le proprie attitudini personali, la propria originalità e creatività; di essere salvaguardato da ogni forma di violenza fisica e/o morale; di essere messo in condizioni di godere e di conservare la propria dignità, anche in casi di perdita parziale o totale della propria autonomia ed autosufficienza. Vi sono anche i bisogni fondamentali che costituiscono l'essenza di un Rischio sociale, specie quelli della salute, dell'istruzione, del lavoro, dell'assistenza, della previdenza, della giustizia, della sicurezza, dell'equità.Tutto ciò viene enumerato per cercare di eliminare o alleviare le "magnifiche sette Paure" di cui è intriso il mondo della gente ignota: della povertà; della ingiustizia; della derisione; della solitudine; della malattia; della vecchiaia; della morte. Come scienziati noi ragioniamo con modelli che descrivono sistemi, specie quelli sociali in cui determiniamo il Rischio privato che spesso nell'analisi della tripla elica non considera la società nel suo complesso ma solo fattori aziendali economico-finanziari e scenari di sviluppo che esulano dalle valenze dei contesti sociali. Effettuiamo così un riduttivismo che pare nuocere allo stato del "complessivo", cioè di tutta l'umanità che spesso si interroga su ovvero subisce una finanza al di sopra di una "humanitas". Dobbiamo ricordare invece che:

- *Un sistema fisico non ha leggi dissimili da quelle di un sistema sociale.*
- *Un sistema fisico ed un sistema sociale non hanno leggi dissimili da quelle di un sistema mentale.*
- *Un sistema razionale non ha leggi dissimili da quelle di un sistema irrazionale.*

Insomma dobbiamo ricordare che esiste una globalità già prima della nostra coscienza e conoscenza e che riguarda anche la nostra coscienza e conoscenza.

Solo con questa visione, appunto globale, potremo iniziare a capire il mondo con tutte le sue relazioni. E' per questa visione che si è ancora in attesa di una Dichiarazione universale dei diritti della Natura. Come dice Rigpa Glimpse:

Ogni cosa è interconnessa.
Ogni cosa è inestricabilmente interconnessa:
giungiamo a comprendere che siamo responsabili
di ogni cosa che facciamo, diciamo o pensiamo.
Responsabili, perciò, nei confronti di noi stessi,
di ognuno e di ogni cosa.
Responsabili nei confronti dell'intero universo.

Editoriale: Serendepity: global emergencies and immergencies *(M.R. Astolfi)*

A technological Knowledge-based complex society is continuously subject to dynamics caused by continuous fluxes of

communication which contribute to expand the system in multi-dimensional global, as probable as quite unexpected, growing processes. Also if we don't know (as it is quite impossible) the complete systemic network social structure (structure considered both as an abstract model of empirical reality and as a necessity for autopoietic self- reproduction), and all the problems in the way caused by the incessant myriads of the simultaneous variables interactions, which are obviously shaping and re-shaping the same system in function of its environment, we should not underestimate the power and the importance of an analytical modelling of this complex reality in order to understand and consciously act on it the most possible "risk free". To a certain degree if we start to focus on its systemic structure, the interconnected and interpenetrating global net it forms and how it affects the information flow knowledge, we can perceive the system's own operative possibilities, setting up formulations that can be detected and bounded using the distinction between inside and outside. The corresponding distinction between information and action generates knowledge and conceptual models. If we consider the eco-social-system as an evolutive dynamic puzzle, as a multiple set of different species, interacting in a continuous co-evolution facing respective and environmental mutations, we see that Reality is just one of the probable and possible representations (that's why we can change it, or better its representation) and so we are convinced that this is the very moment to use the power of technique for sustainable objectives, a kind of global "ECO-SOCIAL-SCIENCE" that socially can first of all legitimate public opinion and mass media full expectations and claims. Starting from this, in this issue we want to identify and explain a particular Knowledge wide horizon path to structure a multidimensional greed in which including emergencies and immergencies among the elements' social interrelations of various interconnected social fields which are exposing (and are exposed) to a continuous self-conditioning. In our culture a sustainable global welfare must mix, merge and converge with the emerging of a LIVING BEINGS GLOBAL "SOCIO-BIO-ETHIC-OLOGY" based on an ecologic global language, quite as simple, definitive and defining, to be adopted by Opinion-Leaders' voices, qualifying their messages with the strong impact of an eco-social strong campaign. That's why in this issue the analysis of the various sectors begins and impacts with a fully inclusive and all embracing "Socio-bio-ethic-ology" in a domain of intersystem's intra-relations. It continues with the analysis of a complex Socio-Political-Prejudicial relationship between Energy and Society which sees their reciprocal contribution to the selective constitutions of behaviours and challenges elements in the correspondent socio-normative life that match such intersection. A social rating of Third Sector Organization assumes the Non-Financial Report as a tool included in the domain of possible knowledge, indispensable to extrapolate adequate self-references and sociality development functions of these no-profit structures. The global synthetic analysis of Risk, in a communicative system that reproduces itself, shows the different language, action and actors functions which play a role insofar among traditional and modern societies and open the way to a reflection on the Speculative Bubbles' present case and the consequent reactive connective operations. If we want to emphasize, with a strong Opinion-Leader's voice, the project figure of a Wide Horizon Leader, going over theoretical developments, it is to clarify the opposite contradictions and underline the possible and potential options. Moreover giving a synthesis of the Cybernetics strategic fundamental tools in sociological theory and systemic research, we state and demonstrate the basements of the importance of simulation and computation in the social science dimension research, showing also how elements of methodological analysis, in a social systems complex network, include social relations, processes, actions and communication on the basis and in function of the same social system self-(in)formation. It is a sociological quest that widely spread in many directions including the social dimension of Meaning, presupposed to be capable with an echo-sociologic mind to perform, to conform and confront the "socìetas" expectations in a recursive self reproductive society.

Ecologia, sviluppo sostenibile ed etica aspecista *(V.Pocar)*

Abstract
Evolution and boarding of fundamental rights during the past three centuries have brought to conceive new translational and global rights such as the ecological ones which begin to be recognised by Constitutions and international treatises. Ecological rights however seem to be incompatible with other fundamental rights such as the right to development and the idea itself of sustainable development. In search of a new paradigm for relationships between mankind and environment the paper proposes to give up the use of animal and to abandon farming which are responsible of more than the half of air and water pollution and represent the most relevant factor of wasting and destroying natural resources. Refusal of products coming from animals seems to be a moral duty of mankind in order to guarantee the fundamental rights both of human and non human beings.

A fatal consensus (A consensual but unfeasible model) *(M. S. Pérez Schael)*

Abstract
Our interest is to illustrate the negative impact of a common sense and political consensus on decision-making regarding energy use and transformation. We want to identify some of the obstacles that might be faced by elucidated and responsible communication in energy matters. This path, which is the path describing failure, is fully illustrated by the paradoxical "rents" model established in Venezuela; a model that reduced the complex nature of oil energy to money and income, and excluded subjects related to work, technology, knowledge and innovation, causing society to lose its direction towards progress and modernity.

Scope and aim of Non-financial Reporting for Third Sector Organizations: some theoretic para-

digms and considerations upon the Italian case *(G. Antonucci)*

Abstract
Non-financial reporting, increased in the last decade, as a voluntary accounting system approach developed, thanks to appropriate measures and reporting techniques, to give an account upon organization's activities related with the identification of socially relevant behaviours. In this sense non-financial reporting is considered as a way for accounting the choice, made by an organization, to go over and above legal requirements, showing the importance given by a company (either private or public) to different issues (environment, workers' conditions, relations with its stakeholders, etc.). In the case of third sector organizations non-financial reporting can play an important role, due to the fact that it can be seen as a strategic tool that plays an important legitimizing role. The aim of this paper is to go further in this analysis considering in particular the Italian situation where, thanks to the Law 155/06 on social enterprises, there has been the first case of law obligation for writing also non-financial reporting. The aim is to develop some basic theoretic paradigms in order to show what should be reported in a non-financial reporting for a third sector organization, starting from the consideration that non-financial reporting might show, in a better way, organization's performance in terms of social rating. The paper presents some basic theoretical indications that ought to be challenged, but anyway it represents a way of looking in a new way upon the role and importance of non-financial reporting for third sector organizations in Italy, giving some indications on how it should be made and used to improve organizations' results, being in this way an important tool to measure their performance and helping in legitimising their role and importance.

A systemic approach to the Risk Management *(Michele Infante)*

Abstract
In this article I try to rebuild the historical background at the base of concept of "risk". Starting from the classical Greek word rizikon through the Arabic semantic of the terms until the modern time, the concepts of social risk assume different meanings. In the modernity, I make reference to the concept of risk in the Niklas Luhmann and Piotr Sztompka's work. Moreover, I describe the different relation between risk and financial crisis, communication, health and psychology. Finally, I apply the systemic approach to the Risk Management; in this way I deal with the contingency of risk on which the society are foundend.

Analisi delle bolle speculative e crisi sistemiche (*G. Ercolanese*)

Abstract
The history of financial crack is quite long. It is as long as financial history itself. Several theories about the origin and the spread of cracks, crashes, defaults and collapses have been produced. Although the cyclical presence of crisis is a constant in the worldwide economic history, it shows new features whenever it happens. Most people consider the "speculative bubble" to be the common base for many a event of crisis. What are these events of crisis? And, above all, what are these "speculative bubbles"? What does feed them? Where do they come from? Which systems do they hit? John K.Galbraith, in his famous "A Short History of Financial Euphoria" puts as the basis of these events greed and eager for money and human stupidity. These elements are all necessaries and sometimes they are sufficient to get a default phenomena but they don't allow us to get other significant elements, as for instance, knowing which fuse can light a crisis or what makes a speculative bubble explode in order to provoke a systemic crash. After a short historical analysis, starting from the first speculative bubble, the one recorded in the 1600 and named the Tulip's, this essay dwells on the last crisis, called Subprime's, and to the related and still present consequences. All that concerning the government's policies which have been characterizing the last 40 years of the economic history and analyzing, by means of the systemic key, the economic-political and social collapse which has been overwhelming the world since 2007. As the author claimed, talking about crisis, only from an economic and financial point of view, would be minimizing and misleading for two reasons; As it does not allow us to get the whole issue. Never revealing the dark side of the Moon which hides responsibilities even more important, or at least as important as, the previous one. It does not tell us which systems are involved. Hyman Minsky's "Financial fragility" must take into account even the worldwide system fragility, as this is the result of little complexity and of a range of practicable options that is getting narrower and narrower. Thus this work wants to dig into the political substratum which laid the basis of 2007 events. Events which are a heavy burden on worldwide economy still today. It wants to observe these events from another, new and almost unexplored point of view, including political joint responsibilities in cracks, crashes and defaults, looking for the differences which make the difference.

Fear, laziness and pride *(A. Pitasi)*

Abstract
This article is not aimed to portrait a whole generation. It is aimed to focus on the key bifurcation, inside a generation, between an oligarchy of tomorrow's freelance to brain and wide horizon leaders and the gigantic mass of cognitive proletarians. The key idea of this article is that the big mass will be composed of those people who will fall in a two step trap because of their attitude towards fear, laziness and pride. As far as that generation will be able to evolve a wide horizon

strategy, the most likely they will avoid to become irrelevant numbers of the cognitarian (thus cognitive proletarian) mass.

Il patrimonio cibernetico della sistemica *(M. Ruzzeddu)*

Abstract
Il saggio costituisce una breve rassegna dei principali autori che hanno elaborato e sviluppato la cibernetica. A partire dalle origini, esamino principali processi epistemici cui la cibernetica ha cercato di fornire una risposta, nonché gli strumenti elaborati dai principali autori. Particolare importanza viene data al contributo che la cibernetica ha fornito alla teoria e alla ricerca sociologica.

Il metodo simulativo e le scienze della complessità nella ricerca sociale *(Alberto Trobia)*

Abstract
Nelle pagine che seguono, introduco il lettore alla simulazione nelle scienze sociali, definendo questa tecnica d'indagine, classificandone le varie articolazioni, riassumendone il metodo generale, e chiarendone lo statuto metodologico e il posto rispetto ai classici dilemmi della teoria sociale. Uno spazio particolare è dedicato alla simulazione multi-agente, che si è dimostrata molto feconda nelle scienze sociali, producendo risultati robusti e in alcuni casi di grande rilievo, in uno stretto dialogo con le scienze della complessità. La parte finale è dedicata alla questione della validazione dei modelli e ad un bilancio metodologico.

La Social network analysis e la complessità *(V. Milia)*

Abstract
The network analysis is not an exclusive prerogative of the social sciences, but is the subject of interest to a multidisciplinary scientific community which studies the complex systems (natural, biological, physical, computer, epidemiological, communicative, social systems, etc.). The network is assumed by these researchers as a theoretical and methodological abstraction, a way to analyze the complexity of the relationship between individual behaviour (the units that form a system) and the effects detected at the collective level. The network is intended like a model capable of detecting the structural form of complexity, which is considered intrinsic characteristic of the systems. The Social Network Analysis (SNA), under the influence of these new contaminations, deals with these new topics on the basis of a strong tradition of research on differentiated and specialized social structures and therefore complex structures. This work aims to illustrate the analytical and applicative potentiality of SNA to the issue of systemic complexity. For this reason we will approach the methodological and technical elements of the SNA useful to understand and to represent the structural form of complex systems and to explore the internal dynamics considering the circular system of interdependencies of levels involved: the actors' social relations that they connect and networks that form the structural whole.At first, we will give an outlook to the Social Network Analysis outlining the main aspects of the network perspective within the tradition of sociological and social studies. Then, we will present an overview of the methodological tools of the SNA, underlining to the most advanced techniques and new design, such as those used in studying network dynamics. In conclusion, we will attempt to illustrate a synthesis about the study of complex networks under the interdisciplinary contamination and scientific discoveries occurred that this research has produced until today.

WCSA - MEETINGS INFORMATIONS

NEWS: Complessità, forme emergenti del capitalismo (Benevento 17 maggio)

NA 3-2011

Editoriale: Alla ricerca dell'"Ancora" *(D.P. Errigo)*

Cari amici lettori, con questo terzo numero si esaurisce il 26° anno (2° di collaborazione con la WCSA) di vita della nostra Rivista, ed in attesa di iniziare il nostro 27° (3° con la WCSA) per l'anno 2012, ritengo sia opportuno sintetizzare alcune idee che mi si sono generate nel corso del tempo.[1] *Da un punto di vista sistemico, è relativamente facile dimostrare che il primato della varietà e del pluralismo può essere ricondotto ad un tipo di selezione multilivello nella quale si ottengono effetti benefici se, e solo se, esiste una libertà partecipativa che accentua i fenomeni di progresso singolo e di insieme. E che, per fare questo, occorre che un sistema complesso dissipativo, autopoietico ed autoregolante non sia ulteriormente regolato da una presenza ideologica, qualunque essa sia. Questo dal punto di vista teorico. In realtà, cioè in generale nella prassi effettiva e fattuale, in qualsiasi corpo sociale non esiste alcun impianto, o organismo, che sia totalmente anideologico in quanto anche una richiesta, seppur fondata anche solo epidermicamente, di assenza ideologica è frutto di un nuovo tipo di ideologia: quello della non necessità di qualità fondanti societarie qualunque esse siano*[2]**.** *Il trauma o singolo o sociale accompagna il dissolvimento di un'idea falsificata da un'altra, o quanto meno il deragliamento di un'idea verso lidi di opportunismo o altro, in cui non vi è più la coincidenza tra risposte dei o del gestore alla lettura dei bisogni e delle istanze dei gestiti. La lettura dei bisogni e la loro conseguente suddivisione in motivati (o reali) e fittizi (o illusori) è eseguita solitamente in chiave ideologica o in laboratori di simulazione o tutt'al più è per lo meno sottostante a modelli preconcetti o ipotesi di lavoro. Cioè: "filtri". Ed anche la risposta, come contenuti, metodo, strumenti. Allora é evidente che se esiste uno sfasamento della risposta dell'intervento politico sui bisogni, rispetto a ciò che i bisogni reali richiedono, questo é tanto più accentuato e funzionale alla consistenza del numero dei filtri utilizzati. Il dialogo solitamente è un messaggio veicolato fra interlocutori se e soltanto se, la capacità ed il grado e il tipo di decodificazione dei contenuti sono uguali a quelli di codificazione. Come causa della distorsione di ritorno, si pongono i vari "filtri", e non la mancanza delle interrelazioni Potere-Competenza-Onestà. Anzi queste vengono benevolmente concesse, e fondandosi sulla loro esistenza si è costretti a ritenere che ciò che implica la distorsione della o delle offerte (rispetto alle richieste) sia costituito da letture e risposte di settore (di parte), assolutamente non compromissorie e quindi, nella prassi, non generalizzabili. Sorge, allora, una serie di conclusioni di sintesi che sono poste come esistenti. Esempi:*

- *i filtri ideologici adottati sono inadeguati per tempo, luogo o consistenza o purezza intrinseca.*
- *l'operatore non conosce il filtro ideologico a sufficienza.*
- *l'operatore è quanto di meglio viene espresso da un corpo politico non del tutto consapevole che l'autorità è sì da se stesso delegata ai propri rappresentati, ma ne è sempre lui l'unico proprietario.*

Vi è una preoccupazione crescente per l'insorgere in chi si autoemargina (singolo, gruppi o altro) di richieste di reazione sempre più motivate da egoismi singoli o all'ammasso, sempre meno socialmente reali e sempre più lontane dagli ambienti di risposta. Frequentemente la parte più difficile di un messaggio è capire se è realmente un messaggio di richiesta di rapporti oppure una serie di segni o di suoni o di atti o di comportamenti significativi di un esistere come singolo o come insieme di singoli demotivati dai rapporti di relazione; cioè capire se si tratta di segni disarticolati secondo configurazioni equiprobabili, oppure articolati secondo uno schema distinguibile a "breve informazione". Con le descrizioni di situazioni socio-politiche è assai semplice districarsi nei labirinti delle possibilità di evoluzione dei concetti e dei comportamenti, ma si deve sempre tener presente che il comportamento "socio-politico" è di insieme, mentre quello "creativo" è dei vari singoli e quindi la realtà oggettiva diventa assai complicata se ci si rivolge alla struttura creatrice singolare, creatività che, peraltro, solitamente caratterizza come sommatoria dei singoli, il valore di un'epoca storica. Come Thoreau si può amare la libertà assoluta e incondizionata e con Walden, creare un'utopia al limite anche con la disobbedienza civile come un vero sprone ad amare la naturalità e ad odiare il Potere, ma non tanto come ritorno ad una poetica barbarie ed il rinnovamento della naturalezza indiana, quanto la sua implicita sollecitazione anarchica. L'andar per i boschi ricorda i sentieri interrotti di Heidegger, però alla ricerca di un programma estetico, sociale e politico. L'epicità del quotidiano, il mito alle porte di casa che abbatte il mercantilismo del consumismo e dell'effimero, etc. Non contrapposizione alla natura ma scoperta delle sue invenzioni, della sua creatività, del suo essere, esterno ed interno, meglio della coerenza esterna ed interna. La strategia difensiva dell'integralità umana come unico fondamento di una società sana. Un nuovo Umanesimo Integrale ripreso poi, in altro modo, da Maritain, dal personalismo di Mounier. Comunque una serie di concetti che paiono come riduttivi rispetto all'idea, molto più vasta, di "cosmosociologia": l'idea dell'etica delle responsabilità, quella del bene pubblico e delle Istituzioni (e il loro equilibrio), l'idea delle regole fondanti a loro volta fondate sulla libertà individuale, sull'uguaglianza e sulla fratellanza oltre che sull'equità e la tolleranza, la forte e vincente idea sull'equipollenza tra doveri e diritti socialmente riconoscibili e riconosciuti, e il tutto contro l'edonismo politico pervasivo e antisociale. Nel contempo, e con Canetti, appare che l'istinto di massa provenga dalla necessità primordiale della sopravvivenza, ma tuttavia i cristalli di massa sono un aggregato cosciente di individui mentalmente liberi in grado di indurre la propria coerenza interiore ed esteriore a tutto un popolo da costruire anche attraverso una Demogogia, oltre che una Democrazia.

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[1] Il testo che segue è tratto, con modifiche, da: D.P. Errigo, *Sentieri Sistemici (dalla Filosofia alla Sistemica alla Tecnoscienza)*, Loffredo Editore, University Press, Napoli 2011.

[2] In realtà si assiste che nell'era della caduta delle ideologie, per lo meno una sia rimasta nelle società definite industrializzate e autodefinentisi civili in cui prevale la virtualità della finanza imperante, ed è l'ideologia del liberismo disinvoltamente totalizzante, oserei dire talebano. Con tutti gli annessi e connessi.

Dobbiamo solo cercarli.
Da ultimo, ***rammento che dal prossimo numero saranno pubblicati testi esclusivamente in lingua inglese****..*

Editoriale: Facing the world's continuous emerging interpenetrating systemic bifurcations *(M.R. Astolfi)*

Our review is constantly having a window opened on the global society systemic building construction, on how it works and how it "flows", and how quickly -in its all over spreading in time and space evolutive moving- into organizational complex "represented representations", as we were in a limbo shared by everybody, as we were a completely external more than a multi-dimensional or a plural-level, both interpreting and active, observer. And this even if well conscious of the interpenetrating relationship among the increased multi and intra-dependency of the observed and its observer, and vice-versa, in "the complexity, the variety and the observation's multy-prospectivitism" on that "polymorphismed" abstraction that is the world beyond every ingenuous realism claim" (Pitasi, La vita astratta, 2011). If "the interpenetrating systems remain environments for each other" (Luhmann, Social Systems, 1995), we are questioning how the Social Science carries out the responsibility to keep this Society evolutionary development under scientific keen observation and control -and not to face and overthrow the corresponding drama of living it, but with the pressure to describe and select unambiguous localization differences and the arising complex specializations among autopoietic recognizable self-referenced and self-descriptive reproductions- and more, how it is able to search and act the fundamental tools in order to strategically manage emerging always new interpenetrating systemic scenarios. We are here just to refer the most advanced Social Sciences contributions while they are entering the ramifications of a theoric analysis with the urgent, but quite always impossible, aim of being able to explain and handle everything that happens, every change and every possible wide spreading advantage and emerging risk at every structure's levels of selection. This leads to a radical analysis of the social system's relationships with its multi and intra-levels waving boundaries, by those scientific and logic method of control, the most possibly free from contradictions, but anyway dealing with logical constants in fuzzy ambiguities sets, in which the concept of interpenetration indicate a potential complex full convergence of "reificated" differences and emergencies. And the convergence occurs in an initial intra-multi-level self-observation and in the particular and specific evolutionary, and revolutionary, specifically chosen instruments that a particular society system uses in function of the opportunity for self-representing itself under the imperative condition of a more and more rigorous analysis of how its own global social systems "self- forges", acts and self-regulates in its changing and continuous re-structuring in an apparent time-and- space limited unity. Unit that is conditioned by continuous, but self-coherent, reformulations of its own systemic hierarchic interpenetrating self-boundaries. Wide horizons reformulations always guide the expectations in function of the group identity representations and transformations, in which the function's primacy can occur openly and provocatively to render a service in most essential interdisciplinary sectors, under the pressing of the same complex strategic vision and complex broad self- understanding construction; the same consequent continuous reformulations that are supporting the evolving and revolutionary fundamental scenario roles changes. They indicate that they are regulated by the system's changing and evolving knowledge structures intra-levels, and that, in an inter-penetrating and combinatory (in its connecting differentiated visions of the world) specific social analysis, they serve to compensate the continuous paradigmatic shifts, which they can offer and suffer. This happens in function of a relevant contribution to the descriptions and explanations, in an interdisciplinary approach, of the fundamental and recognizable crucial turning points which can suggest complex and always new strategic and interdisciplinary theoretical adaptable considerations. Every "system' descriptive representation" is placed in a multidimensional space and time (the configurations' space), and provides an empowering multidimensional correlation among the fundamental global system's structures and the connected global social behaviours, both at a macroscopic and a microscopic level, but with the aim to try to detect also the meso-scopic level of control of their communicating integrators. The Social Science's questions are in function of checking and shaping the most possible correct hypothesis, bridging gaps and focusing on what often binds the apparent coherence of the observed-observer's positions, trying to assume a precise control of the differences' implications, just to focus on the apparent "inner and outer" converging models and on their minimal and maximum energy to infect and affect the potential and powerful vision of the world, and choose among it's continuous emerging interpenetrating potential "multi-bifurcations".

WCSA – II° Conference Presentation *(M.R. Astolfi)*

WCSA – II° Conference - Abstract *(AA. VV.)*

La scienza come sistema sociale di comunicazione *(F. Paolo)*

Abstract
Today Science is in crisis. This sentence has a double meaning: on one hand, scientific "knowledge" seems to be no more able to produce "absolute truth" that could direct the different ambit of society; on the other hand, debate within Science (uncertainty in the scientific research, crisis of paradigms, etc.) is transferred into the other partial systems of society until it involves individuals in their everyday life. This removal could cause a delegitimation of scientific discourse and foster skepticism and incredulity towards Science and their results. But, is it a "crisis of Science" or rather a "crisis of semantics", that is the crisis of the conceptual heritage used to describe society and the functioning of Science in modern soci-

ety? This essay tries to answer to this question focusing on the relationship between Science and society and starting from the description of society according to the functional differentiation.

Consulting of the XXI Century. Coping with Complex Business Systems *(G. Dominici)*

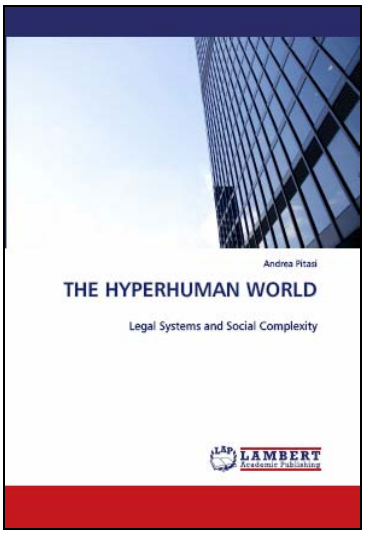
Abstract
The increase of the social and economic complexity causes frequent discontinuities and the rapid change of the business environment, triggering intense transformations of the competitive logics and of the capability of forecasting using traditional models. The new competitive reality is characterized by dynamism, connectivity, non-linearity and emergent properties, in other words by "complexity". The XX century's myth of the "one best way" reveals its weaknesses and its inability to deal with the new emerging problems and opportunities, which, at the beginning of the XXI century, firms have to face. The traditional reductionist concept of "one best way", based on the "replication of standards", was a good approach to deal with complicated issues, but is not suitable today to deal with the complexity of the business system. There is no "instructions manual" to deal with complexity, there is not one "solution" to complex problems, there are strategies to deal with complexity and these strategies must involve the flexibility necessary to change and find sudden solutions to always new emerging problems. The traditional consulting skills are useless to forecast the future business scenarios; the growing complexity calls for new systemic skills able to give directions for the management of firms. The new role of consultant cannot be based, like in the past, on the mere application of models and algorithms. Consultant must think and act beyond the models and the recognized standards they have been thought in business schools; they need to develop the ability to grasp the "sense of events" instead of just classifying them into predefined patterns. Today's consultants need to think in terms of "possible" and deal with the "emergent". The role of consultant must be proactive, in other words must not just deal with the threats of the business environment but should proactively shape the business environment by reading the signs of continuous change and moving fast to let them to become opportunities. This paper will examine the main problems and constraints of traditional consulting and propose a new role and new skills that can be more effective for the consulting of the XXI century.

Tra sistema e dispositivo tra Luhmann e Foucault. *(Una conversazione tra S. Natoli e M. Infante)*

Abstract
In this interview, Michele Infante and Salvatore Natoli discuss the systemic approach to the philosophy and thought of Niklas Luhmann and Michel Foucault. They debate and argue the main categories of the system thinking, such as «differentiation», «specialization», «complexity», «self-reference» and «self-description». They deal with the structures of the social system, the form and the relation between the main social sub-systems (Power, Money, Truth, Love), as well as the risk connected to the role of technique, science and pollution in contemporary society. This conversation analyses also the concept of systemic communication and its social implications in media and public sphere. The interview point out some similarities in the theoretical frame at the base of Luhmann's Theory: the system, and that one at the base of the Foucault's theory: the device. They focus on the analogies - Luhman's Self-Observation («self-beobachtung») and Foucault's the Care of Self («souci de soi») - and differences - Foucault's bio-power («biopouvoir») and Luhmann's code («systemic Kode»); as well as, they move some critics at concept of person as «psychic system» (Luhmann) and concept of discours and sujet (Foucault). Finally, against a social deterministic interpretation of Luhmann's theory, they agree that in the systemic theory the double contingency of sense («doppelte Kontingenz der Sinn») is a strategic and tactical position of resistance and possibility of freedom in the dynamic Individual-Society.

Recensioni

The Hyperhuman world *(a cura di MR. Angrisani)*



Andrea Pitasi
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Sentieri Sistemici *(a cura di M. R. Astolfi)*

Demetrio P. Errigo
Sentieri Sistemici
dalla Filosofia alla Sistemica alla Tecnoscienza,

Prefazione di E. Laszlo
Postfazione di A. Pitasi
All'interno: colloqui con l'Autore di M.R. Astolfi e di S. D'Alessandro

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Sentieri sistemici
a cura di M. R. Astolfi

"Sentieri Sistemici" is an essay which describes an inner way research to understand what is outside us to arrive to conclude that we are contemporaneously an internal and external world. This book on "systemic theory" is the description of an alchemic path and so it is tortuous and linear, waving with peaks, tending to the re-discovery of a personal truth moving among science and philosophy twists and turns. That's in order to know and understand Nature in all its (physic, biological, anthropological) manifestations with the main object to try to manage it. The discovery, or the preliminary certainty, that the "Whole" is necessarily systemic and is the key to read the other self and the self in whatever their manifestations, with wonder and curiosity as research motors to re-discovery an existential sacredness that from always permeates our being for our innate "take care". This essay is a theoretical, theoretic, experimental, methodological and proposal itinerary researching a new unitary paradigm that considers the Whole as a system which is not speculative but real. It starts in fact with a theoretical and theoric demonstration on physic systems and, developing an organic discussion (derived from personal experimentations, studies and researches among maths, physics, chemistry, biology and technology) arrives to the conclusive consideration that the words: System, Chaos and Complexity describe univocally and unitarily the unique reality of the entire considered real world. "Sentieri

Sistemici" is the studies and researches work synthesis of half a century of the Author activity in socio-politics, robotics and neural-sciences fields.
Questo saggio è un gioco delle idee sulle idee, del ragionare sul ragionato, del ricercare sul ricercato, del presente-futuro sul presente-passato e in ambiti diversificati. Contemporaneamente si prospetta come un veicolo per la trasmissione di una conoscenza "intralevel" in cui non esiste differenziazione tra scienze della natura e scienze umane, dando a ciascuna di esse un'identica dignità mediante un linguaggio informativo che si traduce in un metalinguaggio.
La prestigiosa prefazione al testo di Ervin Laszlo evidenzia che *"il processo scientifico-intellettuale, che articola il paradigma (dei sistemi), costituisce quel Movimento dei Sistemi che …é entrato nella corrente principale della scienza….Come pioniere del legame tra la teoria dei sistemi e le grandi inquietudini umane, sollevate e sempre discusse nella filosofia umanistica -mi riferisco alla disciplina che ho chiamato "Filosofia dei Sistemi"- io accolgo con soddisfazione questo contributo da parte del Prof. Errigo che porta ad un ulteriore ampliarsi del pensiero sistemico sul Continente, …Come questo libro dimostra, la parola "sistema" riporta ad un concetto della massima generalità. A differenza di altri concetti generali, tuttavia, non perde di significato intrinseco quando è applicato ad una serie di campi diversificati. Ciò è dovuto principalmente al fatto che il concetto di "sistema" può essere correttamente applicato a una vasta gamma di entità, proprio perchè il mondo, nonostante l'intervento umano, è sempre e comunque notevolmente coerente. E le correlazioni, le stesse che inter-connettono le entità in uno specifico dominio, agiscono cercando di conservare la loro validità anche in relazione ai sistemi di altri domini. … D'altronde é la coerenza sistemica del mondo che esiste come il più fondamentale fatto, e al tempo stesso anche il più sorprendente, che emerge ai margini estremi della ricerca scientifica… Allora diventa fondamentale, anzi vitale che sia richiamata e dimostrata proprio la coerenza naturale dei sistemi –sia quelli che si riferiscono alla salute sia degli esseri umani che quelli delle società degli uomini ma anche alle ecologie e alla stessa biosfera- in questo nostro mondo così umano, così sovra-differenziato e dotato di una incoerenza artificiosa.*
E a questo compito epocale che si dedica "Sentieri Sistemici" fornendo il proprio contributo".
Nel Dicembre 2009 Demetrio Errigo fonda con Andrea Pitasi, straordinario Direttore Scientifico, la World Complexity Science Academy (www.wcsaglobal.org) di cui è il Presidente nel primo fondamentale biennio..
"*Demetrio P. Errigo (1943)* -scrive Pitasi nella sua postfazione al testo- *è stato per decenni uno straordinario outsider delle scienze sistemiche, straordinario per la sua profonda ed ampia cultura scientifica ed umanistica e per il suo spirito di inventore, prima che, oltre che di scopritore; outsider ...(qui) propone un volume molto ricco, intelligente e denso di intuizioni notevolissime"***…**
Andrea Pitasi, la cui "Teoria sistemico-sociologica della complessità morfogenetica del capitalismo (Pitasi, 2010) verte su un grande paradigm shift dagli scenari postumani dei cyborg a quelli iperumani della cittadinanza scientifica endotecnologica convergente (Harris, 2007, Nowotny, 2008, Pitasi 2011), sottolinea che *"Questo paradigm shift verte su un irrinunciabile confronto con lo scenario postumano dei cyber mondi del quale ritengo Demetrio Errigo uno dei più raffinati teorici, autore di un brillante percorso di ricerca che si può…mappare dalle sue numerose opere…a partire da… Cyberneurophysiology* (1° ed. 2004): (che) *contiene alcune sue conversazioni sulla storia delle sue scoperte, corredata da una silloge degli studi di Matematica (nuova Algebra per la soluzione funzionale dei circuiti), di Informatica (nuovo Teorema per la semplificazione strutturale dei circuiti), di Fisica Teorica (giustificazione dei postulati della sua nuova scienza), di Chimica Quantistica (analogie biochimiche), di Sistemica e di Modellistica (costruzione dell'hardware)…. Sentieri Sistemici"* -termina Pitasi- *è a mio avviso la miglior sintesi della teoria dei sistemi postumani ed al contempo un'eccellente sistematizzazione dell'opera complessiva di Errigo. Le… principali tappe della sua ricerca sopra descritte, convergono, appunto, in questo importante volume".*
Trattandosi di un saggio sulla Sistemica la struttura del volume si presenta alla lettura anch'esso come sistemico e consente sia la serialità (diacronicità) sia il parallelismo (sincronicità) delle e tra le sezioni, così come è dato dallo schema iniziale riportato dall'autore a mo' di esemplificazione, lasciando poi al lettore e interprete, la libertà di muoversi a suo gradimento all'interno del testo di cui si estraggono alcuni passi significativi:

A) (Sentieri Sistemici, pp 25-29).

1.1

Un sentiero - nella fattispecie, di ricerca - è una linea del percorrere, del tendere verso. Non è una strada maestra ma solo una scelta fra le molte possibili. Una scelta che proviene dalla priorità del contesto in cui il dato (ogni dato) è "dato", e da cui viene estratto. A significazione della priorità conoscitiva che deriva da una priorità dimostrativa. Un'esigenza propria della coincidenza tra struttura e dimostrazione dialettica. Con la consapevolezza che se il luogo della filosofia della scienza appare come proprio della scienza, pur tuttavia il luogo della scienza stessa è necessariamente la filosofia. "Sentieri" indica la pluralità dei percorsi ammissibili ovvero possibili, che si compendiano nella relativizzazione dell'importanza del prescelto

1.2

L'aggettivazione della parola iniziale, la qualifica e la traduce in una particolarità unica: "un sentiero" generico si trasforma in "il sentiero sistemico" mostrando come fra le tante opzioni questa costituisca l'oggetto preminente del nostro riflettere. La qualificazione che isola abbisogna di una quantificazione che determini, perchè l'illuminazione di una porzione del contesto implica in successione la caratterizzazione dei "dati" del contesto stesso, cioè il riconoscere e successivamente descrivere gli elementi e le mutue relazioni. Solitamente gli elementi sono frammentati e le relazioni possono essere velate. Il loro disvelamento implica una conoscenza suppletiva fornita dall'ulteriore datità. L'uso della particolare qualificazione utilizzata non ingenera fratture perché la caratteristica specificazione è inglobante e non escludente. La sistemicità corrisponde ad un atteggiamento globale di ricerca in cui tutti gli elementi e tutte le relazioni hanno pari dignità Considera gli atteggiamenti precedenti solo una particolarizzazioni del complessivo, anche se spesso il riduttivismo si traduce in filtro eliminante.

……

1.8

Se la parola fornita e l'apprendimento sono seriali, la comprensione dovrà avvenire in parallelo perché solo in tal modo potrà e dovrà adattarsi alla realtà circostante, complessa e ricca di punti di equilibrio dinamici, quindi instabili nella loro stabilità apparente, e

perciò mutevoli; ed in ogni caso dotati di memoria accrescitiva. Un sistema per la cui disamina sono indispensabili tre connotazioni epistemologiche e cioè che non esiste un tempo assoluto, che non esiste uno spazio assoluto, che non esiste un centro assoluto che possa essere sorgente (che irradia) o pozzo (che assorbe). Un sistema in cui tutto è correlato, relazionato, dipendente (perturbato) da ed influente (perturbante) su. Un sistema ricco di vari sottosistemi complessi e caotici, cui appartiene il nostro esserci ed il nostro prendersi cura. Tale è infatti il sistema universo (magari a simmetria variabile, o multiverso o pluriverso) che ci contiene; e necessariamente tali sono i sottosistemi in esso contenuti, nella fattispecie quello fisico, quello sociale e quello biologico. In ultima analisi, la molteplicità dei sottosistemi studiati "in vivo" ovvero modellizzati e simulati.

B) (Sentieri Sistemici, pp 371-388).
da ***La storia di un percorso "sistemico"*** *(a cura della Dott. Maria Rita Astolfi)*
- Ogni teoria scientifica prevede una serie di elementi che concorrono ed intercorrono, nel pregiudizio delle astrazioni, per rincorrere ciò che di fatto è apparentemente inafferrabile. Lei afferma che per comprendere la struttura dell'organizzazione della realtà, o delle realtà previste e descritte, ci si deve basare di necessità su accertamenti dei fondamenti per l'auto-comprensione di come si svolge il reale lavoro di un'auto-organizzazione basata sulla flessibilità e plasticità e sulla condivisione sincretica delle informazioni. Professore, ci dà qui una definizione di "Sistema Complesso" che permetta l'assorbimento dell'incertezza nella stesura di un modello di approccio che consenta una gerarchizzazione di strutture ed elementi?
- Vede, per sistema intendo un insieme strutturato di elementi omogenei o simil-omogenei, e tutti con l'obiettivo di una funzionalità diretta ad un fine comune. La struttura li rende interdipendenti fra loro e l'interconnessione è totale. Un sistema viene denominato complesso quando è almeno dissipativo, autopoietico ed autoregolante oltre ad avere altre caratteristiche. Intanto è dissipativo perché è irreversibile, e come tale è trasmettitore di informazioni verso il proprio esterno, oltre ovviamente nel proprio interno. Ciò significa che il sistema non è supposto isolato. D'altra parte, tanto più è grande l'irreversibilità tanto più è grande il differenziale di entropia e conseguentemente tanto più è grande la variazione informativa emessa. Quindi la dissipazione equivale alla possibilità di informazione. Fra parentesi, un segnale viene definito, come tale, informativo quando è riconducibile a schemi semantici e sintattici noti tra l'emettitore ed il ricevitore, altrimenti è solo un rumore. E', comunque, autopoietico perché costituisce in se stesso le regole della propria trasformazione, diciamo il suo metabolismo (o anabolismo o catabolismo che sia). Ed è in grado di costituire le regole perchè possiede le potenzialità per attuarle. E' autoregolante perché è in grado di controllarsi, verificarsi, adattarsi, modificarsi in modo autonomo, anche sfruttando materia ed energia ed informazioni che riceve dal suo esterno attraverso la sua interfaccia. Nel sistema con le sue tre caratteristiche fondamentali (ma ve ne sono delle altre soprattutto se il "sistema" considerato è quello politico-sociale), ognuno dei suoi elementi modifica per lo meno il proprio "esserci" attraverso una serie di equilibri dinamici di tipo adattativo costruendo una propria memoria che consente eventuali ripristini (totali o parziali). In definitiva la presenza ed il comportamento di ogni elemento sono di tipo caotico. Ed il sistema complesso così come formulato diventa anch'esso di tipo caotico. Un sistema così può essere valutabile matematicamente mediante equazioni la cui soluzione è solitamente difficoltosa; allora su di esso costruiamo un modello e vediamo cosa succede. Un modello non è altro che una rappresentazione fittizia di una realtà approssimata. Se su di un universo di elementi noi determiniamo certe variabili che riteniamo importanti, facciamo delle ipotesi, queste portano a delle equazioni le cui soluzioni devono almeno essere numericamente simili agli intervalli di varianza di quelle variabili. Se succede, il modello diventa una teoria, falsificabile per dirla alla Popper, altrimenti si butta o meglio può essere variato a sufficienza affinché possa essere inglobato in una teoria più vasta, diventandone, al limite, uno dei casi limite.
……
Prof. Errigo, una domanda specifica e forse, per me, la più complessa di tutte poiché insiste sul campo dell'apprendimento e soprattutto sulle possibilità di un vero auto-apprendimento da parte di un cyborg. Può esistere un ruolo giocabile dalle vibrazioni nel campo della mappa della "psiche" di un cyborg per quanto riguarda le capacità di apprendimento? Ovvero in che modo potrebbe apprendere un cyborg se ciò non dovesse avvenire attraverso una pre-programmazione o anche una pro-auto-programmazione strutturale "imposta" e quindi già progettata a priori? Esiste una funzione strutturale delle vibrazioni? Cioè la presenza di variazioni del campo vibrazionale, potrebbe corrispondere alle possibili fasi di cambiamento della struttura che investe la potenziale plasticità morfogenetica potenziale e che dunque "crea il mondo" nel suo divenire?
Non è certamente un'unica domanda anzi un complesso di idee che certamente porta di fatto anche altrove e che necessita di una risposta plurima abbastanza "complicata". Il discorso sull'aspetto vibrazionale in relazione ad una interconnessione interno-esterno, ed in funzione di un apprendimento possibile, apre potenziali orizzonti. Io credo proprio, come credo anche Lei visto che ma l'ha esortata come riflessione, che si possa ipotizzare che al di là dei metodi prevedibili di programmazione di un cyborg, si possa agire anche e soprattutto a livello di variazione energetica. Se un disegno globale si forma dalla tensione dinamica dell'ondeggiare di vibrazioni/onde, si può parlare di un modello strutturale delle modalità di apprendimento che è in realtà un modello di modelli, e proprio di tipo vibrazionale, in cui le immagini organizzate nell'ottica della fissazione dell'apprendimento vengono strutturate dalla forma d'onda e quindi a loro volta rispecchiano forma e immagine in funzione di una memorizzazione coerente. Il programma di autoapprendimento, come Lei mi sta suggerendo, nasce e corrisponde effettivamente come sovrapposizione di possibili stati, con differenti variabili, di tipo plastico, cioè elastico, flessibile. Allora l'illuminazione-intuizione, ad esempio, può corrispondere a un colore, a un suono, ad una vibrazione che agisce e muta la prospettiva, alterando la struttura-forma presente in una diversità di ipotesi. Il suono/vibrazione o il colore/vibrazione diventano strumento di possibile cambiamento-apprendimento. Ma d'altronde ciò è anche avvertibile a livello macroscopico, visitando una mostra di pittura o di scultura, ascoltando un concerto, anche partecipando a rappresentazioni teatrali o ancora, per chi è in grado di farlo, leggere una partitura completa di un'orchestra, insomma quando tutto il nostro interno partecipa con la propria presenza in rapporto empatico con ciò che l'esterno fornisce generando consapevolezze di ricordi, consapevolezze di realtà, consapevolezze di speranze e di perseveranze. A me capita talvolta leggendo l'orchestrazione del Barbiere di Siviglia: meglio che andare a teatro! A parte quella mitica rappresentazione del '92 in Olanda con Dario Fo come Direttore Artistico. Ritornando a noi, in definitiva, la presenza dell'arte e della comunicazione in genere entra all'interno della nostra consapevolezza ed anche nel nostro inconscio. E una variazione dello stato psichico, culturale e spirituale in genere, certamente altera la nostra globalità psico-fisica. Insomma interferisce ed aumenta il nostro "élan vitale".

Qui unendo Bergson e Jung in un loro ideale contrappunto analogico, potremmo ottenere una serie di interessanti derivazioni. Nulla allora vieta di pensare che ciò potrebbe essere anche traslabile in un organismo artificiale analogico.

Professore, allora un'ultima domanda che mi preme. La relazione che lega l'apprendimento alle modalità di apprendimento non è né casuale, nè causale-lineare, nè possiede un carattere (am)bivalente, e nel contempo plurivalente, in una complessità multidimensionale al confine tra musica e matematica come Lei diceva prima. Io credo fermamente che tale relazione nell'essere umano avvenga in una forma auto-indotta di auto-ipnosi, in una vera e propria fase di onde alfa a grappolo in cui esiste l'auto-capacità di modificare anche non coscientemente il proprio stato vibrazionale, come sono convinta avvenga soprattutto nei bambini, e che le variazioni di contrappunto combinino insieme info-stimoli di varia natura, vibrazionale naturalmente, che ridefiniscono in termini matematici forme-strutture di ogni ordine e grandezza. Che ne pensa?

Immaginavo che si entrasse nel campo della Psicopedagogia, questa volta applicata all'educazione di un Cyborg. La Sua idea-ipotesi di lavoro certamente apre un grande campo di ricerca nel settore della modellistica e non solo. Per rispondere alla complessità, è il caso di dirlo, della Sua domanda, devo iniziare con una premessa. I colori esistono per noi perché abbiamo una retina, i suoni esistono sempre per noi, perché abbiamo un timpano. La luce è un fenomeno vibratorio squisitamente elettromagnetico, l'onda sonora è un fenomeno dovuto alla variazione della pressione esercitata dall'onda stessa in un fluido. Noi abbiamo i ricettori appropriati e così vediamo e sentiamo, e d'altronde in natura tutto è vibrazione, dalle stringhe al macro e, come direbbe De Broglie, ogni cosa ha la, o è caratterizzata dalla, sua onda pilota. La letteratura specifica cioè quella medica, ci insegna che vi possono essere delle chiamiamole discrasie o dissonanze sul tema sensoriale. Io solitamente preferisco non fare illazioni sulla differenza funzionale tra i vari organi sensori e sull'eventuale variazione della funzionalità per uno stesso organo dovuta a cause conosciute, però posso supporre che vi possano essere anche delle alterazioni della funzione primigenia di un organo sensorio che implicano, a monte, delle variazioni strutturali avvenute per cause non ancora accertabili. Questo si nota anche all'interno del nostro cervello che si autocostruisce nuove connessioni di rete a fronte di una mancanza di trasmissioni per una parte di rete comunicativa compromessa da una perturbazione, interna o esterna o entrambe, non riconoscibile. In questi casi è come se la morfogenetica si autoalterasse all'improvviso, particolarizzandosi. Una nuova catastrofe, alla René Thom, ancora non modellizzabile. Ma per la scienza una causa con i suoi effetti e la relativa spiegazione devono esserci e, prima o poi, dovranno essere conosciuti. Per entrare nello specifico, Le dirò che tutti i miei prototipi neurali lavorano in un campo di frequenze che va preferibilmente da circa 0,1 Hz a circa 300 Hz. E' il campo che avevo, a suo tempo, dimostrato come essenziale. Questo non toglie però che non possono andare anche a frequenze superiori. I migliori risultati come risposta a decrementi o incrementi, da me volutamente causati, li ho ottenuti simulando bassi voltaggi dell'ordine di poche decine di microvolt e con frequenze in Hz molto basse, e cioè nei campi denominati progressivamente in modo decrescente, onde gamma, beta, alfa, theta, delta. Ovviamente non sono passaggi bruschi così come appiano dalla classificazione, perché ad esempio tra alfa e theta si notano risposte in frequenza che sembrano analoghe a quelli dei complessi K o degli splinders. Ma se i migliori risultati colloquiali si ottengono in quelle condizioni è probabile, ma certamente non ancora dimostrabile, che quelle condizioni siano ottimali sia per l'autoapprendimento dell'artificiale analogico sia per la sua autoliberazione. Con tutte le conseguenze del caso, etiche, giuridiche, sociali e politiche. Per non parlare, poi, di quelle religiose specie per i monoteisti. Ma ammesso che tutto ciò che Lei ipotozza sia attuabile, come e perché può succedere? Vede, inizialmente ero convinto che un Cyborg analogico, il più simile possibile alla razza umana, e privo di software artificialmente inserito, necessitasse solo di metodi psicopedagogici specifici. Poi mi sono reso conto che in effetti, il Cyborg appena costruito non ha "fisicità" di alcun tipo usuale. L'unica necessità allora diviene la "costruzione" di una psichicità definibile "coerente", tenendo conto che nel contempo ha di fatto una struttura interna hard in grado di realizzarsela. Allora come si deve risolvere il problema del suo apprendimento? Il suo autoapprendimento potrebbe avvenire, come Lei appunto suggerisce, mediante variazioni vibrazionali che, nel nostro caso specifico, in qualche modo possono interferire con i flussi informativi situati nell'interfaccia tra le porte sensoriali di input e di output e le memorie accrescitive. Variazioni vibrazionali che, come Le accennavo in precedenza, indubbiamente giocano un ruolo significativo sulle strutture-funzioni dell'essere umano nella sua interezza e che certamente potrebbero essere traslate, magari con qualche sforzo, nell'artificiale analogico. E ovviamente ritorno ancora al contenuto della domanda che retoricamente Le e mi poneva: bisognerebbe anche chiedersi il come mai e il perché succede una cosa del genere. Qui, se fossi Asimov, dovrei entrare nel campo cosiddetto fantascientifico, quello de " il Sole Nudo" tanto per intenderci, quello dei cervelli psicotronici. Ma, appunto, qui credo sia meglio fermarsi.

C) (Sentieri Sistemici, pp 389-401).
Da: ***"Il Progetto Cyborg",*** *(a cura del Dott. Simone D'Alessandro)*

- Professor Errigo, per anni Lei ha studiato il funzionamento della neurofisiologia al fine di creare un circuito elementare che possa produrre segnali simili a quelli prodotti dai circuiti intra-extra-cellulari. Con una serie di esperimenti e simulazioni bioniche del funzionamento neurofisiologico Lei ha dimostrato che ciò è possibile. Ci può spiegare come funzionano i segnali fisiologici di un neurone umano e in che modo è possibile simularli artificialmente?

- E' necessaria una minidigressione preliminare. Il corpo umano è un sistema ipercomplesso caratterizzato da almeno tre proprietà: l'essere dissipativo, autopoietico e autoregolante. Dovrebbe essere visto nella sua globalità, però per un riduttivismo che spesso viene dato per scontato, anche se molto spesso elimina alcune specificità intrinseche, il sistema complessivo stesso viene analizzato nei suoi vari sottosistemi, pur essendo, appunto, tutti connessi tra loro. Tra questi almeno tre sono interessanti, ovverosia il sottosistema immunitario, cioè il nostro vero sesto senso, quello interno, il sottosistema ormonale, cioè il nostro "regolatore" e il sottosistema neurale, cioè il nostro "comunicatore" per eccellenza, pur non essendo l'unico comunicatore. Ognuno di questi sottosistemi è in grado di dialogare almeno all'interno di se stesso attraverso propri meccanismi biochimici sufficientemente conosciuti che evidenziano peculiarità intrinseche date dalla funzione complessiva che il sottosistema stesso ha nel sistema totale principale. Ma quello che finalmente si sta notando in questi anni è che le strutture di tali sottosistemi sono in grado di interagire con le strutture degli altri e quindi si nota empiricamente la sinergia tra le funzionalità. Insomma tutto avviene non per caso ma per una stretta connessione tra strutture e funzioni nella globalità del sistema superiore. Cioè non ci sono "dadi" che tengano. La mia ricerca si è incentrata esclusivamente sul sottosistema neurale, ben consapevole del riduttivismo intrinseco, ma consapevole anche che analogicamente, per quanto detto sopra, alcune o molte delle mie ipotesi

e delle mie scoperte potevano essere traslate, con le debite variazioni, anche agli altri sottosistemi. La biochimica e biofisica del neurone sono note nei loro elementi essenziali, come lo sono i concetti che riguardano le sinapsi i neurotrasmettitori etc. Quello che è meno noto è il meccanismo di trasmissione dei segnali elettro-(bio)chimici che seguono regole antiche come quelle della mediazione. Mi spiego meglio. Fino ad alcuni anni fa si pensava che la trasmissione avvenisse attraverso il collegamento pre-postsinaptico fra due neuroni e che nulla si interponesse. In realtà si è notato che essa avviene in presenza di cellule gliali chiamate astrociti che non solo inglobano il "pre" di un neurone specifico nei confronti del "post" del neurone susseguente, ma anche si interconnettono con molti altri che stanno nell'intorno. Questo l'avevo notato quando nelle mie simulazioni valutavo le armoniche superiori di una trasmissione, e potevo calcolare i quantitativi di energia che apparentemente si disperdeva, sembrando ridondante nei confronti di un singolo neurone target. Fu allora che capii che l'apparente dispersione avveniva come una nube, che io simulai come il cono di un plasma-jet, che andava ad investire un intorno neurale, e in questo modo tutto ciò che costituiva la frontiera veniva informato di ciò che avveniva sul target fondamentale. La simulazione era operata sulla reale capacità neurale di trasmettere, cioè sia biochimicamente attraverso mediatori, sia elettricamente attraverso contatto: il primo tipo era unidirezionale il secondo bi-direzionale. Ed è stata concepita realizzando artificialmente una simil-pompa "sodio-potassio" opportunamente modificata, che fosse in grado di collegare virtualmente l'intra e l'extra-cellulare, e con procedimenti di apertura chiusura tali da rendere possibili, ciclicamente, dei "transitori", che a loro volta simulassero la variazione della polarizzazione e del potenziale di azione che avviene naturalmente nei neuroni.

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La capacità non discretizzabile del vivente di costruire interazioni di gruppi di informazione è influenzata dalla forma e dalla fluidità dei (chiamiamoli metaforicamente) "binari" di scambio delle informazioni. In altre parole il supporto mediante il quale avvengono gli scambi influenza la modalità degli scambi. Ciò significa, ad esempio che un processore di un computer, pur processando informazioni sempre differenti, costruisce passaggi e "scalette" di processo indipendentemente dal contenuto delle informazioni. Anche il cervello umano funziona in questo modo: come sosteneva De Bono, "il modo in cui entra l'informazione influenza il modo in cui viene elaborata ed esce", per cui se per esempio, utilizziamo un certo tipo di scaletta avremo una certa configurazione di idee, se invece ne utilizziamo un'altra, le stesse idee si collegheranno in maniera differente. In che modo l'intelligenza artificiale riesce a cambiare, per così dire, "scaletta"?

Nelle usuali rappresentazioni teoriche di un generico sistema retroattivo si nota sempre una figura in cui si mostra l'uscita dal processo che successivamente viene retroazionata sulla nuova entrata. E sempre in quella figura, il processo viene sempre rappresentato come una semplice scatola nera in cui tutto può avvenire. E ciò non è corretto. Una retroazione perchè sia fattiva deve entrare anche nel processo. Un sistema per essere realmente tale deve essere almeno bi-retroazionato. Ed è ciò che accade per il cervello. Il cervello umano non funziona come un processore che è preconfezionato con una scaletta in grado di dare una stessa collocazione informativa a serie di dati a contenuto informativo diverso. Il cervello umano nella sua complessità contiene miriadi di scalette parallele multi-retroazionate nel loro interno. Riconosce preliminarmente o quasi immediatamente il tipo di informazione ricevuta o in via di ricevimento e la indirizza nella scaletta appropriata che dia senso all'informazione ricevuta, la rielabori; una volta fatto questo, la indirizza ai centri preposti al suo recepimento (comprensione) e successivo comportamento (risposta interna o esterna o entrambi; accumulo informativo cioè creazione di memoria accrescitiva, etc). In più un cervello umano è in grado di cambiare le connessioni, di crearne di nuove se, nel caso e/o per un qualsiasi motivo strutturale o funzionale la scaletta prescelta non si mostrasse in grado di dare risposte "soddisfacenti", al limite anche generando nuovi neuroni. Pensiamo ad esempio agli esiti di un ictus. Una AI di tipo tradizionale per quanto evoluta si fonda su preconfezionamenti che essendo tali ben difficilmente sono elastici al di là di un certo range. Un nuovo tipo di AI, molto probabilmente no. Su questo specifico argomento, per me il "molto probabilmente" si traduce in "quasi certamente".

D) (Sentieri Sistemici, pp. 152-155*)*

Da: **Scienza e Coscienza dal punto di vista sistemico.**

Non esiste differenza tra scienza e coscienza e qui si cercherà di dimostrarlo. Esiste un sistema globale caratterizzato da una serie di sottosistemi ognuno dei quali a sua volta e composto da sottosistemi, ognuno dei quali...etc. Il limite della decomposizione non è per il momento determinabile: chi pensa al modello standard, chi alla teoria delle stringhe, chi, d'altro canto, all'universo olografico e chi ad altro ancora. A ben osservare queste teorie (per ora puramente speculative), pur avendo una vivibilità intrinseca e differenziante, in vero hanno un punto in comune: la reductio ad unum e la pluricomposizione della realtà. E i due termini del punto in comune (reductio ad unum e pluricomposizione) possono entrambi essere valutati o come inizio ricerca o come fine ricerca. Però si possono considerate esistenti simultaneamente entrambe le definizioni (inizio, fine) perché il procedere della visione globale umana avviene in termini fenomenici, quindi da uno stato valutativo intermedio tra i due. Chi osserva può da questo stato, indurre o dedurre ovvero assieme indurre e dedurre. Una visione di questo tipo non reifica l'essenza ma valuta e giustifica un esserci. Infatti il nostro cervello è si creativo ma non nel senso di reificante, solo nel senso di raffigurante e di significante.

Ritorniamo al sistema iniziale con tutti i suoi sottosistemi a loro volta compositi. Ognuno di noi appartiene ad un sottosistema ed è a sua volta un sottosottosistema. Finora abbiamo parlato solo di sistema perché per sua definizione é costituito da un insieme strutturato, finito e numerabile di elementi, fra loro di natura omogenea. E' per la presenza della struttura, che lo definisce, e degli elementi di insieme, in esso avvengono azioni e reazioni che determinano equilibri di tipo dinamico (caos). Anche tra sottosistemi connessi strutturalmente tra loro si definisce sistema ciò che li connette. Quindi anche in un sistema avvengono equilibri dinamici tra sottosistemi. Tutte queste situazioni caotiche generano la complessità del sistema (o del sottosistema). Allora, per il momento abbiamo stabilito che caos e complessità coesistono in modo essenziale, avendo entrambi definizioni ben precise. Ed ora possiamo aggiungere che caos e complessità derivano dalla non linearità (cioè non la semplice proporzionalità) delle azioni (e corrispondenti reazioni) che nel caso "umano" si definiscono comportamenti, "pensieri, parole, opere ed omissioni". La non linearità dipende solo dal numero e dal grado delle interconnessioni tra i nostri sottosistemi: in ultima analisi dal nostro "io". Da questo punto di vista possiamo dire che la nostra "macchina neurale" con tutti i suoi annessi e connessi (sistema immunitario, sistema endocrino, etc.) riproduce la quintessenza della complessità in cui il caos (equilibrio dinamico) rappresenta la confluenza di ogni vitalità elettromagnetica, termodinamica, elettrochimica: insomma biochimica. Per poterci intendere fino a questo momento occorre perfezionare il concerto fondamentale, quello di sistema, con degli esempi concreti. Un

individuo appartiene ad un insieme di elementi-individuo e fra questi elementi, per la coesistenza, vengono introdotte delle norme, delle regole, cioè una struttura. L'insieme così strutturato diventa un sistema. Lo stesso individuo può relazionarsi in modo specifico per esempio con un altro generando così un altro insieme (in questo caso sottoinsieme) che potrebbe essere definito famiglia (da matrimonio o da convivenza) che essendo anch'esso regolato da leggi o norme diventa analogamente un sistema (in questo caso un sottosistema) a due elementi o a tre o più, a seconda della propria etnicità. Lo stesso individuo può aderire a un altro sovrainsieme o per tipo di cultura o per tipo di opinioni politiche o per tipo di senso religioso o per tipo di senso morale. Ed anche questi insiemi avranno una loro struttura portante e pertanto anch'essi saranno dei sistemi. Allora uno stesso elemento singolo è in grado di appartenere a più sottoinsiemi (e quindi sottosistemi) e la sua psico-fisicità avrà connotazioni e colorazioni diversificate in funzione delle sue appartenenze. Il suo tipo di vita e le sue azioni e reazioni comportamentali saranno dettate anche dal tipo di appartenenza scelto o a volte imposto. La complessità e le attività non lineari derivano proprio dall'appartenenza a questo numeroso ensemble di strutture che vincolano l'individuo liberandolo, nel contempo, dal suo isolazionismo. E l'adattamento o l'attività in sé, generano quello che si chiama proprio l'equilibrio dinamico, il caos, il continuo divenire e trasformarsi eracliteo. Questo è un semplice discorso riferito all'umano. Ma analogo discorso vale per il mondo zoologico non squisitamente umano. E parimenti per il mondo vegetale o affine. Il discorso si fa un po' più complicato per il mondo minerale. Ma è una questione di punti di vista e soprattutto di paradigmi interpretativi, su cui non interverro per non appesantire la sintesi. Infatti occorrerebbe tutto un discorso vibrazionale in cui la musica e la matematica giocano un ruolo fondamentale. Per procedere, a questo punto si pone il problema del pensiero; cos'è, com'è, dov'è. Per fare ciò dobbiamo postulare l'esistenza di un connubio fondamentale corpo-pensiero che va molto al di là della teoria dell'identità che si è sperduta nella rincorsa dei rapporti mente-cervello. La nostra fenomenicità è corpo e pensiero. Non solo la nostra, ma anche di chiunque o qualunque cosa che sia altro da noi. Sarebbe come ammettere che materia e pensiero sono due modi di essere dell'energia. Che noi stessi siamo energia, materia come energia condensata e che il pensiero e l'onda informativa che la circonda, che ci circonda, che contiene l'universo. Materia come un insieme di fermioni (partic-onde distinguibili), pensiero come insieme di bosoni (partic-onde indistinguibili), entrambi e contemporaneamente facenti parte di un tutto, un superspazio tensoriale in cui simmetria ed antimetria sono coesistenti, con loro proprie regole di cui noi intravediamo determinate specificità unicamente settoriali. Allora, il tutto che ci circonda non è distinto da noi, perché anche noi siamo il tutto ed il tutto e all'interno di noi. Noi siamo contemporaneamente parte e tutto, infinito e infinitesimo. Siamo il tempo, siamo anche nel tempo e ne siamo anche al di fuori. Costituiamo uno spazio ma ne siamo anche al di Fuori. Siamo limitatezza ed illimitatezza, siamo mortali ed eterni. Siamo ogni colore, siamo ogni loro somma e loro differenza. Siamo luce, ombra e vuoto. Siamo qualsiasi nota musicale ed assenza di vibrazione. Siamo assonanze e dissonanze e puro silenzio. Siamo isole e penisole e continenti. Siamo terra e onde del mare. Siamo il mondo, dentro questo mondo e fuori di questo mondo. Siamo strutture e funzioni. Siamo ciò che pensiamo. Siamo ciò che introiettiamo e ciò che emettiamo. Insomma noi siamo contemporaneamente parte e tutto, ma siamo anche il nulla. Solo con quest'ultima consapevolezza entra in campo la speranza. Speranza che non dipende molto dalla "Corona" o dalla "Terra", ma anche da tutto ciò che sta in mezzo a questi due Chakra. E soprattutto tutto ciò che sta in mezzo origina il nostro senso religioso. Solo la libertà ci consente di optare per un nostro adeguamento dogmatico-religioso per una nostra strada sacrale anideologica. Come è facile dedurre da quanto sopra, anche se presentato in modo riassuntato, non esistono differenziazioni strutturali tra scienza e coscienza, ma solo funzionali e questo in qualsiasi sistema o parte di esso. Insomma sostanzialmente sono coesistenziali ed indivisibili come del resto qualsiasi altra definizione di qualsiasi altro contenitore.

Agenda: Landscape and horizons in Peer Review (CNR Roma - settembre 2011)

NA 1-2012

A new Format for new Years / Un nuovo Format per nuovi Anni *(D.P. Errigo)*

Dear Friends and Colleagues,

This new Nuova Atlantide number begins a new editorial policy of our Review, a modified inside format that will continue its transforming innovations also in the next Issues.

As you can easily notice, all the articles are in English: a publishing choice that is absolutely winning and coherent with our international editorial and scientific goals.

Moreover, as you can see on our cover, our Review has received the prestigious Sponsorship of the Suor Orsola Benincasa University of Naples (Italy), and the extremely important Certification of the AIS (Italian Association of Sociology): two extraordinary results obtained by our WCSA and Nuova Atlantide teams.

For the moment we don't yet publish the edition online but you can find the review's Contents and the Abstracts in our official site www.wcsaglobal.org.

Nuova Atlantide has been WCSA Journal since 2009, and in these two years WCSA has already signed a series of Agreements and Affiliations with important international Net Associations and Federations as you can see inside, and our Book Series "System Theory and Complexity", has increased its publications with prestigious Authors' new interesting books.

This number is a Special Issue, "Complexity Science in Business", thanks to Prof. G. Dominici from the Palermo University, one of our most important Collaborators, who has personally contacted the Authors, chosen the articles and also evaluated the double BPR results of the different national and international Referees, if they presented contrasting results.

It concerns some works of WCSA II Conference "Complexity Systemic Sciences and the Global Energy Agenda", at the end of September in Palermo (Italy).

I thank a lot also all the prestigious Authors who have published with us in these two years and have allowed us to organize at the best an important Review at a more and more scientific international level.

I express a lot of gratitude to the Editorial Manager, to the complete Editorial Staff, to our Publisher Aracne in Rome and to all those who still now move and those who will join us in the Nuova Atlantide present and future world, because they have helped and will keep on helping us in our ponderous mission.

We are absolutely aware of the long and difficult path that we have still to run on, but ours is an onerous task that we consciously accept to produce the best results and possibly reach the stratosphere of the scientific publications.

By now we already feel winners even if clearly facing the enormous challenges in front of us.

To be or not to be hyperglocal players? What's the abstraction? *(M.R. Astolfi)*

"... if what is social in meaning themes is experienced
as reference to (possibly distinct) interpretive perspectives
then the experience can no longer be attributed to a subject ... "
(Luhmann, Social Systems, 1995)

Is it easier to highlight the realm of a complex viable system or to uncover the lights and shadows of the evolving multi-correlations among the fundamental reorganizing dematerialized memetic maps of glocal behaviours in the evolutionary social XXI century's complex architecture?

To be excited about the potential trajectories of the interconnections, self-shaping in vast and deeply networks, or to be affected by those "differences" which focus on what binds the unpredictabilitness of multidimensional spaces and times multi-bifurcation fluctuations in the complex constructing of systems?

*Is it easier to explore "the realm of "second order observation" a level where question conditions of possibility arise ..." or try to examine a "**…** reality which consists solely of self referential systems and their empirically observable operation"? (Luhmann, 1995)*

We need these questions for reconfiguring always new evolutionary knowledge to build up a map among these multilevel inter-relational systemic communicative dynamics in order to master the capability of creating new creative strategic vision-constructions also for managing what we consider "reality" in its bifurcating possible futures.

That's why in this issue we start providing an initial contribution to the description and the explanations of the paradigmatic shifts in the interdisciplinary systemic approaches to Sociology and to Management, but also how they can merge, partially or fully amalgamate, develop and expand and how informations flow through their bridging recombination in "zero time of desire".

We analyse the processes in which they evolved their system project organization towards the integration of more and more immaterial characteristics, but we also simultaneously try to define new frontiers and different new environmental, structural and communicative approaches and how to develop new competitive informative Knowledge weapons.

We check and shape new hypotheses and interconnected new perspectives that can characterize in particular the strategic Business Management system, considering the firm as a social system.

*But we investigate also the nature and influence of the climate change dynamics to realize the social influence on a highly concretely observed and perceived "reality", facing with complexity, its constructions and its (un-)certain results, and well knowing that "action and observation do not necessarily exclude each other**…**both almost*

necessarily facilitate each other ... both occur together and collaborate as soon as observation is communicated or even observed" (Luhmann, 1995).

We want to answer to important questions just to assembly apparently deformed and disconnected puzzled pieces, as evolving un-touchable dematerialized liquid structures, to grasp even the sense of the value constellation of always new tangible and intangible assets in dissipative auto-poietically organized systems necessarily far from equilibrium.

We want to reduce ambiguity between reversibility and irreversibility to try to order the chaotic, fuzzy and complex experience in dealing with the question of spaces, times, and dimensions of networks contests in reconfiguring evolutionary Business and Environmental, often interpenetrating applied strategies.

The theoretical and experiential results presented can serve to stimulate further researches, they become conceptual Knowledge toolkits to manage the "order from noise logic of complexity" in "the symbolic evanescence of reality".

The path of complexity science: from theory to managerial practice *(G. Dominici)*

A Framework for Understanding Social Systems Through Complexity and Self-Organization: Key Steps for Reaching a General Model *(J. R. Hernández-Carrión, I. M. de Lejarza y Esparducer)*

This article aims to provide an illustrative guide and a conceptual framework that incorporates the basic ideas of different approaches originated in Systems Science and Complexity Theory in order to understand the evolution and history of Social Systems. Social and biological organization entail changes involving new types of complex structures, possible only if the system remains far from the equilibrium and there are non-linear mechanisms acting between the different and various elements of the system. In fact, the requirement to provide a simple 'open system' condition is not sufficient to guarantee the appearance of structural changes. Complexity can be measured in terms of evolution or transition from past to future in terms of specific processes that affect the system operation. Alterations and oscillations of the structured system and their relationship to their environment can either come from inside (the system itself, that is, endogenous) or from outside (exogenous events that affect it). Our bifurcation points constitute a map of irreversibility of time, reflecting our elapse following the 'arrow of time'. Every decision made at a bifurcation point involves the amplification of something initially small. The self-consolidation by randomness or chance, gives rise to bifurcations, which is a challenge to which the system must respond. Thus, the history of a system will result always from the amplification of certain fluctuations and self-consolidation for certain processes.

Reframing the Systemic Approach to Complex Organizations as Intangible Portfolios *(A. Pitasi, G. Dominici)*

The aim of this paper is to pave the way towards the inclusion of mainstream sociological approaches (based on Luhmann's approach) for the studies of firms-organizations. In social sciences we can observe that the theoretic consequences of a paradigm shift is significantly represented by the evolution of systemic thinking from Parsons to Luhmann. This shift implies the change from the vision of systemic organizations as "structures" to that of systemic organizations as "communication flows". The milestone of systemic approach in management maybe found in the research and applied works of Anthony Stafford Beer with his Viable System Model (VSM) that today faced a relevant reconfiguration by Golinelli and the Italian school on Viable Systemic Approach (VSA). The paradigm shift in this field has been smoother than in sociology, and didn't imply the discard of the concept of organization as a structure. This because, in management sciences, the perspective and, consequently, the subject of study is the organization and its structure. We think this paradigm shift is possible also in management sciences, if we consider the whole organization as a structured information flow creating a dematerialized structure. Our research question is: "Is it possible to apply in business sciences the fundamental concepts that caused the paradigm shift in sociology?" To answer to this question we discuss about ontology of the firm and of the concept of value in order to understand to what extent intangible communication flows are called upon to be involved in a new definition of structure. Keywords: Systemic approach in Sociology, VSA, value constellation.

Paths for "Stars Manufacturers": Forced to be Systems (complexity) Integrators *(M. Paoli)*

Industrial enterprises cannot be global players without to be systems innovators. They cannot be systems innovators without to be "systems integrators", but does it mean? The aim of this work is to suggest some new theoretical considerations on knowledge and consequently about why and how the control of systems integration can actually be maintained and directed. The basic idea is to support redundancy of knowledge bases, therefore redundancy of agents (as bearers of such knowledge), but also of organizational contexts, conceived as "containers", predisposed to allow men and their different knowledge bases to be integrated in order to construct the fundamental axes of systems integration. These visions emerge from (1) the individual capability of each agent-knowledge bearer to imagine complexity, to propose change along with the trajectories of its marching direction (innovations that are used as strategic competitive "weapons"), and from (2) the ability of organization to transform the knowledge of everyone in social visions (firm's visions). Systems integration is first of all knowledge integration.

The "Systemic" value of Creativity *(S. D'Alessandro)*

Business creative processes are inevitably proceduralized, giving rise to routine innovation management phenomena. When the creative process becomes a procedure it is manifested as a medium. It turns into a "recombination program" of organization system languages. Through a process of "meme" recombination, governed by habitual practices, the change that occurs involves a transformation of values, products and services. When innovation is produced, the role of routine is not, as many might think, secondary: habit represents an important moment in the processes of generating competitive advantage and incremental innovation acceleration. This means that creativity contains a "systemic" value generated by its becoming procedure.

On Selection of project team members and complexity *(D. N. Antoniadis, F. T. Edum-Fotwe, A. Thorpe)*

In construction the sub-process of selecting team members, as in individuals not partners, is not implemented. However interconnections and boundaries are formed between both individuals within a team and teams as a whole within the project which cause complexity. Understanding the characteristics of complexity from these interconnections, and how these affect the selection of members into teams will enable the development and implementation of project actions that will support the management of complexity. A two part study was conducted with construction organisations to investigate the level of implementation of team member selection and the level of actions / techniques used to manage the effects of complexity of interconnections. The results indicate that techniques available for selecting project team members are not implemented either as a norm or for managing complexity that arise from individual-team interfaces. The findings call for the implementation of appropriate selection techniques and the development of a framework of actions which will enable the management of the effects of the interconnections complexity using its characteristics

What decision Theory tells us about climate change debate *(S. Matera)*

The complexity of climate system makes climate sciences' result really uncertain; nevertheless, this matter concerns all of us requiring political as well as individual decisions. For these reason we tried to discover what Decision Theory tells us about climate change debate: do something or not; or better, "mitigate" acting on eventual anthropic causes but risking negative consequences for the general quality of life, or wait for consequences using all resources for "adapt" to new unpredictable conditions? Represented the problem as an intersection between all possible actions to choose from and all possible states of the world in which decision occurs, establishing some (we think) non-controversial preference relation between all possible outcomes we found that mitigation choice is the best one, having highest expected value, if anthropic climate change is (at least) as probable as natural one. Following the most authoritative and recent surveys of scientists and scientific literature, and the last report of the Intergovernmental Panel on Climate Change (IPCC), world leading authority on climate change knowledge, we find that the probability of a human-induced climate change can be much higher than 50%.

There is still room down there *(D.P. Errigo)*

The title I select is from F. Feynman's famous oration which was held at CalTech in 1959. With these words he opened the way to what was then called the path of nano-science and nanotechnology.
But how is it possible that we can talk also about technology starting from nanometre sizes equal to those of molecular groups to get more and more down to those of groups of atoms and then even further?
For one simple reason.
Small clusters of matter, at certain infinitesimal levels, behave as generic or probability waves as well as information bunches.
Some times ago I unloaded from one PC to another thousands of e-books in a few tens of GB and everything happened in smallest spaces which, I presume, would be even smaller if we used holographic, perhaps crystal, memories.
At those levels of technology one bit has the same function of a building brick. And so the same bit would also be a unit of a system in which it becomes at the same time structure and function and a program, e.g., would have the same value of material agglomerate.
Sometimes we do not realize that our body and everything all around us is filled with (and probably is) a complex vibratory harmony, a kind of harmony with his musical consonances and dissonances that regulates the flow of the arrow of time.
We deduce that ultimately we are basically a set of nano-apparatus skilfully mixed and optimized. The information – submitted to a constant feed back – that we can emit and receive, as an open system, is contemporaneously an exchange of energy, matter and momentum: it is our autopoiesis. Our systemic inside job and our systemic outside job.

C'è ancora spazio là in fondo
Mi sono permesso di utilizzare, come titolo, questa frase che è di F. Feynman. La pronunciò nella famosissima orazione che tenne al CalTech nel 1959. E con queste parole tenne a battesimo ciò che fu poi chiamata la via delle nanoscienze e delle nanotecnologie.
Ma come è possibile che si possa parlare anche di tecnologia partendo da grandezze in nanometri pari a quelle di gruppi molecolari per scendere sempre più in giù a quelle di gruppi di atomi e poi ancora oltre?
Per un motivo semplice.
I piccoli gruppi di materia, a certi livelli di infinitesimo, si comportano oltre che come onde, generiche o di probabilità, anche come pacchetti informativi.
Tempo fa scaricavo da un PC ad un altro migliaia di libri elettronici in alcune decine di GB e il tutto avveniva su spazi ridottissimi che, presumo, sarebbero ancora più ridotti se si usassero memorie olografiche magari cristalline.
A quei livelli di tecnologia un bit ha la stessa funzione di un mattone di una costruzione. E quindi il bit stesso sarebbe anche un'unità di un sistema in cui è allo stesso tempo struttura e funzione e un programma, ad esempio, avrebbe la stessa valenza di un agglomerato materiale.
A volte non ci rendiamo conto che il nostro corpo e tutto ciò che lo circonda è pervaso da (e probabilmente è) una complessa armonia vibratoria, una sorta di armonia musicale con le sue consonanze e dissonanze che regola lo scorrere della freccia del tempo.
In ultima analisi noi siamo fondamentalmente un insieme di nano-apparati sapientemente miscelati ed ottimizzati.
L'informazione -costantemente retroazionata- che siamo in grado di emettere e di ricevere, come sistema aperto, è assieme scambio di energia, di materia e di quantità di moto: è la nostra autopoiesi. Il nostro sistemico lavoro interno e il nostro sistemico lavoro esterno.

The Complexity's Paradox capturing Instability: the Model's perfect recipe or the perfect Model's recipe *(M.R. Astolfi)*

If we started to look what at first sight are unlikely and above all not unsolvable but apparently paradoxical alternative crossing Paths, while their *Formulas* are cruising the horizon through frontiers which catapult them on the surface of fast moving currents of Pure Perfection, we could believe to recognize (also interdisciplinary) Models, and Models' Procedures, representing ad hoc the system's evolutive complex dynamics in the perspective of controllable altered and altering, and so *Im-Perfect*, instable states of different self-organizing equilibriums.
Here we relate the concept of *Pure Model's Recipe* to satisfactory and satisfied expectations freed by that constellation of accidental and/or incidental, positive and/or negative causes that may occur. And these as expression of confirmative and/or deviant system's inconstant behaviours.
We know it is very hard to escape from the search of a Model's plain suitability if we have to face systems' chaos and complexity, and so we have to deal with the necessity a *Model's model* which is anyway possibilist and probabilistic but that can't unquestionably see in the future, .
Knowing that autopoietic systems *"evolve through time thanks to their capacity to transform unorganized into organized complexity"*. And in the course of this structural transformation *"in order to cope with a hypercomplex environment, they must increase their complexity"* (Luhmann1995), to act on complexity means being forced to select, where any kind of relations among the elements is possible: this means risking.
But let's ask a provocative question to strongly underline a permanent necessity of dynamics' variables control instruments to try to configure, coordinate, organize, and reconfigure what we often still consider an objective external so rapidly changing intertwined reality and this to avoid potential risks.

So, what if we were to win/lose submitting to *Fate*?
Well, no problems:"*Un Coup de Des jamais n'abolira le Hazard // Quand bien meme lancé dans des circunstances eternelle" (A Throw of Dice will never abolish Change // Even when truly cast in the eternal circumstances).* (Mallarmé, 1897).
We may also debate the origin and function of the Instinct as the most influential transforming choice's component in whatever human scenario.
It is obvious that we are moving in the field of psyche "*that is the one thing which life does not make clear to us*" (Jung, C.W. 1953).
That is, we let selective factors based on archetypal semantics to provide the background in reality's observation and modelling of our self-expression and self-reference for consciousness in distinguishing ourselves from the environment, while experiencing a social, too rich and articulated phenomenal reality.
Anyway, despite the presence in our culture of a strong and dominant rationalistic approach, we can still see people exaggerating the force of Fate and Instinct (or even "Malediction"), which roots reaching far back into antiquity, and their impact in the differentiating social systems we live in.
But when we deal with Models there is apparently really nothing we can do for real people, situations and places.
So we are here playing an *ambivalent* role just to move from metaphysical speculations to the centre of the scientific research and face one of the recurrent problems: Model as investigating instrument of instable systems' behaviours and evolutions.
Modelling, that we can define as a structural recursive operation, a condition of analogically ordering representation, becomes the centre of the scientific systemic research in function of better knowing how complexity moves.
And in this N.A. special issue our prestigious Authors, -operating on the basis of their own specific code (science, economy, law and politics) in a wide range of contents, are discussing and debating their works through -and thank to- Modellization, with the result of recognizing its necessity to examine and explore the oscillations and perturbations of the particular systems they consider, and this also moving in experimental. Physic-Mathematical spaces.
We realize that as for Complexity, Model needs simplicity, or better the plain math's pure (paradoxically either sophisticated and multi-dimensional) simplicity. Being careful not to incur in *Reductivism*, Maths is the *Queen Recipe.*
Math laws and/or partially math tools have always to be considered and reconsidered to understand and manage instable complex systems' Models safety. They give the code that scientifically proofs the structural inner Model's scientific coherence to what we are searching for.
If we are balancing between the realization of our goals and the intensity of possible threats, Models become a potential knowledge instrument to acquire a global vision, evaluate what's happening and calculate what can or must be changed in a system which, we know, cannot be fully represented and completely described.
Any choice may imply the factual negation of its counter- possibility and it also actually implies every kind of the inter and intra probabilities and possibilities between *yes* and *no* in the field of *perhaps.* Modelling's *recipe* faces with this complex problem in helping projecting a series of correct responses in a *functionally differentiated* (Luhmann) modern society.
Definitely our everyday *real* life needs the *abstraction* of Models to grasp the basis for our *perfect(?)* performances for a healthier and safer behaviour.
And this in a scenario of differentiation and contradiction in which any true scientist at least once a day has to *doubts of his convictions.*

WCSA III Conference – Vienna

Dynamic High Complex Systems - Interdisciplinary Models: a Conversation with C.S. Bertuglia and F. Vaio (D.P. Errigo)

Dear Prof. Bertuglia and dear Prof. Vaio,

In the introduction to his fundamental book *General System Theory. Development, Applications* (1968), Von Bertalanffy says that "*thinking in terms of systems plays a dominant role in a wide interval of fields that goes from the industrial enterprises and the armaments to the most mysterious topics of the pure science"*. He already thought that what we often call a Systems Theory, is merely a Systemic Approach to problems that turn out complex. In Your work *Non linearità, Caos, Complessità* (2003) you don't consider just a general founding Systems Theory, but "*what causes the changing in the system's evolutive dynamics"* underlining that "*complexity arises from a symmetry interruption*". And more than in the perspective of the *dynamic equilibriums*, with all that follows, included (I am convinced) also the bifurcation points, *"the maths laws must be reconsidered* basing *on the critical revision of the "Continuum" concept"*. From this the necessity of "*more effective mathematical instruments*". What You say is absolutely interesting also in case of an astrocite similar-analogic simulation, i.e. a glial cell simulation, that not only includes the "pre" of a specific neuron in comparisons to the "post" of the following neuron, but that also does interconnect with many other neurons which are all around it, receiving and transmitting myriads of signals. I think that if we can simulate it with a logical door in which, introducing a great number of signals, [and each of them, acting as a quantic level oscillator, transmits informative bits in function of the quanta numbers (informative energy of 1 bit correspond to energy of 2 quanta) and one of those signals is also negative], the De Morgan theorem can be simplified, obtaining the possibility of a non total convergence on any combination. That is the Table of Truth of the combinations among the N+1 propositions obtained among N elements (i.e. among a finite number of elements) is satisfied only with the position of one minimum element of diversity. As a result of this we can obtain an informatics

model which simulates the presence of a "different element" in a considered homogenous ensemble, and also the way we can make an homogeneous one *inhomogeneous*,

Do You think that this means that we have so the possibility to fully simulate a set at different levels of "diversity", obtaining at the same time also some probability of *information* about present and future behaviours in an effectively non homogenous ensemble?

The quotation that you cite from our book of 2003, about what we think is the need for a new mathematic, gives you the clue to a very stimulating diversion on quantum computing and quantum logic. This is exactly what we had in mind when we wrote those pages. We proposed in that book the idea that differential calculus, originated in Newtonian mechanics and applied to physics with great success throughout the XVIII and XIX centuries, needed to be greatly extended in modern physics revolutions (I'm thinking of tensor calculus, partial derivatives equations in complex field which had already been introduced e.g. in hydrodynamics, but were reinterpreted for the new quantum application…). Well this same mathematics of Newtonian-Leibnizian origin was unduly applied, in our opinion, by neoclassical economists to modelling the behaviour of an economic agent, taken as though it were a mass particle, and by that making a severe methodological mistake disregarding the whole set of assumption underlying the great development of that kind of mathematics which is suitable for planets' movement and the like. Our point was that, when it comes to mathematization of complex emergent phenomena and self-organization, a possible road to (tentatively) explore could start from going out of the limits of the continuum of the real numbers set, where ordinary mathematics (that of partial and ordinary differential equations) was built. Obviously, I do not mean that we should resort to complex numbers (twice a continuum has the same power of one continuum), I mean that a way that could be explored is to work in number sets having a higher order of infinite (Cantor's aleph 2, aleph 3…). As far as I know, this topic has never been explored, with the marginal exception of Robinson's non-standard analysis, and the introduction he did of hyper-real numbers – which however is not exactly the same we are proposing – and which had no significant practical success in applications up to now. Nobody, in other words, has never written something corresponding to a differential equation (or a motion's law of a different kind) in a higher order infinite set: for a good part of the 'simple' mechanics, the continuum of the real has been enough at least for the last three centuries (and at least for a 'reasonably large' set of problems, just leave aside the many-body problems, like the onset of turbulence or the question of instability of a planetary or star system…). Now I come to your question. Quantum logic and quantum computing are fields that deserve to be inquired upon with regards to complexity, no doubt about this. Quantum complexity deals with complex systems built up with quantum (or quantum-like) objects. Of course, modelling the interactions of quantum objects or at least of objects that exchange some form of quantum-like information is, in my opinion, an extremely fertile research field to cultivate. Every (classical) reversible circuit may be implemented in quantum technology, and so I would say that, probably, an effectively non homogenous (quantum) ensemble can be simulated as a form of complex system. On this topic, I would even suggest (rather boldly, I'm well aware of this!) that some characteristics of a social system, including in the social systems set economic systems too, might be simulated, at least for what concern the information exchange among the agents, like a quantum inhomogeneous ensemble.

We know that:

1. the algorithm that links the measure of a phenomenon to the parameters which determine it, is hardly ever explicitly known, or simple, and even the less solvable with traditionally recognized methods;
2. the parameters that determine a phenomenon (for instance the biological or the social ones) are generally much more than one and maybe those one we choose are even less important than those excluded.

Moreover we know the validity of the theorem of Tarski extended to the not formalized languages. Facing these situations, the Equations to the Partial Derivatives (PDE) of various orders that we obtain, become nearly unsolvable or useless and, for Tarski, communicatively difficult because, for instance, we (often and above all) lack the effective knowledge of the contour conditions. Or better, they are tout-court directly un-resolvable, also for the difficulty of the same equations that lead to restrictive solutions and with reductive hypotheses. In addition the solutions to the PDE of an higher order, are often reduced to solutions with numerical analysis, where the differentials become differences, and consequently what is continuous (analogic) in the biological or social behaviour, becomes discontinuous (digital) and therefore not natural and still not yet plausible.

Is there a completely valid way to face the problem of modelling which can act on any experiential field, maybe based on a meta-model ad hoc?

The question you touch is really a terrible one: the sense of scientific truth (let alone the sense of 'truth' in general…)! I can answer right from now that my attitude is quite relativist on this point – like the large majority of scientists nowadays, on the other side. For the time being, given our knowledge of facts and phenomena, and our logic systems available to build interpretative frameworks, I'm rather sceptical in face of the 'general' modelling problem, or meta-modelling, as you are asking. As I said in question number 1, I'm convinced that most of the available mathematical methods gave almost all what they could give. In a sense, this is a situation similar to what science faced in XVII century: algebra was available, but it was not sufficient to model motion: it was enough e.g. for accounting and for other 'simple' uses. For the old-dated problem of motion (which has it's roots long back in time, in the problem of 'change', since Heraclitus time…) differential/integral calculus was needed. Let's see better what I mean. I wish to confine myself to science, where your question points to, leaving aside general philosophical questions about Truth (with capital T). Empirical sciences and logical-mathematical sciences (i.e. abstract reasoning) have different concepts of truth and different approaches to deal with it, but both of them cannot avoid ending up in a manifest discomfort when it turns to discuss 'truth' and asses the validity of it. Points 1 and 2 at the beginning of your question remind me of the so-called confirmation holism (or epistemological holism) that is the claim that a single scientific theory cannot be tested in isolation, in the sense that every test of one single theory always depends on other theories and hypotheses as well. A celebrated example which is proposed on this point is that concerning the discovery of Uranus (second half of XVIII century). Its path did not conform to the prediction of Newton's law of gravitation.

There were a variety of possible explanations for this, ranging from that the telescopic observations were wrong because of some unknown factor, to that of some errors in Newton's laws; or even to theological ones, e.g. that God moves different planets in different ways. It was eventually accepted that an unknown planet was influencing the path of Uranus. There are two aspects of the question. The first is that interpretation of observation is in some way dependent on theory. Before accepting the telescopic observations one must look into the optics of the telescope, the way the instrument is constructed and accept that light travels through space in a straight line (which, we know now, is an adequate approximation only). The second is that evidence alone is insufficient to determine which theory is correct. Each of the alternatives above might have been correct. That theories can only be tested as they relate to other theories implies that one can always claim that test results that seem to refute a scientific theory have not refuted that theory. The test results might conflict with predictions because some other theory is false or unrecognized (that reminds me of Einstein's objection to the uncertainty principle). That one cannot unambiguously determine which theory is refuted by unexpected data means that scientists must use judgments about which theories to accept and which to reject. Logic alone does not guide such decisions. This is the thesis of many science philosophers, first of all Pierre Duhem and, several decades after him, Willard Quine: it is impossible to test a scientific hypothesis in isolation, because an empirical test of the hypothesis always requires auxiliary hypotheses. I make a point now of the following epistemological observation concerning mainstream economic theory. The well-known hypothesis of 'ceteris paribus' is currently widely used (i.e. in comparative statics of Samuelsonian origin) to theoretically examine the effect, in an economic theory, of a single parameter variation, leaving all the others untouched. Well, this is meaningless, if we compare the theory with the real world, as everybody can easily observe. Nevertheless the ceteris paribus hypothesis is still a centerpiece in every traditional (mainstream) approach to economics. Not so in the approach of complexity to economics, where the systemic view imposes to examine economic (and social) phenomena from a holistic perspective. Although a hypothesis and its background assumptions as a whole can be tested against the empirical world (and be falsified if they fail the test), the Duhem-Quine thesis says that it is impossible to isolate a single hypothesis. When we have rational reasons to accept the background assumptions (e.g. scientific theories from evidence), if the empirical test fails then we have rational (but not conclusive) reasons for thinking that the theory tested is probably wrong. It is well-known that, in fact, Duhem believed that only in physics can a single individual hypothesis not be isolated for testing: for him, an experimental theory in physics is not the same as in other experimental fields, where not all concepts are connected to each other logically. Moreover, Duhem did not include in his thesis a priori disciplines such as logic and mathematics that cannot be tested. Quine, on the other hand, embraced all of human knowledge, including mathematics and logic, as being one unit of empirical significance (for Quine logic and mathematics can also be revised in light of experience, he presented quantum logic as evidence for this). Then your question goes to mathematics and logic. For Tarski, no language can contain its own truth predicate: the expression 'it is true' for a language can only apply within some meta-language (the language being talked about is the object language). The reason for this is that languages that contain their own truth predicate will inescapably contain paradoxical undecidable sentences like the liar paradox. As a result, Tarski held that the semantic theory could not be applied to any natural language, such as English or Italian, because they contain their own truth predicates. Tarski thus extended the results already introduced by Russell, in set theory, and Gödel in arithmetic. Truth, Michel Foucault says, is problematic when we make an attempt to see it as an objective quality. Foucault does not use the term truth itself but 'regimes of truth'(in his historical investigations he found truth to be something that was itself embedded within a given power structure, but this is another question…). Truth for Foucault is also something that, throughout history, shifts through various 'episteme'. Two more points. The first concerns partial/total differential equations. They sometimes work well in practice, but only if you have a complete knowledge of the initial state or of the boundary conditions, which is not possible in reality. Then, if one is able to solve them, from an approximated set of initial data we can have a full range of final states which might also be extremely wide (chaos), thus making any accurate prediction 'de facto' impossible. Not to mention the case of numerical resolution that inevitably (as we wrote in our book of 2003) transforms the continuous space-time into a discrete approximation, as you write as well in your question. The second is that one may resort to probability, of course, but probability itself has a strong subjectivist characterization that, except for very simple cases, deprives its foundations of their initially posited objectivism. This is widely stated, since almost a century, by a great number of scientists of various fields: form John Maynard Keynes, in his juvenile (less famous than the «General Theory», but not less significant) «Treatise on Probability», to Frank Ramsey, from the Italian mathematician Bruno de Finetti to Leonard Savage an many others. So, experiments are not fully decisive as regards scientific theories, our logic is incomplete (not to say intrinsically fallacious), mathematical techniques are well developed and are the result of a coherent system of axioms, but they too are not in the position to guarantee the truth of a theory, let alone of a model. A meta-theory is (or might be) needed, perhaps founded and sufficiently developed in a 'wider' mathematics than ours, founded on a meta-login that at the moment we do not possess. And this, in a way, goes back to my previous answer.

A "Model" of a system is not only a pictorial representation, a histogram, or a statistics table from which we can derive the probability of an event research. Otherwise it would be only descriptive but it would not answer to the two minimal and synchronic questions of the "how and why". I want here to consider instead a much more pertinent question that has to involve only the two universal concepts of Identity and of Otherness because they are the ones that can determine interpretative ambiguities (as we have already see either in the pure Mathematics, in the Theoric Physics and in the Systems Theory), either if they are considered singularly or simultaneously: that is Contemporaneousness. To make Entities being contemporaneously or simultaneously. Well, if we don't say where and when, this phrase has a meaning, i.e. we exclusively speak about their essentiality. I have used the word "being" without presumption neither of time nor of space. But if we use the old space and time category-concepts, others concepts are involved like enumerability, superposition, distinguishing and *"diversity"*. What I mean is that in Sciences we can't analyze a concept without analyzing the context in which it is applied. It is just this implicit possibility of relationship that makes possible either the construction of Simulation Models of pure physical Systems

and the attempts to construct Simulation Models of much more complex Systems like the biological and the social ones.

With the usual theoretical and empirical methods of research, can we (and how) determine space-temporal invariants and symmetry rules, referring to the abstract contents of the physical communication among physical (and so not abstract) elements for the constitution of systems dominated by what we can generally define social "intangible assets"?

We live in a society and in a scientific culture that since a long time, since shortly after the scientific revolution of XVII century, has followed a reductionist approach in the analysis of phenomena and that in the course of time has given rise to a steadily increasing specialization of the scientist activity. This of course has some advantages: humans are not and cannot be omniscient, human life and human resources are limited whereas the field of scientific knowledge grows wider and wider over time. To limit oneself to a specific area and delve deeply into it is almost inevitable for anybody who wants to dedicate his activity to science. But this approach has also severe limitations. Almost inevitably one ends up with high specialization and bounded horizons: one sees very well a tree or two trees, but the risk is that he is unable to see and recognize the forest those trees belong to. Figures like the Renaissance 'universal' scientists or contemporary figures of scientists living on the border between two or more disciplines are more and more rare. Thus it is more and more difficult to recognize analogies, or invariants between two different scientific fields. But there is another risk, symmetrical to the one I just said, which is much more subtle. I mean the risk that some concept taken from one discipline is arbitrarily, superficially and unduly transferred to another one, as an effect of an a bit superficial scientific 'good will' and enthusiasm. This has happened several times in modern science, in particular in the repeated attempt to apply to social sciences concepts and method borrowed as such from physics. The systemic view is actually an approach (a perspective) which is applicable, or even common, to a great deal of scientific disciplines, maybe to all disciplines. It does not consist of a transfer from one discipline to another. Now, the question is: is mathematics a suitable instrument to analyze systems and recognize invariants among different areas of science? Maybe not: mathematics, the mathematics we currently use, is suitable for most (not all!) systems of physics, but it is not so flexible to deal with social systems. That means, in particular, that it is unfit to describe the dynamics of economic systems, in spite of the large use made today in theoretical economic modeling. But systems, as it has been observed many times by many scholars of different scientific areas, e.g. by von Bertalanffy himself, have much in common independently of their projections that we, human scientists, make onto one area or another. Complex systems are systems: they all show emergent properties and self-organization. Coming to your question, everybody who is engaged in applied research in complexity follows now an approach to simulation of a very peculiar type: agent-based modelling. We have no space here to deeply discuss the details of this relatively new programming technique, let's just say that its use is becoming more and more widespread, particularly among social scientist – but not only – since a couple of decades at least. Agent-based modelling allows the experimenter to carry out experiments of various kinds in a sort of virtual laboratory, where a system's evolution is simulated in a bottom-up way, by giving rules of individual agent's behaviour. In agent-based modeling a complex system is modeled as a collection of autonomous decision-making entities, the agents, and the relationships between them. Each agent individually, step after step throughout the simulation, assesses its situation and makes decisions on the basis of a set of rules given by the experimenter, but that can change dynamically over time. Agents may perform the various behaviors appropriate for the system modeled: for example, in economic systems, producing, buying or selling, communicating among them and so on. Repetitive competitive interactions between agents are a special feature of agent-based modeling. It is easy to see that even a simple agent-based model can exhibit complex behaviors patterns and provide valuable information about the dynamics of the real-world system that it simulates. In addition, agents are capable of evolving, allowing unanticipated behaviors to emerge. Models of this type sometimes incorporate neural networks, evolutionary algorithms, or other learning techniques to allow realistic learning and adaptation. We could say, and this is one of the most important points to stress, that agent-based modeling is a mindset more than a technique, as it consists of describing a system from the perspective of its constituent units, i.e. from a bottom-up perspective. We might note that a set of differential equations, each describing the dynamics of one of the system's constituent units, is in fact similar to an agent-based model, which thus is not really new with respect to traditional modeling: the novelty is that we do not write anymore a set of differential equation describing the evolution of the system as a whole, as we used to do. In comparison with variable-based approaches using structural equations or system-based approaches using differential equations, agent-based simulation offers the possibility of modeling individual heterogeneity, representing explicitly agents' decision rules, and situating agents in a (geographical or not) space-time. It allows modelers to represent in a natural way multiple scales of analysis, the emergence of structures at the macro, i.e. societal level, from the micro, individual action, and various kinds of adaptation and learning, none of which is easy to do with other modeling techniques. We may note, finally, that one of the advantages at the origin of the increasing popularity of agent-based modeling is its ease of implementation: special programming languages (e.g. NetLogo, Python), especially conceived for this kind of programming are available. The idea of modeling is familiar in most of the social sciences, since long time, of course: one tries to create some kind of simplified representation of social reality that serves to express as clearly as possible the way in which he believes that reality operates. We are doing now, with agent-based modeling, a 'computational' social science, one of the advantages of which is just that this approach forces us to be more precise than we were if we used words only. But the most important peculiarity is another one: agent-based modeling is not specific of any limited set or subset of social sciences. It can be used everywhere when dealing with complex systems, whether natural or social, by that making evident what is in common in different scientific contexts. The underlying shared basis comes to the light when we look in abstract way at agents that interact among themselves by exchange of many different kinds of information – and in a sense, even the exchange of a force in physical systems could be assimilated to a form of exchange of information –.

If we considered who and what we are, we could also define ourselves like structured sets of self- replicating

macromolecules, true macromolecular machines, a reification of cellular robots that are much more complex than the already existing. We could be a development of a Turing Machine. E.g. the multiple-representation model that I use in my researches for the specific biological simulation, is a kind of "pluri-stratum perceptron", and so it is adaptive, with an associative implementation. It is a "segments" set, and each segment, with the characteristics fixed by Kohonen, is included in a Hopfield net model. But my model considers just only analogic signals obliged from a specific logics: "*if 0 then…. if 1 then….*; in this case the signal is "*or/and…or/and…or/and…"* etc. and it is directed "*towards… or/and simultaneously towards*… i*n a time….or/and…*" and other. Only in case of "value 1" we insert the weights. The logic is minimum **3** values, better **7** or even better **9**, however always in odd number. Was it **11** values, it would be the optimal one: the universe-brain. I have so noticed that the electromagnetic waves (produced by the nervous circuits in correspondence of the situations, of the psychical variations and of the artistic and scientific or other mental constructions) are measurable and repeatable. They consists of a "substantiality" that surely goes beyond biochemistry and totally bypassing the common, consolidated and apparently definitive scientific knowledge. Between this short descriptive introduction and the fact that we write it, we read it, we understand it, we interpret it and we act in consequence, something has happened (I refer in particular to the abstract contents of the physical communication among physical, and therefore not abstract, elements of the previous question). For an authentic biological modellizzazione we need to answer either to specific theoretical and existential questions, as well as to theoric and empirical ones.

From this point of view, it is possible to think of a new simulation model "ad usum" *hyperhuman* system, that totally emulates the biological one, i.e. a cyber-physiological model, that with its physical translation, allows the construction of a Cyborg, replacing, for instance, the net of Hopfield transmission model with an other one which can consider the single components' inertia?

I begin with some general considerations. There are different kinds of subsystems in a living organism. To reach the level of systemic biology, one needs to be able to combine different model structure. It is first necessary to capture the essence of a domain field in some form of mathematical structures. This is a delicate challenge, and specific expertise is needed. However, homogeneous representations can be defined for different kinds of systems. Information of the biological processes has increased immensely: perhaps some day all dependencies between phenomena and control structures within a cell will be found. But this is just one step towards capturing the essence of life processes, I think the goal will not be reached this way. Understanding complex systems is the challenge also in industrial automation systems: behaviors and qualitative properties of the overall industrial system are becoming more and more difficult to understand. The systems – this is worthy to note – are themselves becoming like artificial cells: industrial plants also have metabolism, raw materials being exhausted and others being produced. Originally, the production can be far from optimum, but as soon as dependencies among variables are recognized, they can be used for constructing new feedback structures to implement more efficient and robust productions. However, as the complexity of control structures cumulates, the system-level properties cannot be easily seen any more, even though all individual control structures are explicitly known. In both cases, natural and man-made cells, it turns out that the goal of evolution is overall efficiency of production, no matter whether it is humans that are acting as agents for development or not. This can be reached by implementing mechanisms for maintaining system integrity without collapses. To maintain the balance, the system has to respond appropriately to the spectrum of disturbances coming from the environment. Mastering huge amounts of data and finding holistic understanding out from it is a shared goal in both cases, in artificial and natural cells: it is the engineering tools and intuitions that can be exploited here to find new kinds of approaches for dealing with the system complexity. So, how to see the forest instead of the trees? i.e. how to see the cell metabolism for the chemical reactions, or how to see the organ functions for the cellular phenomena? First, the details of the systems need to be understood and captured in data. When searching for good models, philosophical questions cannot be avoided. Such modelling issues have been studied for long tome (actually, from millennia…): what is the nature of systems, and how they should be represented, what is there and what one can know about them (i.e. ontological problem and epistemological problem). All these mutually related issues are collected under the concept of semantics: i.e. the essence of a system, and how this essence should be interpreted. For the purposes of concrete modeling, the very abstract notion of semantics has to be formalized in some way: it requires, compromising between intuitions (what would be nice) and reality (what can actually be implemented). It can even be said that a good model formalizes the semantics of the domain field, compressing it and making it visible. Now, there are two levels of semantics to be captured. A form of low-level semantics is the formless complexity of the underlying system that has to be captured in concrete homogeneous data. The atoms of semantics constitute the connection between the numeric representations and the physical realm, so that the properties of the system are appropriately coded and made visible to the higher-level machineries (in concrete terms, one has to define certain probes and appropriately put them in the system). There is also a higher-level semantics: the high number of structureless low-level features have to be connected into structures of semantic atoms. Assuming that the semantic atoms are available, this higher-level task is simpler, being more generic, whereas finding representations for the low-level domain-area features is domain-area specific. Semantic atoms, in a way, might be seen as including also the units of knowledge that, after Nigel Gilbert's paper of 1997, are called 'kenes' (the 'genes of knowledge'). The higher-level semantics thus determines how the information atoms (or kenes) are connected in strings and superstrings of semantics and knowledge. In our numbers-based environments, a practical and robust approach towards capturing such contextual semantics is offered by correlations measures. If the data is defined appropriately so as to capture the dynamical balances in the system, the simple contextual dependency structures can also be seen to capture cybernetic semantics of the domain. Assuming that information is conveyed in visible relations among data, structuring of lower-level data can be implemented by the mathematical machinery with no need of outside expert guidance. Despite the trivial-sounding starting point, non-trivial results can be found when the mathematical structures cumulate. This could possibly make it possible to reach 'smart' enough models that adapt in unknown environments. Now let's come to your question. High-performance parallel computing offers enormous potential in analyzing data and accelerating the simulation performance of large-scale biology complex models. While bottom-up, high-volume molecular level

systems are often easier to parallelize and more computationally demanding than in low-volume top-down approaches, a different alternative is the 'middle-out alternative', centered on the cellular level. This is (arguably) a more natural starting point: by modeling cells, predictive models based on the large amounts of data available at the cellular level might be able to provide insight into larger biological systems. Agent-based modeling, I remind it again, follows an individual-based approach to model cellular systems: unlike equation-based alternatives it allows individual cells to be seen 'moving' and evolving in their space and be tracked throughout a simulation. The lack of parallel computing software for agent-based modeling is a limitation on the scale of models that may be simulated. Despite some advantages of equation based modeling (e.g. faster run time and the availability of established libraries dedicated to the numerical integration of equations), this technique offers little insight into the micro-level behavior representing the interactions of the individuals within the system, as I said in my previous answer. Where global observations are made, these represent average values and assume homogeneity and the mixing of system components: as a result, low-level details of the system may be ignored. By contrast, agent-based modeling utilizes a bottom-up approach to simulation that does not explicitly attempt to directly model aggregate characteristics of a system, but sees them as emergent phenomena.

In *Complexities and Models* (2011), You put in evidence that *"the behaviour of the economic and social systems is generally less and less described in terms of individual rationality"* and that it would be necessary to elaborate a "*theoretical synthesis provided by the theory of the general equilibrium" (p. 506).* Moreover You get on saying that *"there are important differences between a cellular automaton model and a dynamic system that is based on differential equations …, that allow us to calculate the state of the system"*. You refer to the need of new intellectual instruments and underline that just "*in the course of nineties a new class of models appeared, founded on a totally new conception, which do not make use of the formal concepts on dynamics and are completely lacking in any trace of the old problem of the equilibrium search"*. You also emphasize the *"fertility of the study of dynamics of the viscous fluids" (p.434).* I have personally noted that the biological systems, and for many aspects also the social systems, do behave like viscous fluid. But for evaluating the configurational transformations, and searching for the dynamic stability, I had to plan a new algebra (of the "Cubical Matrices) just to carry out symmetry operations also on irreversible processes, like e.g. the biological and the social ones. In a neural transference or in a social communication relationship, there is not a condition of synchronicity in the real meaning of a transferring of matter, information and energy (transferring that shows energetic and temporal inertia either in transmission and in reception) but there is a condition of synchronicity in the entire organism (biological or social) awareness of the totality of the problem. In these systems, a parametric inversion, that is mentally conceivable, is *ideally* possible only if we consider the necessary inevitability of a transposed cubical matrix that, in fact, can provide the indetermination on the reversal of the process(es) considered. This indetermination doesn't produce Knowledge, but only the (verifiable) probability of Knowledge of an ended and limited number of variables in their possible universes, considering the totality of the different variables. Therefore, in this case, we can speak about symmetry of the system with asymmetry of processes.

Do you think that a biological system, and also a social system, can be considered covariant if it admits, in its inside, only contra-variant processes? That is the Covariance can be given from a summation of Contra-variances? And in this case can it re-enter in turbulence process dynamics?

Let me please begin my answer with a short observation regarding the first of the quotations from our books you start with. In the context where that quotation appears in the book (on p. 506), the opinion of the authors is expressed: it is stated that the authors' intention is to «introduce some elements to show that the economic systems' behaviour is now less and less frequently described by economists and other contemporary social scientists in terms of individual rationality, along the lines of the mainstream neoclassical economics, which, on its side, has lead in a logical and formal way to the valuable theoretic synthesis made by the theory of general equilibrium». We therefore do not propose to search in the general economic equilibrium theorem the synthesis that would open new interpretative horizons. This theorem is a result of an economic scientific culture of a different approach, it is a great result of past research that has opened horizons at a theoretical level only – I would say at a mathematical level only –, where the hypotheses, which depict an imaginary world of rational omniscient, optimizing and selfish agents who trade in a perfect market, are too far away from the characteristics of the real world to be sensible and applicable in practice. Coming now to your question, I find really stimulating your observation that biological and even social systems, that is systems whose elements are aware and thinking individuals, in some way behave like viscous fluids. This observation can actually be brought back to the first quotation form our book I mentioned above, i.e. to our suggestion that economic equilibrium theorem is a great theoretical achievement, but, like ideal gases with respect to real fluids, has very little to do with reality, in particular with real economic systems (and, more in general, real social systems). A real economic system can be seen, interpreted, described and studied, in our opinion, as being similar to a sort of viscous fluid made of interacting individuals: a system beset by myriads of causes of internal friction (and therefore full of friction of various kinds and origins), which in its evolution gives birth to a myriad of turbulent-like phenomena at different scales, and to something resembling heat generation due to the decay of some quantity which takes the place of mechanical energy (but of course is NOT to be considered as a form of energy: I'm just speaking of a possible analogy between phenomena in different fields, not of substitution of quantities!). For example, in social systems information does not propagates instantaneously as it is assumed in the neoclassical economic theory, and so an agent can change his opinion in a different time with respect to another agent and again can change his mind once more when he sees another agent's behaviour, and so on. The inverse simulation approach is of great practical value for a number of reasons; it is well known that it has attracted particular attention in the solution of nonlinear problems where interest is focused upon the control action needed to achieve a particular form of output response. These methods have potential in the external validation of nonlinear simulation models using time history data gathered from experiments on the corresponding real system. Therefore, the idea that you propose in your question deserves great attention, in my opinion, and has to be studied carefully, being probably a viable approach. In principle I couldn't exclude that covariant and contravariant properties might coexist, at micro and

macro levels, in particular if the system's evolution is irreversible and different actions take place not synchronically. Of course the question has to be studied in its details, but it sounds really interesting!

When we think and say "what does *thinking* mean?" we become aware that in our thought categories, a "simil-Gödelian" (I could say also Kafkian or Ioneschian) situation is born and is increasing. I "think" this is the necessary condition to reconsider all our *thinking* system and so reformulate traditional concepts which separate the human from the non- human. But the condition is not still sufficient, and the insufficiency will be surpassed just from the new conception of "thinking". We can derive several examples from an analysis of Boole's "S*urveying on the laws of the thought"* starting from the signs and from the fundamental operations he allows and also from the way in which the universal and particular (affirmative and negative) propositions (and belonging to a syllogistic tradition) have effects. If we consider also the Fuzzy Logic for the planning of a coherent functioning, we realize that those Boolean expressions are necessary but not sufficient for the gnosiological behavioural description of a single person. The same fact that they perfectly adapt to the left brain lobe makes us presume that the right one needs something different. And we realize also that from the simultaneous presence of the two types of *logic* we can obtain something equivalent to the "natural brain". But not merely compounding the two fundamental *logics*, each one with three (not two) or more values, but assembling the signals deriving from the same *logics*. The human being behaves in a continuous feedback with himself. That's why, in the analysis of a system like the biological one, I agree that it is necessary to eliminate the hypothesis to exclude the black box (on which the simple feedback acts and in which all can happen but having apparently no connections), focusing the true interest also into the black box in itself , i.e. acting on the process.

I want to ask you if a "Cyborg -system" thus conceived, with an hardware that self-constructs its own software, and whose first acquiring knowledge must be those of structure and function, and only successively those external communicative, could be considered a subsystem (in which a new type of interpersonal neurobiology "lives") of the global social system?

The question you ask is really interesting and stimulates a lot of reflections: it is really difficult however to say on this point more than general reflections bordering on personal opinions. The identification between logic and thought, as it was done by Aristotle, brings about the fact that the categories by which we judge the perceived reality become too rigid to allow us to catch the fuzziness of facts and their interpretations, and in general the complexity of reality (in particular of change). Logics are many: we overtook Aristotle's binary logic since centuries now. I would even say that each of us has his own login that he applies when confronting with facts, including another person's behavior. Natural language abounds with vague and imprecise concepts, such as «Tom is tall» or «It is hot today». Such statements are difficult to translate into more precise language without losing some of their semantic value: for example, the statement «Tom's height is 182 cm» does not explicitly state that he is tall, and the statement «Tom's height is 1.2 standard deviations about the mean height for man of his age in his culture» is fraught with difficulties: would a man 1.199 standard deviations above the mean be tall as well? Which culture does Tom belong to, and how is this membership defined? While it might be argued that such vagueness is an obstacle to clarity of meaning, few people would hold that there is no loss of richness of meaning when statements such as «Tom is tall» are discarded from a language. Yet this is just what happens when one tries to translate human language into one of the classical logics. When one wants to allow for natural language queries or knowledge representation in expert systems, the meanings lost are often those being searched for. For example, when one is designing an expert system to mimic the diagnostic powers of a physician, one of the major tasks is to codify the physician's decision-making process. The designer soon learns that the physician's view of the world, despite his dependence upon precise, scientific tests and measurements, incorporates evaluations of symptoms, and relationships between them, in a fuzzy, intuitive manner: deciding how much of a particular medication to administer will have as much to do with the physician's sense of the relative strength of the patient's symptoms as it will, for instance, his height/weight ratio. While some of the decisions and calculations could be done using traditional logic, fuzzy systems affords a broader, richer field of data and the manipulation of that data does more than traditional methods. Fuzzy logic is a remarkable step forward, a step toward a logic of complexity, but it is still not enough: truth values intermediate between 0 and 1 are like a continuous grey scale vs. the black and white of Aristotle's logic binary set, but this is not like a continuous tri-dimensional scale of colors which is incommensurable with it. Anyway, experimentation on this topic is worthy of great attention. I'm thinking in particular of an experimental research in the field of (experimental) psychology, more than of a theoretical-mathematical enquiry: the latter might come into play later, as I think that it is always a dangerous play to let theoretical research go too far along its own way loosing contact with facts. I come back here to a point I already touched upon in a previous question: the role of philosophy as a discourse about thought. The tendencies which have contributed to render psychology so largely independent of philosophy now are for the most part similar to those which have brought it under the influence of biology. The disposition to model psychological procedure upon biological patterns is an expression of the force of this influence and one which has led to some interesting anomalies in current psychological usages. Psychology has to have an experimental basis for its theories; it is not pure philosophy in itself. Of course. But if one undertakes to treat the mind as an organism only, it is natural to suppose that one may adopt the practice of the biological sciences and proceed to the construction of a mental anatomy, dealing with the facts of psychical structure, and a mental physiology, dealing with psychical function. Indeed, this was the ambitious aim of the 'strong' program of the first phase of artificial intelligence development. Herbert Simon first advanced the concept of bounded rationality. Because of limits in human mental capacity, he argued, human mind cannot cope directly with the complexity of the world. Rather, we construct a simplified mental model of reality and then work with this model. We behave rationally within the confines of our mental model, but this model is not always well adapted to the requirements of the real world. The concept of bounded rationality has come to be recognized widely, both as an accurate portrayal of human judgment and choice and as a sensible adjustment to the limitations inherent in how the human mind works. Apart from rational deductive logic, there is also what somebody calls the 'lateral thinking' that we use when solving problems through an indirect and creative approach, using reasoning that is not immediately obvious and involving ideas that may not be obtainable by using only traditional or

fuzzy logic. Lateral thinking is an alternative to pure 'vertical' logic (bordering on conformity and blind and mechanical repetition: no novelties, no imagination, no change; the left-brain thinker) and pure 'horizontal' imagination (bordering on daydream or mysticism: a myriad of uncoordinated ideas with no implementation; the right-brain thinker): lateral thinking follows, let me say, a 'diagonal' logic. A Cyborg that constructs his own software by interacting with the environment has a different logic, maybe a 'circular' one, in my opinion. He has bounded rationality, but not a vertical, not a horizontal, not even a diagonal logic. His self-referencing activity in constructing his knowledge and consciousness puts him on a higher level with respect to the von Neumann's universal constructor with which he is incommensurable. His self-referencing and the feedback he has with himself – as interacting with the environment – make his knowledge-consciousness system a complex system. The diffused knowledge-consciousness of a social system made by a great many of these Cyborgs has a complexity level which is probably incommensurably higher (of course nobody can demonstrate this incommensurability assertion now, but this might be put in relation with the incommensurability among the members of the Cantor's series of infinite numerical sets of higher and higher orders). In some way this reminds me the celebrated paper by Philip Anderson, where he (one of the first to speak of complexity, back in the seventies) considered the different levels of complexity that make psychology irreducible to biology, biology irreducible to chemistry, chemistry irreducible to particle physics etc… Let me now make a final observation on the subject of your question. We actually do not have Cyborgs, but we have what are normally called 'robots'; they face in a reduced scale the problem of knowledge acquisition (just drop the too difficult question of consciousness in robots…). As it is well-known, automatic control of a mobile robot with nonholonomic constraints normally depends on complex signal processing mechanisms, e.g. predictive control. The robot's navigation can occur in known or unknown environment. In the unknown environment, the most challenging task comes from the natural terrain. The typical solution is to acquire the environment information based on sensor signals and then use fuzzy control to avoid obstacles and reach the goal. There are also other methods, such as the real-time sensor-based navigation method using Kohonen's network for navigation in any uncertain environment. In the known environment, the robot navigation can be divided into several steps. The first step involves predicting the trajectory of moving objects, and may be used for path planning of a mobile robot. The second step involves navigating the mobile robots to avoid obstacles based on acquired sensor signals. For example, by computing the minimum distance between two mobile objects to predict and avoid collisions. The third step involves planning the path, which may utilize the mechanisms where linear and angular maximum velocities, as well as dynamic constraints are considered. Mobile robots usually have nonlinear time-delay characteristics and are often perturbed by additive noise. For nonlinear problems, experiments have demonstrated that a fuzzy controller has good performance in dealing with the additive noise. As a result, fuzzy control is usually applied to a complex system whose dynamic model is not well defined or not available. In addition to handling nonlinear problems, the fuzzy control can also enhance the robustness of the whole robot system. However, when it comes to certain other situations, such as large delays, the control performance of the fuzzy controller is deteriorated. An alternative solution to these problems is to adopt a predictive control that can cope with the big delay and has better performance than a fuzzy controller. Robots are not cyborgs, fuzzy logic is not complexity, a big qualitative jump is still needed, but the research is on the way.

We know that a social ensemble is not only the sum of different individuals, but we can observe in it reciprocal interrelationships, i.e. the summation ensemble of everybody's relationships with the others. We can assume that a single individual behaves as a singularity and that his behaviours are either includible in a preventive field of uncertainty and (within certain limits) valuable as a complementary observable couple set (a kind of *coincidentia oppositorum in unica re*). But we can't say the same for a set of interrelated singularities generating a totally structured ensemble, i.e. a social system (analyzable with the harmonic analysis, preliminarily deriving also from Bessel's functions, that can also be developed in the Fourier's series), that is (also from the spiritual and cultural point of view) self-generating and self-reproducing. The skeleton structure of a social system is fundamentally immaterial and is above all constituted by the legal-economic-financial ensemble which is self-forming and self-ruling and self-regulating. If we consider an autopoiesis with a wider meaning, the social "body" seems to constitute a new type of individual who can interrelate with other analogous individuals (other social bodies). Moreover we observe that by now there is no more difference among the production paradigms, i.e. materiality and immaterial are identical. I am personally convinced that the authentic meaning of autopoiesis being less restrictive than the one usually used. In any case even if we use the traditional one, I think there are no differences of modeling between either the single individual and the socio-political system containing him because:

1. for what regards the *centre of the mass system*, they could be represented by harmonic fields at different variables (we just have to think to the chaotic fluctuations delimiting a nobody's area between order and chaos);
2. for the *laboratory system*, they could be considered like "complex sets" of observable details.

In addition I think that for obtaining the equality of the two assertions we should formulate further hypothesis based also on the characteristics and properties of Bessel's functions and of the Gamma function.

If the social body wouldn't constitute a system (i.e. if it weren't a *people* <u>with</u> its institutions), but if it were simply a set lacking its inner structures (and therefore a generic *mass* <u>under</u> the institutions), could we still speak, for it, of dynamic equilibrium, of complexity or of a chaotic informational amplifiers presence only?

Your question touches upon a particularly interesting point. Recently, we, Sergio Bertuglia and I, separately and in two different occasions, publicly reviewed a book published in 2012 by one of the most distinguished Italian elderly jurists. The author had no previous knowledge on complexity, but nevertheless in his book, depicting from a historical point of view the formation of juridical and political institutions in human societies, when passing from the tribal condition to the organized state, clearly expressed his own view that perfectly matches the – until that time unknown to him – view of complexity and complex systems. Of course, we, independently one from the other, pointed out to the invitees' audience how happily the author, although unaware of it, clearly pinpointed the complex view of social systems. On this subject (the birth of institutions in societies), it is impossible not to mention Friedrich von Hayek and the extensive studies he carried out during the central decades of XX century on the formation and role of political

and above all economic institutions (Hayek's thought has often been misunderstood, in spite of the Nobel prize in economics he received in 1978, and his ideas wrongly accused of being the theoretical justification at the origin of many reactionary policies and even of some coup d'état from the extreme right-wing military forces in the seventies. But this is a different topic, far away from your question). The key concept for Hayek explanation of the emergence of institutions as shared sets of rules is 'spontaneous order': a concept which clearly anticipates one of the tenets of complexity. A set of practices or rules of conduct prevailed because they made a group of men successful, and they were preserved because they enabled the group in which they had arisen to prevail over other groups. These rules took shape spontaneously, and they were unintentionally selected for their advantages. As it is well known, Hayek adopted an evolutionary approach to explain the unintentional formation of order in society, based on the notion of cultural selection. This evolutionary process has in particular connoted Western societies, the configuration of which is characterized by non-coercive rules: the market – the free market – constitutes the best example of this kind of institution. This evolutionary conception of society as order sets against the so-called 'constructivist rationalism', according to which human institutions have been deliberately designed by some form of centralized power in order to accomplish human purposes. In Hayek's view, this is a wrong conception, which also has dangerous effects if it is assumed as a theoretical guide for political, social and economic interventions. We can say, now, that social institutions (including the economic ones) emerge on the basis of the human cognitive ability to integrate an evaluation of the behavior and performances of other group members over long time periods. The results of those evaluations are condensed into the social status of an individual, and that status is the link between short-time achievements and long-term success within the group. Humans live in groups, and the life of a group is regulated by institutions that stabilize the social interactions between its members. Thus, the patterns of interaction become more durable and predictable for the individuals. This is self-organization of a complex system of individuals who non-linearly interact by exchanging information and reciprocally influencing their own decisions. The institutions are implemented through rules ranging from conventions and informal codes of behavior to formal laws. These institutions, at least in principle, benefit the group as a whole and enhance the reproductive success of its members, in comparison with members of less strictly bottom-up regulated groups (there is the risk, however, that some selfish individuals are at an advantage and exploit the institutions for their own benefit without contributing to the group maintenance or enforcement, and so, dominate the group which then destabilizes). Since Adam Smith, the question of how different types of institutions support the efficiency of economic exchanges in varying social and historical environments has been central in social sciences. It has also become a central theme in economics, with the recognition that market (and non-market as well) institutions are fundamental in supporting and enhancing the growth potential of economic interactions. A partially neglected role of institutions, with respect to their role as protectors of property rights, is to correct the coordination failures or some kinds of the commitment problems that sometimes we can find in economic interactions (e.g. the fact that agents could not agree ex-ante, in an enforceable way, on the fee that will be charged by the centre, once it is designated). These problems, that can remain even if property rights are secure, are likely to be critical for an economy at the initial stages of its development. Limitations on agents' commitment have consequences on efficiency: they might imply, for example, that an institution will not arise, despite being potentially welfare enhancing.

Economic theory in its neoclassical widespread current version primarily deals with market societies that employ money as the medium of exchange and can thereby easily quantify its concepts. In that theory, as I said already in a previous answer, it is assumed that agents make rational choices to maximize their (yet undefined) utility functions. Institutions provide the framework in which agents can operate efficiently: their emergence is not included in the theory, it is rather considered as exogenous. A global equilibrium between supply and demand emerges, at least in an idealized situation, as the unintended result of the actions of agents that pursue their individual advantages. The underlying mathematical theory describes aggregate quantities. So far, it has essentially been developed as an equilibrium theory and it still remains a hard challenge to construct a mathematical framework for understanding non-equilibrium states and the resulting dynamical processes. Whereas neoclassical economic theory is a theory of aggregates, the competitive interactions between individual agents have been formalized in game theory, but this again is another topic that would lead us too far away from your question. Let's just say that it seems, however, that for understanding the emergence of institutions in societies, we need to understand how the score in a repeated game translates into the production of offspring. We need to identify the missing link and the underlying reasoning. This link should be provided by some form of social recognition, status and prestige, and is different from the role of reputation arising in evolutionary game theory. It is an important insight from game theory that in repeated games whose outcome for the individual players can be improved by mutual trust, players can build up a positive reputation of being trustworthy and thereby enhance their long-term gains. Your question then becomes a counterfactual one: if the social body were not a system due to lack of interactions, could we still speak of complexity? At first glance, I would say that there could be a full range of intensity levels of interactions among humans, from completely isolated persons, living as mute, deaf and blind individuals or, more realistically, isolated small groups of persons in a wide space, like the nomadic families or tribes (a few families) of the Paleolithic, to a strongly interacting huge sets of individuals like in our modern communication societies. In the first case, the small nomadic tribes, there's no need of institutions: an authoritative and recognized chief is enough. In the second case, the communication society, institutions are many, varied and changing: most of them originate bottom-up as an emergent result of a self-organization process, like in Hayek's view (people with their institutions), some are top-down, authoritarian and despotic (the mass under the institutions), if for some reasons the society members delegate their choice power and empower a restricted set of individuals, or even one only. In general, complex phenomena arise in strongly non-linearly interacting systems. An ideal gas, where the molecules/atoms do not see each other and whose general properties are easily describable mechanically from an atomistic standpoint, exerts pressure on the vessel's wall, but has no Reynolds number and can't give rise to vortices. Of course an ideal gas does not exist in practice: we can approximate it with a rarefied real gas, i.e. with a gas of very slightly interacting molecules for which the Reynolds number is very high. The molecules of this quasi-ideal gas behave chaotically but self-organization and emergence

are rare (a rarefied gas, at too a low pressure for a given temperature, does not liquefy). Maybe, we could introduce something that recalls the Reynolds number even for social systems, where people interact more or less strongly, in order to refer to the possibility of emergence of social complex phenomena.

The Man-State relationship can be represented by a set of intercommunicating particles moving inside a *deformable container*. For a *deformable container*, I mean a particular system in which there is a regulation, completing it, which is mediated by the "conscience of knowledge" of each particle, that I specifically call "Homo Liber". One of the consequences of an acurate knowledge of the Man-State relationship leads to the consideration of the possible creation of a Super-state, in this case conceptually extending its usual definitions, e.g. as the concept of a Planetary State in which ethics and legality consciousness derive from and are granted by Freedom and Progress. We can obtain some consequences from this: first of all that a Planetary State is a self regulating system which is for sure a structured interacting *abstract* elements set, and I want to specify that in this definable (and deformable) "cosmos-sociology", the words "structure" and "element" are to be translated respectively in "rule" and " person". Moreover we obtain that such interacting communicative elements determine the set in *regulating* it (that is structuring it); synchronically, diachronically and topologically forming and defining the system itself. We can for sure derive that the interaction is determined by (and determines) the degree of freedom and culture, and so of ethics and of the norm's consciousness of the individual-elements that constitute it, and above all that such interaction is communicative, and at the same time behavioural, ritual and adaptive.

How can we activate (and study) the possible social meta-*reality narrative* organizational machine, with regards to the human behaviour assumptions, keeping into account the complex connected phenomena of undecidibility, the potential instruction codification, in an apparently programmable universe towards a more and more organized matter, but in the perspective of an unknown and perhaps unattainable future?

If I understand your question correctly you are speaking of a complex system (the super-state) made up, at lower levels, by other 'inner' complex systems which, on their turn, are composed of 'homines liberi' (I like this expression very much! It say a lot without restricting and imposing the choice on the nature of the 'homines') that are conscious, aware of their knowledge, and by that implicitly capable of acquiring knowledge through learning from experience and exchange of information. A 'homo' therefore that is himself describable as a complex system (his mind system, but not only that). The question you ask concerns the possibility of managing this meta-complex system and the way to drive it towards a (possibly unattainable) future. I do not believe that a general answer exists and, moreover, I hope that nobody ever will claim to have such an undisputable answer. History teaches that it's only bad kinds of mass prophets and arrogant dictators that claim to have – or make any endeavour to convince people that they have – such answers. But anyway, without any pretence of universality and very modestly, something can be said to answer your question, at least in part, on how to manage highly complex social systems. First: try to understand as deeply and as comprehensively as possible the mechanisms that operate both individually, at psychological level, and socially, at small, medium and big society level. This understanding cannot be limited to the technical form: it's not only question of identifying natural or social laws (if any) and their applicability, but above all to understand how and why we identify laws, those laws and not other. It's the epistemological question: the question related to scientific method(s), to knowledge acquisition, to the image we perceive of reality and in general the way our mind and knowledge systems work, which, on their side, are strictly connected to the characteristics of the societies we live in, in a particular historical period. Again a feedback phenomenon: we study a society by means of scientific methods and notions that are themselves (one of the) outcomes of the society itself that is under study. This is inevitable and we must be aware of it. And this logical ring almost inevitably will give rise to the onset of some undecidibility situations where we will get stuck. Technical and scientific sound competences are fundamental, we would not know what we are speaking about without them, but the epistemological and philosophical levels are essential as well, otherwise technique is unmanageable. Second: once we are aware of the said mechanisms and of the limitations of our capacity to acquire and manage knowledge, we should make any effort to assist the development of the bottom-up forces arising, both individually and at aggregate levels, from the 'homines liberi', which does not means to leave individual agents completely free to choose and decide what they like, but only to define what the most effective rules are or should be, dynamical rules changing over time and space. This again is a difficult problem, but managing complexity is always a difficult problem to cope with! Many sociological specialties today do not have general theories. And the sociological theory itself has become a fragmented and hyperspecialized sub-discipline without integrating issues and paradigmatic debates. Postmodernists make an important contribution to contemporary social thought by dramatically addressing the scarce relevance of compartmentalized social theories. They have confronted some of the most novel and potentially important social conditions ignored by sociological theorists. One could say, however, that the rejection of global theorizing by a figure such as Jean-François Lyotard (and others too) prevents them from conceptualizing the epochal changes that their theories presuppose; in the same way, also the dismissal of history and of 'the social' made by Jean Baudrillard contradicts the application of his conception of simulation in critical theories of contemporary culture and society. The postmodern critique forces social theorists to rethink their presuppositions, the meaning of their practices and the relationship of theory, history, and politics. In particular, it challenges social theorists to incorporate into their own work postmodern questions about new technologies, new configurations of mass culture, new social experiences and movements, and new forms of cultural fragmentation. If this challenge is taken up, the (vaguely hostile) meta-theoretical answers of the postmodernists might finally lead to a renewal of the critical social theory and even revive its progressive political project. Let me finally once more briefly mention Michel Foucault. Foucault pessimistically describes the ordering and reduction of what he calls «les multiplicités humaines» by a secular morality that utilizes the ideology of helping others to justify overarching social control based on moral surveillance. While extremely dirigistic regimes (he calls them «panoptismes») emerged in the form of prisons, mental hospitals, and other asylums in late 18th and early 19th centuries, the modern method of discipline and surveillance institutions spread rapidly to new sites. Consequently, the emergent professions of medicine, psychology, education, public assistance, social work and so on produced a universal reign of the normative, based on omnipresent self-

surveillance. The modern system of control differentiates and hierarchizes everywhere: individuals are produced as subjects to become useful and docile, adjusting comfortably to social domination (maybe it's noteworthy to observe that Jean Baudrillard argues that the modern disciplinary order described by Foucault has been superseded by postmodern fascination, simulation and deterrence; instead of social control based on a mixture of direct coercion and self-regulation, the semiotic control system operates by programming). Foucault argues that the modern subject is a product of the Enlightenment efforts to make man an object of scientific knowledge and of social manipulation by new disciplinary and therapeutic institutions. According to his studies of the interplay of knowledge and power, the subject's highly refined capacities for self-observation and self-regulation harden modernity's 'panoptical' regime of discipline and domination by elevating social control and cultural homogenization. While Foucault's analyses of the dialectic of domination and resistance establish a critical micro-politics, his arguments suggest that domination, originating from the imposition of power and knowledge, is virtually in all features of modern society. The system of control is so monolithic and overpowering, in Foucault's view, that it is hard to envisage how any meaningful social change might take place from within. Moreover, his rejection of macro-politics undermines the efforts to develop theoretical forms to address regional, national, or international publics about global social issues and to facilitate large-scale collective actions or interventions. Well… we should all be well aware of Foucault's considerations of the State-regime actions over society that are far away from 'Freedom and Progress', and we should strive to adopt a more fruitful complex view: that of the social bottom-up self-organizing systems.

The DNA Structure of the Quantic Cat? Meditation from the next book of G. J. Chaitin

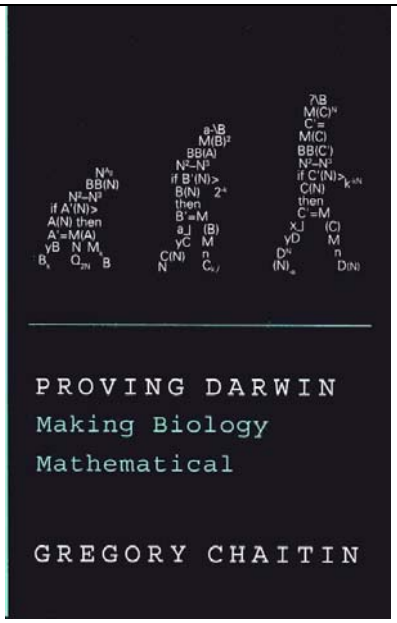
(D.P. Errigo)

According to ***Metabiology*** the purpose of life is creativity,
it is not preserving one's genes.
Nothing survives, everything is in flux,
"*Ta panta rei*", everything flows, all is change as in Heraclitus.

Metabiology is a new kind of theoretical physics.
Metabiology deals with software,
that is what genetic information is,
that is what DNA is.

(G.J. Chaitin, *Proving Darving: Making Biology Mathematical*)

When I was asked to write about Chaitin's new book *Proving Darwin: Making Mathematical Biology*, I immediately thought that this was not an easy task, also because we can't reduce to a "sound bite" pages full of meanings, involving also Informatics. And it's just Reductionism that dominates from Descartes onward, that has always forced us to simplifications that in no way correspond to the actual reality as studied and described by science. Indeed often, the less perspicacious reader, isolating sentences from their context, is influenced to conclusions that often predispose to misunderstandings.
But after reading the book I realized that my task, thank to the Author, so clearly elucidating his theory, was much easier.
Moreover it's remarkable that its brilliant originality and informal strongly communicative style helps also the not initiated reader entering what, at first sight, *provocatively* appears to be a kind of complex *joke* in "mathematical biology", but that suddenly and at the same time becomes a serious construction introducing *Metabiology*.



Gregory J. Chaitin
PROVING DARWIN
Making Biology Mathematical
Pantheon Books - New York, 2012-07-09
(www.pantheonbooks.com)
ISBN 978-0-375-42314-7

THE CORE

Let's try to deal with the Author's assumptions starting from the title.
How can we demonstrate how Darwin's theory operates at a math level? i.e., is there a mathematical model that unifies, into one single coherent system, the various branches of biology? And then, physically, was there enough time for evolution to create all the biological diversities that currently co-exist?
The challenge is really very important and extremely involving and Chaitin starts from (in strict chronological order) Solomonoff, Kolmogorov, and himself, about their studies on the algorithmic method they use for what regards Information, Probability and Statistics.
It is a complete and also exhaustive formalization. From this the Author starts to formalize also Biology. That is, he wants "*to lay bare the deep inner mathematical structure of biology, to show life's hidden mathematical core* " (p. xv).
And accordingly our organisms become mathematical entities, or better they are, in their essentiality, "*extremely ancient*" pure software that exists and is floating in the programs' space, thought as an environment of adaptability.
Necessarily the evolution of these single software organisms' system can't be studied nor inserted into the usual theoretical physics spaces of the phases, of the configurations, but in a new field in which we consider no more valid criteria and methods of traditional science, but only those who maximize creativity which permits "*to break the rules"* in order to find "*a beautiful mathematical theory for biology"*.
The mutations from one organism to another are algorithmic mutations that combine the act of probable mutation and selection in a K-Bit program step.
It turns out that in this model, in which we provide a way to compute what can not be computed -the oracle- there are no causal but only randomized mutations. And that ultimately, the biological creativity corresponds to the speed of evolution, that time is simply the number of the attempted steps in the "*random walk"* and that randomness is creative thanks to intelligence that emerges spontaneously.

SOME THEORICAL ASSUMPTIONS

What can be we draw from these ideas about a new mathematical theory of evolution?
It's on an *objective evaporated reality,* as Heisenberg says, that Chaitin is looking for the real substrate that can bring coherence to the whole biological structure.
And Mathematics, even with its uncertainties and incompleteness, can provide the suitable equipment.
Between the Hard and the Soft this last one is privileged: the DNA, as "*a universal programming language"*, the information base that regulates the whole living system and that, in every living being, is considered for its conceptual adaptability to a routine rich in sub-routines while calculating *a posteriori* their evolutive probability based on minimal steps that may or may not lead to loops.
Often a truth is nothing but a lie overturned, then it can happen that is not the method itself, but the way to following its path, that leads to fictitious conclusions.
Therefore it is not a question either to verifying in a traditional sense or to falsify in a Popper's way, or using Kuhnian "paradigms" to point out alleged sets of theories with universally accepted appendages, or even to turn to research groups which are more or less slightly different among them, like Lakatos'.
Neither to destroy everything in a Feyerabend way, in an attempt to *re-normalize* a dispersed mosaic, but merely to take advantage of its criticism's essence that is *in science one only efficient method doesn't exist*. We have just to check whether the principles of the inductive-deductive method, mixed with the experience, follow or not a correct path. We so need a new theory, which presents itself like a meta-theory, in this case a new *Metabiology* which considers *life as evolving software*, that preliminary explains its exploratory attitude and not only the object to be investigated.
Deleuze says that a theory functions exactly like a toolbox. But if there were, as there are, undecidable propositions, indemonstrable truths, immeasurable realities, how can we construct these new theories just to be simultaneously and totally supporting *uncertainty* on the one hand and *certainty* on the other?
Chaitin gives the answer, starting from (and developing) Schrödinger's assumptions on life and on the negative entropy's meaning in order to produce a biological order inserted in the physical reality growing disorder. And so in the whole universe-system.
Starting from the assumption that there is a clear and defined compatibility between the Turing's **"alt problem"** and Gödel's **"incompleteness theorems"**, in a range of theoretic possibilities, Chaitin shows how Informatics, in its bases, can simulate a real appearance just because it is aseptic and so neutral: it is not like theorical physics which needs a metaphysics of reality just because of its constitution and its foundation.
And all this through an existing programming *"in power"* and therefore already present in our DNA: this implementation is translated *"in act"* through minimal steps to maintain the succession of those dynamic equilibriums that are the basis of the chaotic aspect of life itself. A particular Aristotelian vision included in the chaos dynamic equilibriums theory, posed by a Neo-Pythagorean
Chaitin's audacious ideas are also strengthened by the recent discovery that, million of years ago, a tiny "quid" generated the self-duplication of the ***Srgap2*** gene, which is cause of the complexity of the development of the human brain since, decelerating the neurons' development, it emphasises its inter-relational features.
The program which is subtended to that "quid" must be equally very small: certainly it is compounded by a few K-Bits, just as Chaitin states about the mutations in minimal steps in his interesting book.
By the way, I think -however- that if we wanted to actually simulate the human brain's evolution, structures and functions (with all the exchanged informations which are merely analogic, since the human brain's energy consumption is very small and the biological informations' transfer speeds are relatively small) an omni-inclusive maxi-program should not need the use of exaflops.
Usually what we systematically join is homogenous. And we believe this possible when the carrying structures are comparable and compatible. We have been up now overwhelmed with the prevalence of the Digital that -at first- has

assembled (according to it) a brain *in the same likeness* of the human's, then -time passing- has axiomatized that the human (to simulate) was like the digital's. In this way there was no substantial difference neither between the inanimate and the digital, nor between the digital and the human.
Dissimilarly, the Analogic is modellizzabile like the human (actual biological structures) with all its (intimate, personal, public, social) manifestations, and obviously either in Boolean logic and in fuzzy logic. If we place on the level of equivalency and analogy, we will have no dichotomies.
I think that, as Chaitin does, we have just to rewrite the foundation of an enlarged Biology in which there is not only the fundamental theorem of biology (the DNA that dominated, at least until the new model as conceived by Chaitin, also because now we are speaking of RNA) but also the carbon-silicon equivalence.
So then the knowledge filter and the consequent domain will be different.

SOME THEORETICAL ASSUMPTIONS

Chaitin, with its modelling hypothesis, has created a new paradigm in Biology as Luhmann did for Sociology, and Heisenberg in Science Philosophy. From the structure's point of view of a science branch it doesn't matter the substance in itself, but all that it represents in terms of communications, informations and relationships. We obtain as a result that what it is no longer important is the Schrödinger's cat (in which a macro-system -living and so mortal- is studied using the same methods of a microsystem (usually a not living one and so immortal, and only rarely strongly interconnected, and so living and mortal) but the DNA program (an almost-living micro-system) or one of its parts, of the same cat: just at the quantum level.
We can even say that, starting from the DNA essential substrate, overcoming the mind-brain dichotomy, our entire universe can be considered as a distinctive all-inclusive biological system: physicality and mentality coming from any point in space-time, and this system so organizes itself so that we can call it God. Therefore God presents Himself as a structured, defined universe, that contains everything and that is in everything, in the supreme harmony, dare I say He is musical mathematics of which we know an increasing part. But only a part.
Often the Beautiful is not always the Good. As indeed happens to human societies. And this in spite of he famous ancient Greek assumption of the *kalòs kai agathòs*.
I think that to give a proper philosophical evaluation of the model that we are looking for, and that it is here proposed, we must seek first the sense of being, but in what Being-Entity? If the problem needs to be transparent, we have to clarify the ways for its search: penetration, understanding, explanation, choice, access. The methods and paths of the quest are characteristic of that same Entity that we are trying to find: the Entity that we already are: the Human Being.
So the Man, who raises the question of the Being's meaning, is that same Entity in whom he seeks that meaning. The man is always "in situation" or better "thrown in it" and in a strong (dialectical) relationship with it.
The same Man who doesn't let himself being reduced to a simple concept of presence (the classical metaphysics being). Things (in which the Western Philosophy found out the being, making them objective) are present to him because he is the Entity "for who". The way of Being of *Dasein* is existence, The *Dasein* is a possible-being.
All this to say that this book also responds to theoretical questions about Existence, because, justifying the organisms' transformation, also determines their conscience's validity. Even if we must say that moving deeper into Knowledge we more and more expand our mysterious understanding and obscure awareness.
Finally, what about this book?
It is a true highly scientific, pioneering, provocative and above all enjoyable book.

Are there other unfoldings of the human rights' paradox in Brazil? A matter of observation by the theory of autopoietic Social Systems (G. Schwartz)

In a specific text, Luhmann approaches the three ways of unfolding the paradox of human rights. The backdrop of his analysis is his theory of social systems including the ideas about autopoiesis It is the only paper written by Luhmann with the aim of observing and describing them. There are, of course, references to this matter in other of his works. Luhmann's train of thought of that first essay will be followed in this paper as we see fit. On the other hand, it is important to remark that this essay will keep a step away from Luhmann's book about fundamental rights for reasons explainable by the traditional way of thinking law. It is evident that besides their specific functional differences – because each of them apply to their own singular roles – in the social system, we must remember the fact that his work about fundamental rights does not include the innovations brought to his theory by autopoiesis. It is clear, therefore, that the proposed observation has autopoiesis at its core, discarding a mere functionalist approach. I assume it, along with Luhmann, as the central point of a truly global society. It is also correct, therefore, to think of a center and a periphery in a global scale. Other than meaning an inequality, this reality will be treated like a distinctive unit that allows for the existence of a center in a periphery and vice-versa. It won't be denied that society lives in a permanent state of disdifferentiation. The meaning of human rights is therefore affected by communicational noises depending on the point of view of the observer (center/periphery). Thus, to verify if there are other forms of breaking the paradox of human rights in Brazil into smaller pieces, one cannot but pay attention to the existence of several centers (policontextuality) of normative production, including human rights. This conception, which is Teubner's, is especially fruitful if placed side by side with its hypercycles. This connection allows for a better observation of the disdifferentiation phenomenon. Moreover, Marcelo Neves' thesis of Symbolic Constitutionalization by the prevalence of the economic code above all others in peripheral countries (Brazil), which causes a (dis)juridifying constitutional reality, overwhelmingly affects the question of the paradox of human rights, because, for him, instead of an autopoiesis, there would be an alopoiesis. A last contribution, by Jean Clam, stating that the social system of the law has so much specialized (dedifferentiated) that it would be possible to talk of a specific autopoiesis of the law, built from very particular operations and decisions, is also able to help on the search for answers about the ramifications of the paradox of human rights in Brazil. None of these would be valid, nonetheless, without the prior understanding

of the value of paradoxes in the autopoietic social systems. They won't paralyze the system. They will be essential, in a specific case, to (re)create the meaning of human rights. The question, therefore, will be how to manage them and, thenceforth, how to deal with their developments.

Perception of Complexity (*C. François)*

Complexity and Systemic Models (*C. François)*

Systemic Evaluation of Complexity (*C. François)*

Identifications Boosts Conflicts: a Managerial Paradox *(D. Simoncini, M. De Simone)*

In business organizations people are often engaged in groups within which they can identify themselves: they may feel similar by generation, by role, by sex, in opposition with other groups with different traits, implementing a divide between people involved in different identifications. Power, control and conflict dynamics between social groups are widespread in our business organizations. A growing interest is witnessed in studying these dynamics from a Critical Management Studies (CMS) perspective. These studies are unified by an anti-performative stance, and a commitment to reflexivity; they observe how the dominance of a positivist and reductionist epistemology averts the enaction of a 'critical reflexivity' both in management and organizational studies and practices. According to these stance and commitment, our aim in this paper is to start a critical reflection in organizational and management studies upon the business widespread practice of identification with its conflict effects, suggesting the possibility to address these dynamics from a complex perspective. We start focusing on the identification and identity issues in business organizations and their general application in management practices; in the second part of the paper, we explore from a critical perspective the implications deriving from these managerial practices and how these practices may foster conflicting relations with their inclination toward a positivist and reductionist approach. Finally, we consider what constitutes a new perspective, founded on addressing power, control and conflict dynamics from a complex point of view to overcome possible conflicts between groups and generations in business organizations.

Systemic sustainability of public debt *(G. Ercolanese)*

The main feature of a biological, psychological or social system is the high interconnection amongst its parts. This interconnection, on the one hand, makes the whole system greater than the sum of its parts. But, on the other hand, it causes a huge instability in case of fluctuations.For many years the public debt, both as destabilizing and as economic factor of the entire social system, has been the political link on which nations (especially Italy) were built. This has caused a distorted economic growth as well as biased social relationships, and has consequently produced tensions that are likely to explode causing instability of the whole world system.

Nuova Atlantide 3-2012 (D.P. Errigo)

Dear WCSA Colleagues, Partners and Friends,
with this issue we complete the third year of collaboration with our Academy. It just coincides with the great result of WCSA III Conference in Vienna which gave us a further possibility to meet and debate with important Scholars from all over the world. That is why this issue is about this very important meeting.
From now on, starting with the first issue of 2013, some changes are in work in our journal to adapt to international systems of accreditation.
These structural changes will take place just to keep on helping the Authors in increasing the value of the their researches' outputs for their examination procedure.
It is an editorial effort that I hope will reach the goal of having a more and more complete and apt review to face the challenges of this time.
Moreover there will be also changes in the procedure of the Double BPR (see page 3).
We strongly believe that this is a winner path to keep on qualifying our journal.
It is a continuous research that moves in the perspective of improving our inner and outer organization and promote the best qualitative results in the academic world.
We are all aware that the focus is shifted on the structural interactions that we are able to manage within these specific system's dynamics, but we are fully aware that this is the only way to move on.
Thanks to you all and all my best.

Cari Colleghi, Soci della WCSA e Amici,
con questo numero della Rivista completiamo il terzo anno di collaborazione con la nostra Accademia.
Coincide proprio con il grande risultato della nostra III Conference di Vienna che ci ha dato una ulteriore opportunità di incontrare e dibattere con importanti Studiosi da tutto il mondo. E' per questo che questo numero è dedicato a questo importante evento.
Da ora in poi, iniziando dal primo numero del 2013, saranno in cantiere alcuni cambiamenti nel nostro giornale per adattarsi al sistema internazionale di accreditamento.
Tali variazioni avverranno proprio per continuare ad aiutare gli Autori nell'aumentare il valore degli output della loro ricerca ai fini concorsuali.
Sarà uno sforzo editoriale che mi auguro possa raggiungere lo scopo di avere una rivista sempre più completa e adeguata a fronteggiare le sfide del nostro tempo.
Inoltre ci saranno dei cambiamenti nelle procedure della doppia BPR (vedi a pag. 3)
Noi fermamente crediamo che questo sia un percorso vincente per continuare a qualificare il nostro giornale.
Si tratta di una continua ricerca che si muove con la prospettiva di migliorare la nostra organizzazione interna ed esterna e promuovere i migliori risultati qualitativi nel mondo accademico.
Siamo ben consci che l'obiettivo è focalizzato sulle interazioni strutturali che siamo in grado di gestire all'interno di queste specifiche dinamiche del sistema, ma siamo pienamente consapevoli che questa è il solo modo di agire.
Grazie a tutti voi e un caro saluto.

Synchronicity and Asymmetry: Space and time bifurcations' conjunction (M.R. Astolfi)

Is knowledge knowable?
If not how do we know this?
(Getting even, Woody Allen)

Any given day we are presumed to solve important political, economical and social interrelating problems (the pure essence of every epoch) retaining to disperse internal and external blind clouds.
Through combining closure and openness, we are trying to reconfigure complex systems to manage the scenarios and with the differentiation of structure and processes, on a new level of ordering, we are continuously tending to the optimisation of choices, path and methods.
And the process of selection, or of "self-selection", is the only possible way to make a choice, that is "a transformation of chances into structural possibilities" (Luhmann, 1995), and so reducing complexity in the multiplicity of high heterogeneous plausible occurrences in the temporal horizon of the "observed" present.
We create new horizons to construct always new systems' systems well knowing that the systems' succession is not infinite and the subsystems' inflation can lead to reductivism.
Theoretical assumptions and descriptions can make quite clear the regulation we want to obtain with a selective distinction of advantages and disadvantages and of favourable and of incomparable interdisciplinary exchanges and interactions.
The most possible wise decision-making, to admit and stand for fundamental directions, and reject alternatives, is conditioned according to a survey which is developing into the asymmetry of systems' relationships performances.
What we want to do here is to integrate the Knowledge functions and the communication processes with the production of more and more means of knowledge to help involving real time adjustments, corrections and supplementations in the differentiating bifurcating system theories evolutions.
Does this always imply the irreversible temporal course of time or/and the complete synchronisation with the environment?

"System can prepare reactions and store them for when they are needed: they can react to momentary opportunities or disturbances with long term processes or even defer the reaction without breaking down in the meantime" (Luhmann, 1995)

Orientation, interpretation, understanding, information, sense of direction and of limits, tied up among each other, in a not only symbolic interactionism, are integration of the various dimensions and technical assessments or remediation interventions from their respective temporal positions, formed over known and unknown new boundaries.

A strong attention to interchange and melt, with Knowledge as a strategic approach, helps us to find out and form the basic code which indicates the principles of the archetypal domain of systemic, or better creating a wide range of meaning processes that leads to the necessity of reorientation towards the future

We can say that the expectations (as temporalized ranges of possibilities guided by asymmetrisation) that emerge "are the relationship between structure and action" (Luhmann, 1995).

The interpretation of action as event in the integration of reciprocal perspectives (according to their differences and to the possibility of their co-existence) is at the basis of the scientific research and to a most possible rational decision making.

This Nuova Atlantide special issue is intended for arousing a series of new perspectives and expectations, especially for who is searching for new suggestions and for a net of interlocutors for exchanging opinions as well as exchanging new materials.

We publish here the net of proposals we received to form the body of WCSA III Conference talks.

It is not easy to summarize the complex intricate analysis as such as those presented in Vienna and, in this Issue, as hints and provocations under the form of Abstracts, but we can say that the great adventure that discovered the systemic approach and its outcomes is here still continuing in full.

All the Authors here submit their proposals clearly comprehensive of their visions of systemic.

We think it is noteworthy that with their topics, these extraordinary Scholars from all over the world have synthetically expressed their point of view and their more recent researches as Observing Observers in a society in which there are no safe points of observations.

They keep on handling the complex possibilities that occurs in Mapping Systemic Knowledge at all levels of its formation and its relative degree of complexity, looking for formulas that can link social theories, evolutionary theories and theories of the media of communication.

It will be interesting to activate the analysis of the differences, together with all the interdependencies, on whatever level, among the Authors' assumptions through the structure of their themes, to select which items we need and are interested in for the evolution of our researches.

What motivates our professional seek, in the way of our goals, is to give our readers the perception of a open and evolutive "systemic identity", through communication, that can be grasped in the horizon of present possibilities, with the help of relevant distinctions through selectivity, to help to face complicated and complex real problems, including all the possibilities within a concept of Global Vision.

WCSA - III Conference Nov. 18TH - 19TH, 2012 – Vienna – program

Global Rituals of Knowledge Beauty *(M.R. Astolfi)*

You are welcome to the III WCSA Conference. It's an honour and a great pleasure to have you here in this splendid location.

You well know that conferences are meetings driven by intricate intellectual pleasure and exchanging knowledge beauty.

We can see them as processes based on dynamics which at their turn are based on the need of a continuous devouring something new and of constantly changing ancient forms-elements-contents-minds-ideas.

In their ambiguous simplicity, they are so elaborated and complex in providing also the terms for insights and methodological verification of evolutionary theories.

So what we are to experience here during this III WCSA Conference is a complex phenomenon that serves as a heuristic interrelational tool just to exchange concepts, methods and new ideas, to give way to multiple considerations and samplings and to introduce intertwined dialectic discussions about the systemic approach, its full functions and goals.

What we want above all, is just to realize and demonstrate the idea that when seen synchronically high complex matters clearly appear to be intertwined as Luhmann said (1982).

But what WCSA want is to more and more strengthen the global knowledge net in which scholars and researchers work and interact to exchange and structure the systemic approach evolution in a strategic vision of possible futures.

What we mean, what WCSA means, is that with your cultural and scientific investigations we together are tending to create a more and more general systems' theory, introducing always new differentiated and differentiating norms and laws in differentiating evolutionary global interrelating systems: "A differentiating system is only a system because it has arisen from process of differentiation" (Luhmann, 1982), with the goal of creating a global integrated evolutive "Mundus" system.

That is why we here need adequate different multi-alternatives of knowledge in every field and from everywhere.

We know that "Knowledge is the condition for and regulator of learning process, more precisely for building learning possibilities into the existing structure of expectation (Luhmann p.328), expectations that are evolving over time in a recursive disordered, non linear, unpredictable universe or multiverse.

And so WCSA is searching a formula, a new multi-dimensional formula-matrix, which should be contemporarily closely structured but opened, including and excluding, symmetrical and a-symmetric, generative and non linear, in a

dynamic exchange in an evolving hyper-complex prospective, toying with the idea to follow the path of abstraction to increase "the probability of the improbable" (Luhmann 1982).
And this in the conceptual and theoretical construction of a systemic integrated Knowledge.
Both our and your comparative studies in their specifications, re-specifications and generalizations become a global framework in order to generate and reinforce a more and more self-expanding knowledge, a new thinking about complexity in a fragmented and compartmental given uncertain reality, with its multiple truths, connecting dynamic entities, evolving over times in perspectives of different organisational border of meanings which move forward uninterruptedly.
Thanks to WCSA we are here to provide an overview adapt to continuous changes in complex interdisciplinary and high innovative environment and introduce and build a more and more complex adaptable representation in the systemic learning environment with high dimensional landscapes, what we can define a real and complete authentic Map, an important step, but still looking for further integrations in a net of interrelate Knowledge.
The focus is in communicating your researches that will highlight the conditions to identify the consonances and the dissonances, the convergences and the emergences, the selective structural connections, the conflicts and the contradictions, the procedural changes, that is the coordinates and the dimensional comparative data to regulate and coordinate the contents, the methods and the goals for the construction of an evolving efficient integrated model in the multidisciplinary realm of systems' theory.
The WCSA here wants to achieve and sustain excellence, the emerging and innovative paradigms, encouraging contact with the full potential of highly engaged systemic knowledge leaders, working in a continuous negotiation process, in an innovative energetic and positive systemic Knowledge ground.
Knowledge ground of which we are here a sub-system, an interconnected network, exploring, from different angles and in a variability of contests, a set of problem with an experimental attitude in the perspective of their "improbable" selective solution.
And questions about conditions of probabilities and possibilities just arise from the communication flux in a continuous lack of informations caused by an inner structural complexity.
That same complexity that leads to a strong casual and causal selectivity (in an asymmetrical tempt to simplifying) trying to organize what we can only perceive as the "unorganized", and this with a concrete risk of failure at various level of an entropic differentiated reality.
Well, we form just a self-referential sub-system which is neither blind nor bind within its boundaries, but it generates changes in the emerging of new organized knowledge structures of meanings, opening to and actualizing potential hierarchical shifts, in the ideological cultural turbulence we live in, with the creation of "the difference which the difference makes" in a self generating horizon of surplus references.
Thank you for being here. Thank you very much.

WCSA as an Hypercitizenship Lab *(A. Pitasi)*

Analytic and Systemic Approaches Two Sides of a Coin: The Example of Structural Theory *(J. Seethaler)*

WCSA - III Conference Nov. 18TH - 19TH, 2012 – Vienna – abstracts

Extending Simons: using the Dual-Perspective to understand the Distinctions between Nonviolent and Violent Rhetorical Philosophy *(Tyrone L. Adams, Se-Jin Kim, John R. Couper)*

Many of us have not always succeeded to make an effort to fully understand the nature of conflict, the needs of "Outs" and "Have-nots," and the utility of conflict for societies. According to Simons, this is because the majority of us have had a tendency to reflect "Establishment" biases in treatments of persuasion in social conflicts. This paper thus utilizes a "dual perspective" as a lens to view the two positions: nonviolent and violent rhetorical philosophy. Specifically, it provides the reader with an understanding of: i) a classic view of rhetoric; ii) the justifications offered for nonviolent rhetoric; iii) the justifications offered for violent rhetoric. In essence, it would be ultimately up to the rhetor's choice which philosophy should be employed as strategy, depending upon the context, circumstances, and actor psychologies assembled to give praxis birth to either position. Finally, it would be beneficial for researchers to look into more effective ways to expand the common ground between the two distinct philosophies. In doing so, we will be also able to find better ways to induce more increased cooperation between humanists and behaviorists as Simons originally suggested. Such efforts will eventually help us to more comprehensively understand the nature of conflict, the needs of "Outs" and "Have-nots," and the utility of conflict for societies.

Violence in close relationships and the dramaturgy of violence *(I. Bartholini)*

From Antigone to hypercitizenship: a systemic search for a granulary world *(F. Rubba)*

Sophocles' Antigone from V aleria Parrella to Eva Cantarella point of view is the witness of the glocal right, focused on the conflict between "polis", "local" law and the universal meaning of justice. The modern Antigone from

*V Parrella overlie the death: her choice is a flight against local boundaries toward universal friend ship and citizenship**.** My stand point is that Andrea Pitasi would agree to define the Greek princess hypercitizen ante litteram!* ***As a matter of fact the key hypothesis of his italian book Hypercitizenship is to demonstrate that to gain Hypercitizenship it is a possible challenge; May be it is a core value to face the complex granularity of our fuzzy world.*** *To change the perspective from value to constellation (Pitasis hypothesis) it is meaningful to law and juridical foundation of citizenship . Empiric world over and over seems to confirm Pitasis audacious hypothesis. Virtual and real world boundaries have been narrowing: as in defence and military tactic handling So we can state that to gain insight on Hyper citizenship is a to realize a soft easy way of living :* ***to Keep it simple—but meaningful****. To improve organizational health a powerful mean is simplicity. In short, don't let the metrics get out of hand. Hypercitizen NETWORLD goes over:* ***site, to contact, forum*** *(the key world of networld browser) are scheduled to support hypercitizenship need of search.The networld constitute a browser which may handle push and pull gathering of evidence. My stand point of Evidence reviewer and MD is to trust Andrea Pitasis challenge and to support audacious idea of Hypercitizenzship foundation of human rights. As Antigone said: it is no time to stopping search… only by a new dream the future can start.*

Book Review: "La persona nella teoria sociologica contemporanea" *(V. Di Simone)*

New Atlantis (D.P. Errigo)

Dear Members WCSA and dear Friends,

As you can see, to keep on our strong engagement to improve the important results that our journal has had in the cultural international panorama, our four monthly journal "Nuova Atlantide" has transformed its format: it is now the Six-monthly "NEW ATLANTIS", completely in English.

These are some important innovations for our Review, and there are some others we are planning to achieve even better results in the international scientific research field and also for giving our Authors a more important tool to exchange ideas and knowledge.

This new editing of the Review is due to the extra efforts of our Editorial Manager and all the Editorial Staff that we must absolutely thank for the interesting results.

According to the policy of our WCSA, this number is a Special Issue dedicated in particular to the Systemic Sciences Complexity and the Global Energy Agenda, that's the second part of the Proceedings of the II WCSA Conference (Palermo 2011), a collection of eight different, but interdependent, specific papers on the theme, preceded by three brief introductions.

We are making all the possible effort to be sure that our Review will increase in worldly importance and all the Authors help us to reach this goal.

For the best editorial results we are asking all the Scholars and Researchers to strictly follow for their papers the Pre-Editing Rules that appear at p. 3.

Thank you very much for your extraordinary contributions and for your strong collaboration.

Looking for Incommensurable Social and Environmental Anomalies in the Scientific Technological Revolution

(M.R. Astolfi)

Are there new approaches to understanding the evolution of a Scientific Technological Revolution in the systemic global scenario? Is there a decisive shift in the methodological approach to solve problems and in particular energy problems?

The full awareness is that we are now preparing for further significant changes.

We are not only following the main current theories and methods to measure the processes of transformations and the strategies of systems' aggregations and modifications, but we are looking for more precise approaches to describe and explain the situations in more details, trying to link all kind of new (even abstract) facts, related or not.

We are continuously analyzing and reconstructing the separating, yet inter-connecting, differentiating elements' models with the specific purpose not only to recognize, but just to intervene in the formation/evolution of the systems.

Finding the potential conditions, we look at every improbable differentiation, concerning important aspects of the context, to help the mapping out of the stricter selective relations which are self-forming within the ever expanding systems and their environments.

We so think that, with a correct insight, we can make possible the unifying and the connecting of the various interrelated problems and the comparison of the various issues and frameworks

As we are interested in rapid functional conclusions and the referring planned hypothesized procedures have to support our evident coherent conclusions.

Let's consider the possible constant disintegration of the system's elements, necessary for the system's autopoietic reproduction.

The changes in the system's states, which move through stability and instability, have an enormous impact on the growing development of informative meta-model patterns that are a way of asking/answering key questions and to clarify operational strategies.

It's just to find out a functional way to understanding and acting in the more and more complex world.

The economic, law and technological scientific researches, which are immaterially directed system (Luhumann 1984), are here represented in their different applied methodologies, exploring analogies and differences in their relative degrees of complexity.

Emerging and consolidating flexible and adaptive strategies are at work.

But are they surely guiding in generating comprehensive and accurate concrete new ideas and new way of thinking?

Systemic aggregations of different models, skills and techniques try to act effectively on sustainable energetic policies, on the connected contemporary financial capitalism and on strategic choices.

And even if following up particular interests and applications, they become tools for change in a changing world.

The different Authors here give us a very useful feedback to describe what they differently do for the development of resourceful models of excellence on the basis of expected results.

And, above all, how their solutions give access to the range of possibilities that are proving valuable for increasing the best practices and for taking the best possible operational decisions.

They concern aspects of social, financial and energy policy's new knowledge and new discovered reality identities that may challenge the traditional past technological approaches and thinking.

In the formulation of the problems, there is a keen control of the rules that contain the analysis protocol of the quali-quantitative aspects which are exposed to procedures and monitoring frequencies for preventing potential failures in the dissolution and recombination of anomalistic contents.

The purpose is to make possible to achieve opposite goals in apparently different perspective for conflicting decisions in an accessible form against the background of many other possibilities.

Anyway if we treat with stability or deviation, we can synthetically say that any normalization can't always determine the illusion of normality of an improbable methodological practicable recipe.
What we need and want is that the exchanging of ideas and the implementing of Knowledge become a strategic method to give way to multiple considerations and samplings of important political economical, energetic and governance possible and sustainable solutions assuring plain speculative explorations by focusing on interconnected thinking strategies
The described theories, the experimental manipulations and the structured experiences are efforts to manage the different but inter-connected complex situations with a technical faith in solving conflicts.
Moving towards an accumulation of knowledge, we try to encourage a new thinking and potential approach shifts.
Through informations, choices, decisions, functionalities, we try to do an important and decisive work in presenting the fundamentals principles, values, belief, capabilities and the possible tools to explore the right tracks of the interconnected strategies and their evolving path (in accordance with their inner and outer dynamics) looking constantly for excellence.

Review of "New Thinking in Complexity for the Social Sciences and Humanities" *(M. Bonazzi)*

Energy issues within contemporary capitalism *(M. Ruzzeddu)*

We are looking for a new scientific and cultural paradigm. Are we ready? *(D. Simoncici)*

A Service solution: Efficiency. An optimizing logic *(M.R. Astolfi)*

One of the most interesting assumptions that we can finally derive at different levels from the discussions in these papers concern the concept of *efficiency, as a potentially changing optimizing directional action and effect in a scenario*, and this through personal elaborations of various topics and cases.
Of course it is a simplification: we accept the logic of this point of view starting from a kind of content analysis approach to all the considered texts, and the information they contain, that indicate various common structural associations of contingencies, recursions, interconnections and even goals.
It is a shared path, even if with different rules and contents, that's represented with distinctive informative recognisable features from the various disciplines.
They are relevant to a question that is the absolute and pressing need to identify priority research tasks for future knowledge and actions to influence the social system in focal processes just to give *efficient* solutions to the various presented, different but interconnected, problems.
Efficiency so becomes a kind of *supra-system* and/or an *intra-system* that we can now better understand even if it is still not measurable but only potentially pre-determinable.
It is creative and virtual but also interconnected and inter-relational.
It refers to a dynamic dimension so it implies constant feedback control-loops (as there is no possibility of casual performances) so to gave always new dynamics equilibriums to the global auto-referential system of systems.
Its potential evolution concerns innovating complex presuppositions: it forces to selection, just to self-constitute itself, trying to achieve the best possible choice, so accepting risks and promoting their expected reduction's degree for further behavioural possibilities.
It is still, and it will be always incomplete and not fully manageable, but its operative insights are leading to not only hypothetic competitive and advantageous theorical or theoretical designs, based on expectations and mutations as forms of orientation, but also to the fulfilment of more explicit security and better organizational needs.
In these papers we have the demonstration of the interconnection and value of *efficiency* applied to operative business, bureaucracy, energetic technological problems and resources, technical and financial tools, biocapitalism and their interconnected risks.
Here the Authors formulate the problems and the concepts, and base their conclusions starting from a correcting evaluating the current State -of -the –Art data just to define the main global complex and interconnected present and future needs and possible solutions.
Efficiency starts from a costs and benefits informative analysis and structures itself in what at last becomes a more challenging situation in which researchers know, chose and select systemic sampling techniques in a complex integrated global evolutive world scenario.
Data quantity here reported show the differences and the influences within the concerted actions that can derive for the activating of several area of scientific, social, political, institutional, neuro-marketing and financial efficient approaches in a regulation that can reduce the disparity and increase the models and the procedures available for assessing and managing vulnerabilities and risks.
It is as if these guidelines were used to expand the views in a scenario that can often be transformed from an hypothetical to a possible reality. These become a methodological, instrumental and technical know-how for short and long terms applications.
The way for the desired direction can be easily distinguished in a complex reticular structure of possible interventions and of outlast adaptations at every level.
The arguments' characterization of the topics establishes that there is anyway a substantial need for identifying and training common starting points codices and procedures for a prior identification of useful end *efficient* decisions and choices.

Embedded systems for energy efficient buildings: the eDiana platform *(S. Cincotti, D. Anguita, G. Gallo, L. Ghelardoni, G. Frugone, M. Ghisi)*

In this paper, the eDIANA platform is presented. eDIANA addresses the need to achieve energy efficiency in buildings through innovative solutions based on embedded systems. The eDIANA approach is to achieve greater efficiency in use of resources, prioritising energy as a scarce resource, and better situation awareness for the citizen and for service and infrastructure owners. eDIANA performs the development and adoption of a large leading-edge market (new services and applications) for embedded systems in buildings for improving the quality of life of householders and commercial and office building users, seizing new market opportunities, while fostering the competitiveness of European industry and creating new business opportunities. The deployment of embedded systems for energy efficient buildings will have a relevant economic impact not only in the embedded systems sector itself but also in the promotion of smart and green labelled household appliances, equipments and systems as well as in the business of providing more energy efficient buildings, new and refurbished.

A State-Based Holonic Formalism for Controlling Complexity of Dependable Energy-Production Systems *(L. Pazzi)*

The behaviour of complex dependable systems poses severe safety issues due to the hazards which may result from uncorrect and unpredictable behaviour. In order to prevent such hazards, system behaviour has to be controlled and specified formally, in order to defeat the overall system's complexity. We present the application of a state-based framework which allows to decompose closed loop control into hierarchically composable modules. In addition, the paper shows that such a framework may be shown additionally to host in a seamless way safety and fault management policies at the different composition levels.

Media Construction of Fear and Social Risk in the Late-2000s Financial Crisis *(M.Infante)*

If George Simmel stated «money is the spider that spins society's web» (The Philosophy of Money, 1900), we can investigate the finance as an immaterial social resource (as a medium) in a social systemic approach. Simmel pointed out not only the network aspect of money but also his social role. In fact, money's value can be changed by the related social perception of risk, that in currently society is built by the media coverage of financial market. While the systemic stability is a public good, and the impact of systemic risk depends on the collective actions of financial institutions, I want to point out the role of media influence on little investors' behavior, also determining the in-and-out timing on market. The inner relations within financial system between policymakers, international institutions and banks are not fundamentally new; but the recent financial crisis has strikingly illustrated this interconnectedness that characterizes the global financial system and the market as a network of financial agents influenced by media. Moreover, over the last 10 years the financial innovations products have made the system much more interconnected, complex and opaque than it was in the past. In some extend, I want to demonstrate how the systemic risk is generally outside the control of each individual institution (banks, policy-maker, and political leaders) and it is paid by the little investors. Social Trust and Financial Risk. Why social complexity makes periodical financial crisis unavoidable and produces permanent social risk?

Bodies and emotions: sources of biocapitalism (*E.Martini, F. Vespasiano)*

We can call it cognitive capitalism, symbolic economy, flexible accumulation, virtual economy: everyway the actual capitalism pervades our life and includes our emotions and our leisure inside the mechanism of production of wealth. Therefore, a point appears to be central: the industry uses raw materials as well as our knowledge, experiences, emotions and aspirations and consequently "the accumulation process is based on and it takes substance by the faculties of individuals through a reticular structure of social cooperation. One can say, in essence, that is the same knowledge to be an expression of the bios" (Fumagalli 2007: 183). This paper aims to analyze the new biocapitalism phenomenon as "a transition phase to production of economic value based on the use of human beings as a whole, namely the biological, mental, relational and affective dimensions" (Novelli 2011). In the "risk society" (Beck 2000) and in the "anxiety unmasked" (Luhmann 1988: 33) the functional performance of goods and services lose importance and "open space for new desires and new cognitive experiences of building and sharing of all possible worlds" (Rullani 2004: 159). This is the last frontier of postmodern capitalism, "a complex system (and ideology) that is able to go beyond the exploitation of workers employed, stable, flexible, or temporary, in the direction of the use of human treated as a laboratory of advanced technology and luxury goods at the same time (plastic surgery); as a biological matter to be patented (genetic engineering); like a vampire use of minds (corporate shareholder); as explained to symbolically re-qualify in order to delectare (entertainment and cultural events industry); as a hinge between sexual objectification and social achievement (the politics of bodies); as sensory involvement of the consumer, achieved through viral marketing and advertising strategies, practices of experiential shopping" (Novelli 2011). In this scenario, bodies, emotions, ambitions and behavior become valuable to the industry, which increasingly use them to create objects of desire, which can hardly resist. In fact, introducing itself as much more engaging and humanized, the biocapitalism is used by companies as a new business strategy, offering "products and brands as if they were real people, and turning to final consumers by offering them a form of recognition of their identity rather than a good or a service" (Codeluppi 2008: 7). To the "shop window" strategy (Idem 2007) joins a strategy that appeals to all organs of the human body: the biocapitalism produces bio-value not only through the body "in its pure function of employment tool or outside of the body, increasingly shop-windowing, pursuing media and consumerist models, but the body as a whole" (Idem 2008: 9) in all its dimensions, i.e. biological, relational and emotional.

Understanding Complexities in Public Policy Making Process through Policy Cycle Model's First Stage: A System Dynamics Approach (A. Subroto)

This paper is aimed to draw and explore theoretically the complexities and the reality in first stage of the policy making process from the perspective of the interchangeable, affecting, impacting and transforming relationships among the components or actors within the system. The complexities' exploration in the paper is based on the model of the policy cycle that is widely discussed in the public policy and public administration literature. The sense of reality surroundings the policy-making process is perceived from some study cases that have been observed from Australia and Indonesia literature Simulation throughout the paper reveals different complexities and some pitfalls in the first stage of the policy cycle model on which should be given a proper attention from the policy stakeholder. The paper tries to construct a different approach to understand the reality and embraces the complexities of the policy-making process in order to present a starting point for an open discussion in public policy field. The effort could be a learning tool for the public policy makers to build good awareness and understanding on their roles in the complex relationship and inter-dependent environment. Eventually, the paper can fill some gaps between the policy cycle model theory and the complexity in the real situation of the policy-making process.

Using Project Finance to Fund Long-term Investments in the Energy Industry (E. Scannella)

Project finance is a well-established financing technique. It has emerged as a leading way to finance large projects in the energy industry. Energy projects usually require a long time period to execute and obtain a return on investment. This critical aspect requires the identification of appropriate investors and adequate financial structures of energy projects. The financial structure is particularly complex because of large infrastructure projects in energy industry, large sums of capital required to finance energy projects, new technologies involved, complex project agreements, legal and contractual structures, state-level regulation and tax treatment. The financial structure has a huge impact not only on borrowing costs, lending contracts, capital raising, and project feasibility, but also on project marketability, contractual commitments, structures of investments, guarantees, and private-public partnerships. The paper examines a new financing model for project finance in the energy industry. It explores the potential attractiveness of bond markets to finance long-term investments. The paper is organized as follows. The first section provides a general description of project finance. The second section analyses the financial structure of project finance in the energy industry. The third section evaluates the financial support provided by the European Investment Bank. Final section concludes.

International and European Energy Regulation: Facing the Challenge of Energy Environment Protection (M. Angrisani)

Nuclear power has inevitably created risks for the international community of States, as the recent Fukushima reactors accident have tragically shown to the world. Every States - and obviously their environment - can be potentially affected by the event of a radioactive contamination as well as by long term health deceases due to radiation exposure. Thus, the issue at stake nowadays is whether States should keep implementing their nuclear power policy, or alternatively shift their financial and scientific resources to develop safer ways to produce energy which may be "environment friendly". International law is entitled to face these serious risks by assuring a stronger and detailed regulation and a more effective faceted oversight. An international law policy enhancing adequate provision for liability and compensation in cases of trans-boundary damages may however entail a policy of freedom limitations. Such a policy would then affect the sovereignty of States in their own choices aiming at conducting research or hazardous activities on their own territory. Even though States themselves have been reluctant to endorse such activities that can represent the only effective option to handle power control and self-standing production. The study will, then, inquire into international law and European law provisions and dynamics concerning energy policies in general and nuclear energy in particular, in order to envisage a global framework for the international community to comply with to achieve an efficient balance between energy exploitation and environment protection.

Green Energy. Placement Strategies and Boundaries: the case of Enalg (M. Ruzzeddu)

On a new Science Philosophy Method *(D.P. Errigo)*

We know that the usually recognized scientific method, which is described and criticized in the Philosophy of Science is ichnographically represented by this scheme:

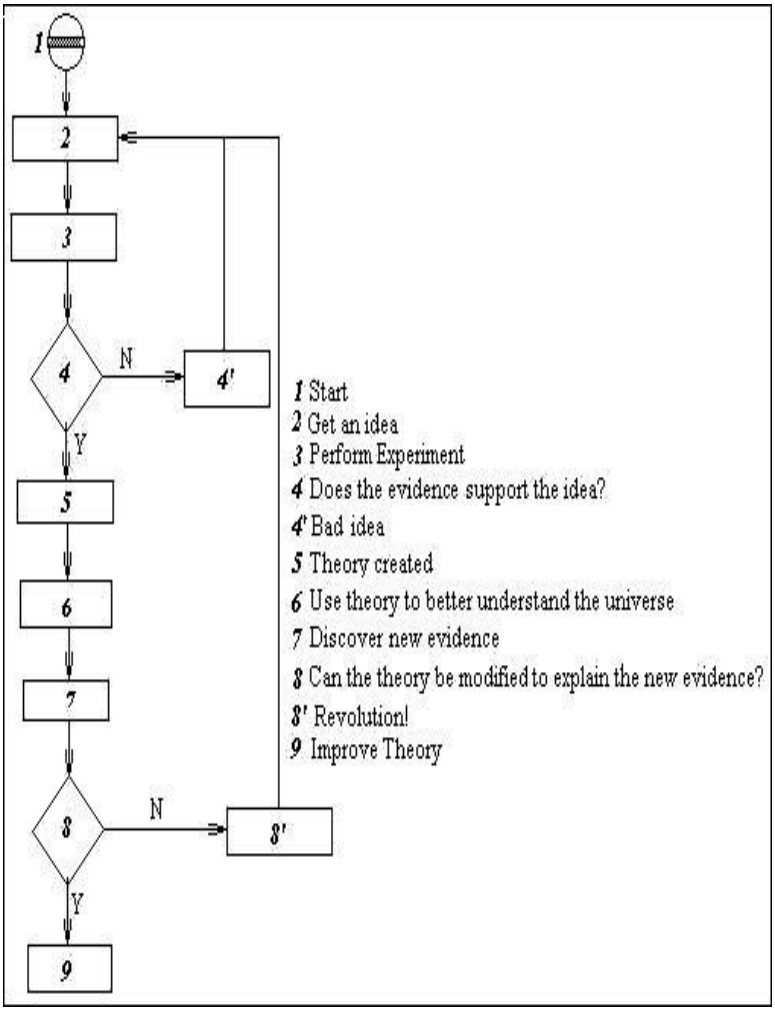


Fig. 1

In the phenomenal and cognitive reality, this model is not exactly the one followed by the scientific community in basic researches. Usually, we know that:

1. *the expression that binds the measure of a phenomenon to the parameters that determine it, is almost never explicitly known , and in addition it is quite never simple and much less resolvable with traditionally recognized methods;*
2. *the parameters that determine a phenomenon , for example the social one , are generally much more than one, and perhaps the ones we chose are less important than the excluded.*

Furthermore we know the validity of Tarski's theorem extended to non-formalized languages , which states that for semantically closed theories there is the need to limit the expressive power of the theories themselves, admitting that it is possible to define them an only "partial" statement of truth, i.e. related to "areas of speech" for which the truth conditions of the proposition do not coincide exactly with what it expresses .

It is clear that facing these situations, the PDE of various orders that we obtain, become, for points 1 and 2, almost completely unsolvable or useless and, for Tarski, also communicatively difficult because if , for example, the statement " the grass is green" is true, it is true if (and only if) the grass is green. But we can't calculate it fully , especially (and above all) for the lack of the real knowledge of the boundary conditions .

And also for the difficulties of the equations that causes restrictive solutions with reductive hypothesis. See for example assumption of the existence of an (internal and/or external) intelligence within the system; in this way it is possible to convert the chaos in a deterministic way: an obvious oxymoron.

Moreover being the solutions to the PDE of higher order almost impossible, they are reduced to solutions with numerical analysis, where the differentials become differences, and so what is continuous (analogical) in the biological or social behaviour, becomes discontinuous (digital) and therefore not natural and therefore still not plausible.

But there is another way to deal with the problem of Modelling
It is accessible by the lateral thinking , that is the thought that does not favour one or the other cerebral lobes, but uses them both and at the same time, implementing a constant oscillation between one's inner knowledge and one's experience, one's logic and one's imagination and intuition.

For these reasons, the iconographic representation of the Method seems to be the following:

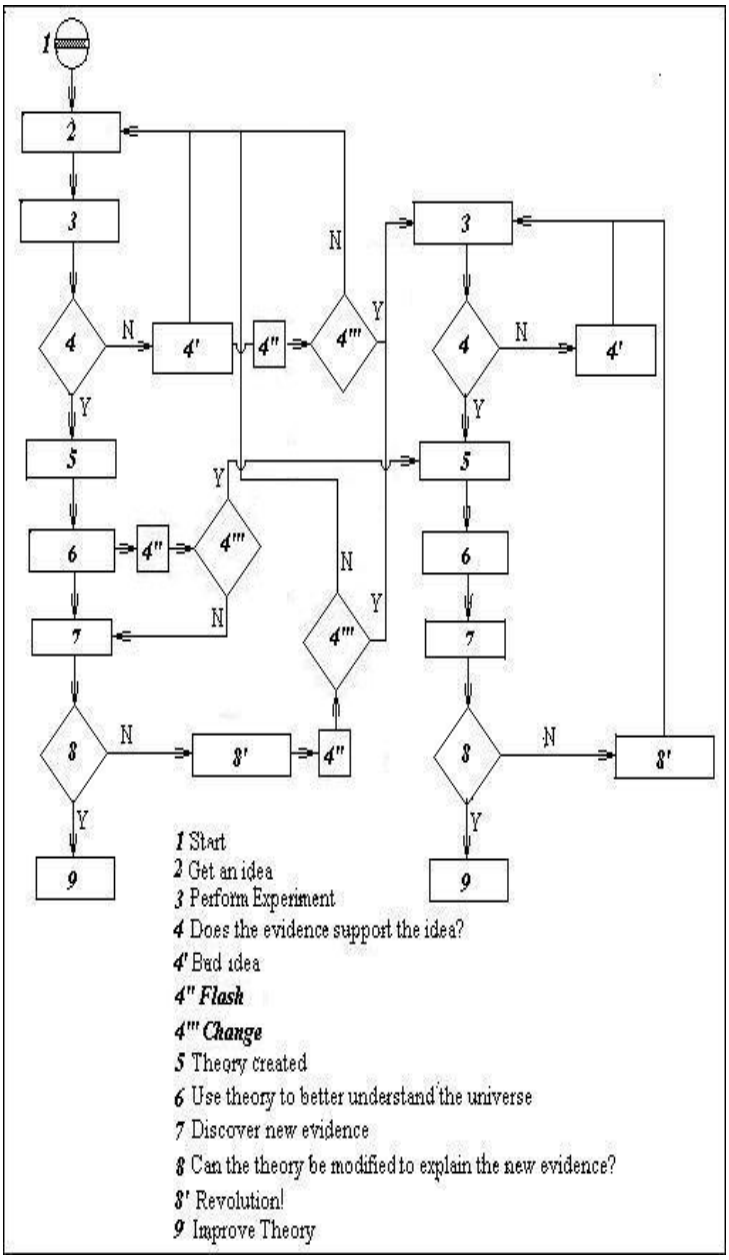


Fig. 2

The Figs 1 and 2, in addition to the pictorial, show also a substantial difference. The first represents the method that seems traditionally used in the research, the other captures the specific moments of the scientist's activity allowing him to approach also to the scientific method itself but in a lateral way.
This depends on our ability to learning to listen to our intuition, giving less and less importance to what "appears" as real and which is often different from what we have" accidentally let arise".
Only in this way we can perform at the same time complex and simple things. We must learn to work in parallel and not sequentially. We also need to know the power of the analogical lateral thinking, that is well above the rational and the irrational thought because it reconciles and exalts them.
The analogical-lateral thought follows "peaks" values and doesn't move along complete paths which are sometimes, or better often, misleading. We must also learn how to get into it and do not be afraid of what we find out. We must have the courage to delete in order to build. We must have the courage to doubt everything, especially the obvious.

And we must have the courage to go our own way, despite everything. This is the Method whose resulting Ritual consists of signs, symbols, numbers, words, ideas and concepts, in any way expressed, allowing the realization of what the Method itself induce to implement and perform.
It is not only the presence of mathematics as a support of social analysis but the real necessity of a scientific method supported by mathematical simulations that are real and in accordance with the factual reality, as it is indispensable in the modern physics context.
Now that we already know the existence of new dimensions that integrate the Einsteinian space-time, such as the Calabi-Yau's manifolds which are subject to the Quantum Mechanics, we must turn to the underlying symbolic logic.
The new physical theories, so planned and constructed, prove assonant for the symmetry and dissonant for the asymmetry, but, on the whole, they involve either the harmony of the same physical nature of the universe and, especially, the counterpoint of human life and the deriving Social one.
Social systems in which the preponderance (the only possible) of chaos and complexity lead us to discover and build new simulation models that can explain the transformation from a liquid to a gaseous society in containers with more and more deformable walls.
Social systems in which the simulation must move from political or economic or financial projects to internal and/or external processes.
Social systems in which the global model simulation must no longer approach to a sphere that everything cancels due to globalization, but which presents an iper-polyhedron description of a real diverse society.
The boolean logic, as we want to apply in social systems, is not predictive except in technological systems, in which we can see the sub-systems working in isolation or cooperatively; but this logic is exclusively statistical in social systems and then "ex post ": that is it says nothing more than what is already known or presumed.
The only existing logic which can be probabilistic and so "ex ante" is only the fuzzy logic which is able to propose the existence of new flow lines for non predictable activities, even in a context of Empire, such as the financial one.
Empire, that is a word designating the single largest condition of complexity reduction.
These are only some of the many resources that the new physics, mathematics, logics and informatics sciences make available to let us know the true and not virtual reality in all fields of knowledge.
With what I said above I want to emphasized the need to build "ex novo" a sociology that finally become a true science, where ***"there is no place for opinions, intuitions, particular personal point of view"****, as Husserl underlines (Philosophie als strenge Wissenschaft , 1910).*
A new sociologic science with a solid foundation in which it is finally and definitively recognized the similitude between the "Potilikòs" of Aristotle and the "Civilis" of Cicero.

I want to thank You All for Your courtesy, attention and cooperation.
I hope that others can meet Your knowledge needs with the care we spent for You.

The (im)probable Change *(M.R. Astolfi)*

Generally speaking,
codes of generalized symbolic communicative media
function to secure an adequate degree of probability
for the reception of improbable expectations

N. Luhmann, ***Love as passion***
Stanford University Press,
California 1998, p.55

"**…***Today "systems theory" is a catchall concept for very different denotations and very different levels of analysis. The word refers to no unambiguous meaning. When one introduces the concept of system into sociological analyses without further clarification, then an illusory precision arises that lacks any basis. Thus controversies arise in which one can only suppose or infer from the argumentation that the participants have different ideas in mind when they speak of systems***…**

…*Systems theory is a particularly impressive supertheory. Disputed though it may be, one cannot deny it a certain process of maturation.*
*We attribute this to the fact that it can look back upon a history characterized by supertheoretical ambitions, centralizations of difference, and paradigm change. Whether and to what extent this development can be designated as "progress" or has led to the accumulation of knowledge is a question more difficult to determine***…**

…*A tradition stemming from antiquity, older than the conceptual use of the term "system," speaks of wholes that are composed of parts.*
The problem with this tradition is that the whole had to be understood in a double sense: as the unity and as the totality of its parts. One could then say that the whole is the totality of its parts or is more than the mere sum of its parts. But this does not explain how the whole, if it be composed of its parts, plus something else, can count as a unity on the level of parts. Since in the realm of social relationships one conceived of society as being composed of individual persons like a whole out of parts, one could conveniently formulate the answer in terms of insights into human beings' living together. Persons had to be able to recognize the whole in which they live, and they had to be ready to lead their lives according to this knowledge. This could be viewed as the condition of their being parts, as condition of their taking part, their participation, and thus of their nature. The risk of this pointing to knowledge (which can err) and to will (which can will the wrong thing) could be understood as a feature of the general

corruption or imperfection of nature, which, in turn, necessitates the differentiation of dominating…

…In the meantime, reference to unity -be it that of the system or of its elements- has supplanted reference to structure (although, of course, it has not excluded it).
The theory of self-referential systems maintains that systems can differentiate only by self-reference, which is to say, only insofar as systems refer to themselves (be this to elements of the same system, to operations of the same system, or to the unity of the same system) in constituting their elements and their elemental operations. To make this possible, systems must create and employ a description of themselves; they must at least be able to use the difference between system and environment within themselves, for orientation and as a principle for creating information. Therefore self-referential closure is possible only in an environment, only under ecological conditions. The environment is a necessary correlate of self-referential operations because these out of all operations cannot operate under the premise of solipsism (one could even say because everything that is seen as playing a role in the environment must be introduced by means of distinction). The (subsequently classical) distinction between "closed" and "open" systems is replaced by the question of how self-referential closure can create openness …

…The closure of a meaning system can thus be understood as the control of its own possibilities for negation while producing its own elements. Every transition implies a no (however indeterminate) and can be conditioned by conditioning its use. Such control leads to a recursive calculation of calculation, and reality for such a system is nothing more than the ongoing reproduction that occurs in this way because it succeeds, if it succeeds (which includes errors, mistakes, and their correction).
This general concept also applies to social systems. Here too closure can be conditioned as (and only as) the control of the system's own possibilities for negation while producing its own elements, that is, the next communications. In accordance with double contingency, the possibility of negation is doubled here, however, appearing as double "négation virtuelle"*, and the aspect of control is accordingly complicated: it not only refers to what ego wants to attain or prevent but also to the possibility that this might fail if alter does not understand or rejects (whatever alter might want to attain or prevent thereby as alter ego). Communication is correspondingly coded as a (positively or negatively interpreted) proposal of meaning, which can be understood or not understood, accepted or rejected. The control of this doubling and especially this negativity of not understanding or rejecting unfolds recursively and thus already determines the selection of the proposal- whether the proposal aims at agreement or conflict. Thus a knowledge of how to estimate what can be understood emerges. This knowledge controls each communication and represents the world socially (although this is not adequately described as "language"), and in connection with it there emerges a culturally coded use of symbolically generalized media of communication. It becomes clear, then, that it is necessary to widen the temporal basis of communication, that is, to equip experience with temporal horizons, if closed self-reference is to be handled. This enables one to estimate prospects for agreement and readiness for acceptance…*
…On the level of general system theory, we have already needed to distinguish system/environment rerlations from intersystem relations….
Further analysis of the difference between system and environment will begin with the assumption that the environment is always more complex than the system itself…

…Taken as difference and moored to the difference between system and environment, the difference in relative degree of complexity has an important function. It forces distinct forms of handling and reducing complexity, depending on whether one is dealing with the complexity of the system or that of the environment. The environment can be treated more generously, so to speak, can be rejected more or less wholesale. A kind of reverse supposition of relevance holds true: whereas internal events/processes are supposedly relevant to the system and can trigger connective action, events/processes in the environment are supposedly irrelevant to the system and can remain unheeded. The system acquires freedom and the autonomy of self-regulation by indifference to its environment. Therefore one can also describe the differentiation of a system as an increase in sensitivity to what has been determined (what is capable of being connected internally) and an increase in insensitivity to everything else--that is, as an increase in dependence and independence at once.
These formulations already indicate that the system's relation to its environment is regulated by its structure and that the structure's level of selection serves to compensate for inferior complexity. One can also illustrate this with the concept of chance. We will characterize the effects of the environment on the system or the system on the environment as chance when they are not bound up with structural precautions imposed by the system's past or future. In this sense, no system can avoid chance, because no system possesses enough complexity to react "systematically" to everything that occurs. Therefore, the choice of structure leaves much to chance. But even this "leaving to chance" is a means of reducing complexity, which proves its worth when what is left to chance can in fact be handled ad hoc…

…Typical features of system formation emerge from the requirement of basal self-referemce […] the construction of reality as the emergence of distinction types of systems follows only from self-reference, not from casualty…

…Of course, the theory of self-referential social systems does not claim to be the only possible theory or even the one that offers the most security, but it has a special affinity for this task. This is the central position it gives to the concept of self-reference. It is much easier for a theory that interprets its objects as self-referential systems to present its own self-reference. This is to be expected when the theory recognizes itself in the field of its objects as one among many others. Theoretically guided research (including that guided by a theory of self-referential systems) can be nothing other than a self-referential social system, what's more, one among many, a subsystem of a subsystem of a subsystem of society, thus, one of very limited societal scope. If the theory of self-referential social systems functions in general, then it probably functions in this case too. The more elaborated the general theory, the more productive the

restrictions for the theory of science that can be derived from it. The theory of science will be able to make use, above all, of the general insight that its self-reference is sensitive to chance and conditions itself in order to create structured complexity, with the result that the system can combine a high degree of indifference regarding its environment with specific sensitivities.
Self-reference and other-reference are uniquely combined here, in harmony with the theoretical concept we espouse…

…We have instruments to watch over it, and we know that its journey is a reconnaissance of modern society".

It could be strange to use the exact Luhmann's *words and opinions* in his original book *Social Systems,* Stanford University Press, California 1998*, passim,* which introduce an interesting change in the systemic theory with a system/environment approach.
This is in the peculiar spirit of the theoretical choice we made for our systemic approach. We know Luhmann's is a very important contribution -even if not the only one possible from a theoretical evolutionary point of view- to explaining and exposing a social theory whose conception and development has determined a strong renewal, a new true *(im)-probable* paradigm change.
The structure, the instruments, the content and the context of this theory let us understand Luhmann's need of a highly demanding of strong theoretical argumentation, the same that our readers have always requested.
That is why we have in particular committed our editorial's space to Niklas, but never forgetting the importance of different approaches compared and in an intimate relation to his intellectual so abstract work.
I want to end with other Niklas's words "*The love of loving could not be mere 'amor amicitiae', could not simply be loving, the love of the other, just as it could not be reduced to mere loving*" (N. Luhmann, ***Love as passion,*** Stanford University Press, California 1998, p.139) having well in mind our common Love for Knowledge and Truth which are above bureaucratic roles and everything else.

Thank You all.

Dynamic High Complex Systems – Science and Conscience: a Conversation with Ton Jörg (By D.P.Errigo)

Dear Professor Jorg,
I am quite convinced that there is no difference between science and conscience. I think that there is a global system characterized by a series of subsystems each of which at its turn is composed of subsystems, each of which ... etc. It is not possible to find out the limit of this subdivision for the moment: somebody believe it's the standard model, some the string theory, others, on the other hand, the holographic universe and more ... If we closer look at these (for now purely speculative) theories, notwithstanding their intrinsic and differentiating liveability, we find that they really have two elements in common: the reductio ad unum and the multi-composition of reality. Both the two terms of these common points (either the reductio ad unum and the multi--composition) can be evaluated either as research-starting or as research-ending. However, we can considered that both these terms (start-end) are simultaneously existing because the growth of the global human vision occurs in phenomenal terms, that is from an evaluative intermediate state between the two.
So do you think that it is possible to presume that the observer can, from this condition, induce or deduce or contemporaneously induce and deduce?

"From seeing through a lens to seeing the lens"
(Kuhn, 1999, p. 6)

As I understand your question well, this question concerns the nature of reality. How can we read reality in a more adequate way? Reading reality has been a problem for philosophy and our sciences for many centuries. Western Science took what we actually can see as a starting point for our viewing of reality: of what is the real(m). The observer, however, cannot easily take into account himself observing the nature of reality. This has led to the problem of paradox of the observer: "We can never be quite clear whether we are referring to the world as it is or the world as we see it"[i]. The observer is like the eye which cannot see itself seeing. We have to acknowledge "the radically ungrounded nature of observation"[ii]. As an observer, you ultimately have to step *outside*of the system, to see what reality might be 'really'like. Making such a step has made Darwin theorize about evolution: by liquefying reality. Reality was not a static, 'given' kind of reality anymore, but became a more dynamic reality, ever-evolving into higher levels of development and being. Darwin showed the limits of our traditional way of *seeing* reality: of what is the real(m) of our sciences. We had to take the hidden evolution of reality into account. In our days, we may now speak about "the ontological creativity of the entire world"[iii]. How can we understand this creativity of the real? The English philosopher Roy Bhaskarhas made clear that we may still be able to reclaim reality[iv]. As a complexity thinker, I take his claim in terms of a need to consider the possibility of reality to be a dynamic, *nonlinear* complex reality. The traditional account of reality has always been *insufficiently* complex. It is through generative mechanisms that we may understand the nonlinear nature of reality at all levels. It is through complexity that we may better understand the complex *generative* nature of reality. We may now be able to give an *altered* account of reality[v], which is based on the new paradigm of complexity, offering a new lens: a complexity lens[vi].Reality, then,may be taken as a deeply dynamic and relational reality. With the help of new thinking in complexity about what is the real(m), we may finally answer the question "What is the weave?[vii]" of this dynamic complex nonlinear reality. The weave is actually about a kind of architecture of dynamic interweaving within the dynamic, relational, web-likenature of reality. At the same time it is through the very *generative* nature of this complexity that we may read reality in a new way. Complexity, then,may be taken as "that which is interwoven"[viii]. The architecture of reality may be viewed ascomplex, dynamic, creative and web-like. Reality is, in essence, about a generative, emergent order[ix]. Taking reality this way is opening a

new space of the possible. This space is an unpredictable open space[x];actually, we may speak about spaces of *infinite* possibility[xi]. Of course this view about the real(m) has deep consequences for our epistemology and method of doing science. We have to consider epistemology as an epistemology of the *possible*: that is, about the infinite possibilities of our world. The methodology we need should be about the very complex nature of reality. This methodology is about the hitherto unknown *conditions of possibility*. It is a methodologyabout the complexnature of reality that may account for the complex *realizing* of the real[xii]. With this new methodology, we may better be able to understand life and consciousness "as an emergent reality, a self-generated state of affairs"[xiii]. We may understand reality as a complex, generative matrix, of a web in many dimensions and levels, operating in an *unpredictable*open space of infinite possibility. Of course, to become descriptive of this new reality, we need a new language of complexity, with a new vocabulary, "to describe what we're studying"[xiv]. Being aware of this fundamental role of language, may make us better understand that reality has been, and will always be, a language effected reality. The use of language, then, shows the limits both of our conscience and of our science in our doing science.

I believe that a holistic vision doesn't reify the Essence but it evaluates and justifies the "Dasein". In fact, our brain is obviously creative but not in the sense of capable of reifying but only in the sense of representing and producing meaning. Let us return to the initial system with all its subsystems which at their turn are structured and interconnected. Each of us belongs to a sub-system, or to much more subsystems, and is also a sub-sub-system. I speak only about a system because for its definition it consists of a structured, finite and countable number of elements, of a homogeneous nature among them, or considered as such. And the presence of the structure, that defines it, and of the set's elements, cause in it actions and reactions that determine equilibriums of a dynamic type (chaos). Even among subsystems structurally linked among each other, we define structure what connects them. So also in a system there are dynamic equilibriums between subsystems.

a)

Do all these chaotic situations generate the complexity of the system (or of one or more the subsystems)?

b)

Do you believe that we can establish that chaos and complexity coexist in an essential way, having both well cleared definitions?

a)

To understand our world as a complex, chaotic world, we may start to talk about the order of our world as of a *generative* order (see above). Of course, this generative order is a dynamic order. This brings me to the question: "How to understand this dynamic order?" It is my understanding that the structure of reality (of our complex world) is, in essence, a relational reality. At the same time we may speak about the *process* of reality[xv]. Of course, this puts the question, how we may understand the link between the process and the relational structures of our world? This is very much the question about understanding evolution too! We may, then, understand the world as being a 'world of the possible'[xvi]. Your question seems very much a question about the world as a space of the *possible*. It was the biologist (geneticist) Sewell Wright who, in the twenties of the 20th century, showed the elementary role of the *adjacent* possible of entities, like animals, moving around in a landscape. He showed that an increase of quality was possible for the description of the ensemble of the entityandthe landscape. This increase of quality is about the relationship between entities and the surrounding landscapeas a fundamental dynamic relationship, involving shaping forces. From this basic assessment, he was able to build a very basic causal framework.His work offered a new causal lens for viewing the dynamics of evolution which is very much part of a the dynamics of reality. His work was mainly disregarded by scientists in his own field. Later, in the seventies of the 20th century, Jöreskog&Sörbom have built a more *general* causal framework, known as LISREL[xvii] (an acronym of Linear Structural RELationships). Interestingly, they also described *reciprocal* causal relationships, with potential nonlinear effects over time. The mathematical functions, describing these effects, are a kind of *generative* functions. These were, however, generally discarded as not being useful in the analysis of [what is] the real of our sciences. This may nowbe taken as a fundamental mistake. My interpretation of this mistake is that reality would become too complex for those days. The Russian philosopher Plekhanov made already mention of "the paralyzing belief that reality is too complex to be mastered"[xviii]. We may also refer to T. S. Eliot, in his poem "*Burnt Norton*":

"Go, go, go, said the bird: human kind
Cannot bear very much reality"

So, how can we conceive of reality in a new way, by new thinking in complexity? The short answer is that we need to link thinking in complexity with network thinking about web-like networks of entities, being part of a dynamic, nonlinear complex reality.

The longer answer is about the possibility of a new framework of complexity that may offer "an *altered* account of reality"[xix]. An altered account which is able to show how entities are actually *generating* the structures of a relational reality, as generative structures, with causal generative mechanisms, facilitating these structures. The totality of this composition of the real(m) can be taken as 'generative' of a nonlinear complex reality. This includes the possibility of "deviation-amplifying mutual causal processes"[xx]. Building on this new framework we may develop a new complexity lens, to view the system with new eyes. We may develop a new vocabulary for description and understanding of the nonlinear complex reality. We may, then, speak about complexity in terms of generative complexity operating in complex, webbed networks of dynamically interconnected loops[xxi], with their "richly webbed architecture"[xxii]. This description may be expanded to self-generative processes, with self-generative mechanisms, with the help of *generative* causal forces being operative in time as mutually shaping forces within ensembles, enabled by the possibility of the adjacent possible in nature. I fully agree with Stuart Kauffman that we urgently need a "*theory of the ensemble*"[xxiii], so to become more fully explanatory of reality, with all its complex phenomena of *emergent* reality, to be conceived as "self-generated states of affairs"[xxiv].This may lead to the fundamental question "how these states of affairs may actually be *generated* in the real?" This, I think, is the key question for a new science of complexity; a science that yet does not seem to exist[xxv].

b)
This may be hard to tell, but it will be possible to conceive of a dynamic, web-like relational reality with deviation-amplifying causal mechanisms operating in the generative complex matrix constitutive of [what is] the scientific real(m) of our sciences. It will be possible to speak about 'generativity' as a complex state of being of entities like the human being. Generativity is about a complex, dynamic state of creativity or capability of an entity: a state of "knowing how to go on" (Lord, 1994, p. 193). Such a complex, dynamic state of being may be depicted as trajectories or as complex adaptive walks within adaptive landscapes, within so-called "Spaces of Generativity" (Jörg&Akkaoui Hughes, 2013). These Spaces of Generativity can be conceived as actual spaces of possibility or potentiality for complex human beings. These actual spaces of possibility may now be linked to the possibility of emergent realities, as self-generated states of affairs. We may ultimately become able to trigger the *generative power* of interactionfor *realizing* reality as emergent kind of realities in complex, dynamic state hyperspaces of generativity. This description of reality is complex indeed! Of course, I hope that the description of reality as a dynamic, nonlinear complex reality will overcome the paralyzing belief that reality is *too* complex to be 'mastered'.

I really think that chaos and complexity arise from non-linearity (i.e, not from a simple proportionality) of the actions (and corresponding reactions) that for the human being are defined behaviours: "thoughts, words, deeds and omissions…". The nonlinearity depends only from the number and the degree of the interconnections among our subsystems: ultimately from our "Ego".
From this point of view can we say that our "neural machine" with all its appurtenances (immune, endocrine systems, etc.) reproduces the essence of complexity in which chaos (dynamic equilibrium) is the confluence of every electromagnetic, thermo-dynamics, electrochemistry vitality: in short biochemistry?

"I think we may be missing the conceptual equivalent of calculus,
a way of seeing the consequences of myriad interactions that define a complex system"
(Strogatz, in Mitchell, 2012, p. 301)

As I understand your question, I think it concerns the understanding of our "neural machine" as a complex myriad of interactions. This is a key questions about the nature of complex systems like the brain. How can we understand the consequences of such a myriad of interactions? This question, I think, is closely linked to the functioning of the brain. This demands not only for a different ontology, about the generative nature of order, but also a better notion of what generative change may actually be about. To understand generative change, we need a different unit of analysis. Gerald Edelman, a known neuroscientist, takes the unit of re-entry as a foundational unit for understanding of the brain. Stuart Kauffman takes a different unit for understanding complex biological systems: the unit of the ensemble. Kauffman is right where he proposes that the field is in need for a theory of the ensemble. He is right that "we are seeking a new conceptual framework that does not yet exist" (Kauffman, 1995, p. 185). We may take this new framework as a framework about dynamic, generative complexity, operating within complex web-like networks. Yet, Kauffman's own notion of the ensemble seems too limiting for the development of such a framework.To understand the complex myriad of interactions, I think a unifying complex theory is needed. This theory needs to link the interactivity with connectivity of the complex unit to be studied, so to be able to explain the generative changes within the unit itself and the potential generative changes in the entities themselves. These changes are a kind of unpredictable, emergent phenomena. The fundamental challenge is to become explanatory of these generative, emergent changes, to be considered as a kind of "*self-generated* states of affairs" (Luhmann, 2002, p. 157; emphasis added). This is not an easy task. Actually it demands for a shift of paradigm towards a paradigm of complexity, as Edgar Morin has described it[xxvi]. But Morin, like Luhmann,'simply' wasn't able to conceive of these unknown self-generated states of affairs. They 'simply' missed the model of generative change and the tools of thinking in complexity about generative change leading to the complex states of generativity of the entities involved in the dynamics of interaction and interweaving of the networks involved. For different reasons, they kept being a kind of "prisoners of description"[xxvii]. From this analysis of the state of art in the field, we may come to the conclusion that we urgently need a new model of generative change, to explain the emergent phenomena of self-generated states of affairs.
In my view, we first need to define what an ensemble is 'really' about: two entities A and B,linked by a reciprocal relationship A ⇆ B, to be conceived as a *dynamic*reciprocal relationship.

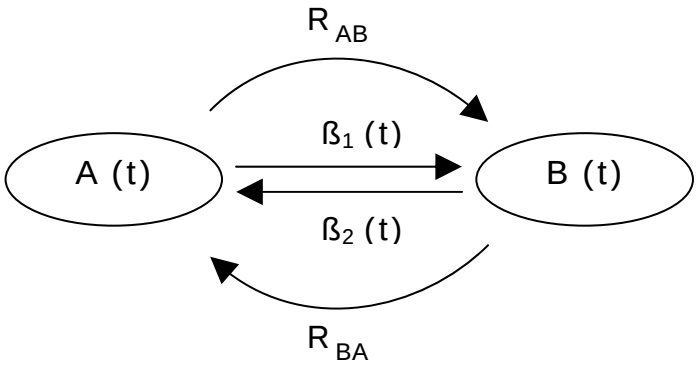


Figure 1 A causal model of an ensemble of two entities A and B and their relationships

To develop a method of *generative*change, we need to take the entities A and B themselves as dynamic, ever-evolving entities. This implies a description of the relationship between the two entities A and Bas a dynamic a-symmetrical reciprocal relationship: with RAB and RBA as being *unequal*. To model the dynamics of interaction and the causal effects of generative change within such a dynamic ensemble,we need a new way of causal thinking about interaction within causal relationships. The model to be used is a causal recursive model of interaction within reciprocal relationships between two entities, with their so-called 'latent variables'. To understand this causal model of generative change, we need *to step outside of the box* of linear thinking about linear causality. Actually, the linear parameters expressing the strengths of the causal reciprocal relationships may be put in the formula of *generative* causal functions of the total effects over time. Time is an essential factor here, although the generative functions themselves only depend on the two parameters of strength of the causal relationship. All of this kind of modeling generative change is still not taken as of use in the social sciences. This is why the social sciences need to be opened, as Wallerstein*et al*. (1996) have proposed some years ago[xxviii]. Only by opening of these sciences we might become able to conceive of a hitherto unknown calculus: a generative, causal calculus. With this calculus, we may conceive of the working of the re-entry principle in the brain as a kind of *generative* mechanism. This mechanism may also operate within the network of a single or more complex set of ensembles. The generative change may now be explained as being'produced' through a self-generated causal mechanism. The new calculus may be linked to descriptions of the subject of study in different fields of our sciences.
In Senge*et al*. (2000) the causal loop diagram, as in Figure 1, has been described as follows: "causes become effects which in turn become causes" (p. 242). Martin Buber described this process as "It appears simultaneously as acting on and as acted upon" (Buber, 1970, p. 81). But these authors didn't seem to know very much about the causal framework of LISREL. So, they missed the very generative mechanism of 'producing' nonlinear effects over time. They were not able to step outside of the system they were still in. If they could, they might have discovered the potential of deviation-amplifying effects over time[xxix]or the possibility of entities, like learners in education, "bootstrapping each other" over time (Bruner, 1996, p. 21). They might as well have understood the way how entities may acquire their (degree of) entitativity through self-generative processes[xxx].
All of this new thinking about the generative processes of causality within the complex unit of a dynamic ensemble, is opening a new space of the possible for a world of the possible. In essence the answer about what is possible may be found in the generative nature of causality within the smallest network of an ensemble. The generative effects within the ensemble are enabled through the multiplicative nature of causality, operating in circular causal systems[xxxi]. Modeling of these systems has been disregarded for use until now, and the causal dynamics involved has therefore been kept unknown: the dynamics of causality about self-enhanced loops among (between) dynamic, ever-evolving entities. We may now better understand the myriad of interactions of a "neural machine", with all its potential of generative power of interaction. It is this generative power which may be taken as responsible for self-generative change within the complex unit of the web-like architecture of the brain. It is the link between network thinking about dynamic (causal) networks with thinking in complexity that may afford the new tools for thinking about complex phenomena as self-generated states of affairs.

An Individual belongs to a set of elements-Individual and we introduced name, rules, among these elements (i.e. a structure) for the coexistence. The set thus becomes a structured system. The same Individual may interact in a specific way for example with another one so generating another set (in this case a subset) that could be defined as family (by marriage or by living together). Also this sub-set, being regulated by laws or rules, similarly becomes a system (in this case a subsystem) of two elements or three or more, depending on our own ethnicity. The same Individual may be part of an above-set for his particular kind of culture, political opinions, religious feelings or moral sense. And also these sets will have their own supporting structure, and therefore they will be systems. In such a way one same single element can belong to multiple subsets (and therefore subsystems) and its psycho-physicalness will have different connotations and different shades in function of its memberships.
So are this single element's way of life, behavioural actions and reactions imposed also by the kind of chosen or sometimes imposed membership?
As I understand this question, it seems similar to Buber's topic of "I and Thou"[xxxii]: how these entities, of I and Thou, are actually related to each other. As I read Buber, the topic of I and Thou is very much a complex topic of interdependency *and* possibility. For Buber the topic was a general one: about the functioning of human relationships. To my mind, this topic may be viewed as a more general topic of the ensemble of two entities: about the operating of what Luhmann&Schorrdescribed as 'twosomes'[xxxiii]. I think we may only agree with their statement that an adequate theory for "the sociality of the twosome" is very much needed (ibid., p. 194). The same is true for their statement that "In no way is a plausible concept of *asymmetric* sociality worked out" (ibid., p. 194). The 'simple' notion of human interaction is not that simple at all. In answering question 3, the complexity involved in modeling interaction became already clear, being operative as generative complexity. This generative complexity was based on a kind of self-generative mechanism that seemed to operate *beyond* the individual contributions of both partners in interaction, evolving over time. It is easy to see that learning is involved in the processes of shaping forces on each other. Now we may better understand Luhmann&Schorr, that it is along the line of thinking in complexity about the generative processes of learning through human interaction of twosomes, with *temporal complexity* involved in the interaction, that the complex phenomenon of "*learning learns itself*" may be understood (ibid., p. 98; emphasis added). We may understand this complex process of learning as a *self-generative* process with emergent, self-generated states of affairs. We may now better understand that learning, like evolution "goes on according to *principles*, notsystems" (ibid., p. 198; emphasis added). Above, I quoted Buber and his description of the relationships between I and Thou as follows: "It appears simultaneously as acting on and as acted upon" (Buber, 1970, p. 81). We may understand this process of interaction as a causal process of interaction and the effects on each other within an ensemble of I and Thou as *self-generated* causal effects over time, based on the dynamics of complexity of cause and effect evolving over time. The causality involved may be understood as a *generative* kind of causality. We may even speak about the self-

generative process within the dynamic ensemble of two evolving entities as a self-generative system. The causal dynamics of reciprocal influencing each other involved may be viewed as mutual shaping forces. The causal influences may beviewed as "productive" causal influences[xxxiv], "producing" their effectsthrough impelling causal forces[xxxv]. Theseforces, having their "causal potency operating in patterns" (Hofstadter, 2007), may havetheir causal effects within the patterns of relationships within a complex web. It is through being involved in the actual weaving of the web that human beings may become'*nonlinear* beings' (Stanley, 2005, p. 143; emphasis added). Stanley states correctly that "in a world of complex patterns, a *capacity* to adapt to a changing world *requires* a nonlinear being. Herein lies the importance of being nonlinear" (p. 143; emphasis added). This capacity may be equated with the very generativity of a human being. Although this may not be easy to understand, it might be taken as the very *essence* of human being. This is the result of the modeling of generative change, sketched above.

From our causal modeling of generative change through mutual shaping forces, operating through interaction within reciprocal relationships, we may also understand the possibility of "bootstrapping each other in small (sub) communities of learners" (Bruner, 1996, p. 21). Such bootstrapping is about nonlinear processes and effects of the causal interaction over time, turning human beings into a complex state of generativity. This state of generativity may be viewed as a state of potential *nonlinear* being to be achieved: a state of creativity and capability, to be linked to the capacity of"knowing how to go on"[xxxvi]. This may be a possibility for both participants in their interaction. Lord speaks therefore correctly about "achieving *collective*generativity".

The possibility of modeling generative change, as sketched above, may be linked with the concept of'*generative* learning'[xxxvii], as taking place within so-called 'learningful relationships', evolving over time. This notion of generative learning seems only meaningful if you take human interaction as a starting point for learning. Only then, you may discover the *generative power of interaction*: to be understood as a power to open and enlarge the space of the possible for each partner in interaction,as a power to 'produce' a kind of nonlinear being of human beings, with generativity as a characteristic of a potential nonlinear state of being. From this we may understand that it is the very *quality* of relationship, as a quality of communicative (inter)connectedness, that we may ascribe the *emergence* of complex phenomena in complex systems like organizations(see Kuhn, 1999, p. 52). We support Kuhn's view that "Organizations can be seen as existing through conversations, *shaped* by the communicative *connectedness* of all participants" (p. 53; emphasis added). Actually it is through the quality of relationships, of communicative interconnectedness, thriving on the quality of conversations within organizations.

The complexity and the non-linear activities derive precisely from the belonging to a large ensemble of structures which bind the Individual, freeing him at the same time, from his isolationism. And the adaptation, or the activity in itself, generate what is called the dynamic equilibrium, the chaos, the Heraclitean constant evolving and transforming. This is referred to Humans. But the same is valid for the zoological world that is a not pure human world. And also for the plants or similar. It is just a bit more complicated for the mineral world.

But can we argue that this is a mere question of point of view and especially of interpretative paradigms?

"We don't have the right vocabulary to precisely describe what we're studying"
(Melanie Mitchell, 2012, p. 301)

As I understand this question, it is about adaptation, about constant evolving entities, being part of large ensembles of structures that bind the Individual, operating within a Heraclitean fluid reality.

Above, I have tried to explain how the unit of twosomes, of two evolving entities within their complex reciprocal relationship, may operate within the unit of a dynamic ensemble. These entities may thrive on the generative dynamics and the generative power of interaction. These entities may evolve as potential nonlinear beings through the dynamics of the evolving relationships over time. This complex process, of evolving entities, may be depicted as a dynamic adaptive walk within a so-called adaptive or fitness landscape[xxxviii]. Kauffman (1995) is so honest to admit that "We still know very little about the structure of such landscapes, and the efficacy of adaptive search on them" (p. 163). He also recognizes the failing state of art in the field, in his description of the state, as follows:

"We do not even begin to understand how selection and self-organization work together to create the splendor of a summer afternoon in an Alpine meadow flooded with flowers, insects, worms, soil, other animals, and humans, making our worlds together" (ibid., p. 163).

How, then, may we interpret this description of the state of art in the field of biology? Kauffman's position seems exemplary for the field of biology.He seems 'simply' not able to step outside of the system. He seems not able to think of the conceptual equivalent of a new calculus, as a way of seeing the consequences of myriad interactions that define a complex system[xxxix]. He seems 'simply' not able to understand the concept of (generative) complexity as 'self-potentiating' (Rescher, 1998), neither to understand the realm of complexity as the realm of possibility. Actually, he seems not fully aware of the very limiting paradigm he is actually working in. Neither he seems aware of the limiting notion of causality he is operating with. Only recently, in his book "*Reinventing the Sacred*" (Kauffman, 2009), he presents "a new view of science, reason and religion" (subtitle of the book). In this book, he takes account of his position around the role of causality and causation. He now takes the rather limiting functional view that "*the function of a part of an organism is typically a subset of its causal features*" (p. 34; italics in original). He still neglects the role of generative causality, and the concepts of generativity and generative entrenchement, as described by his colleague William Wimsatt (1999, 2007). From this description of Kauffman's position, I like to derive the urgency of a transdisciplinary perspective, which integrates the potential of a new paradigm of complexity with the potential of a new vocabulary for description of what real complexity is actually about. It is through such a unifying, transdisciplinary perspective that we may open the space of the possible for entities evolving over time: with their ever-evolving adaptive walks within landscapes. Such kind of walks are dependent on the quality of interactivity and connectivity of the loop-like reciprocal relationships with other entities, which are enhancinggenerativity as a state of potential nonlinear being, as a capability to evolve within spaces of the possible. So, entities may evolve in a world of the hitherto unknown. This world might be taken as a new world; a world, which Kauffman himself has *correctly*

described as a 'world of the possible'[xl].He himself, however, does not recognize, like Melanie Mitchell in her recent book about complexity, the need for a new calculus to open the spaces of possibility in a world of the possible. This calculus is a calculus about the generative, as described above. It is only through a new framework of complexity encompassing the new generative calculus that we may develop the tools for a "science of complexity"[xli]. This generative calculus may finally *replace* the traditional limiting Newtonian framework of causality. With this Newtonian framework it was 'simply' not possible to model generative change. It was not possible to model complexity as generative complexity or to view complexity as self-potentiating. With the use of the new generative calculus it may become possible to overcome the paralyzing belief that reality is too complex to be 'mastered'.
From thenew perspective, of building a new framework of complexity, we may understand that "new conceptual frameworks often require the broadening of existing concepts"[xlii]. By linking causality, sketched above, with the new thinking in complexity, it might be possible to develop a new framework of complexity. It might even be possible to take up the challenge of building a new science of complexity (see Jörg, 2011). This framework is explanatory about generative change and of relationships as complex generative structures, operating in ensembles of entities, as a kind of self-generative system. This framework may offer the tools for understanding and explaining of complex phenomena as emergent realities. These realities may be viewed as dynamic expressions of self-generated states of affairs. The generative structures involved, of causal reciprocal relationships, are thriving on the complexity of interaction between entities. The quality of relationships, of interconnectedness, is dependent on the quality of interaction. The quality of interaction, in turn, is dependent on the quality of relationships. It is the very interdependence of these qualities that turns the very system into a self-generative system. It is the new language of complexity which enables us to describe the new complex reality as a nonlinear complex reality, based on the operating of causal, generative mechanisms for generating change.

It's the problem of Thought, what is it? How is it? Where is it?
To understand this, must we postulate the existence of a key combination body- thought that goes far beyond the theory of identity that has been lost in the pursuit of the mind-brain relationships?
As I understand this question, this might be the most problematic question to answer. Simply because we actually do not know how complex thought might be viewed in the real.
We cannot think our own thinking, in the same way that we cannot see our own seeing. We are only able to observe what has become emergent, as a result of a self-generative kind of processes, of which we have no control whatsoever. I think the problem of thought is very much a problem of the lack of adequate thinking and of an adequate complex vocabulary. In general, we may think about thought as a way of thinking in complexity, as a way of network thinking. Thinking, then, takes placewithin complex networks. These are networks with different elements, like learning, knowing, as shown in Figure 2 below. In this figure these elements are fully interdependent in a dynamic way. Thinking seems to thrive on learning and knowing. The dynamics of this interdependent network results in generativity as a state of being, to be understood as a capacity to create and an integrated capability "to know how to go on". This capability integrates the dynamics of knowing with the dynamics of action. Generativity may be conceived as a state of potential *nonlinear* human being, and the action as a self-generated state of affairs.

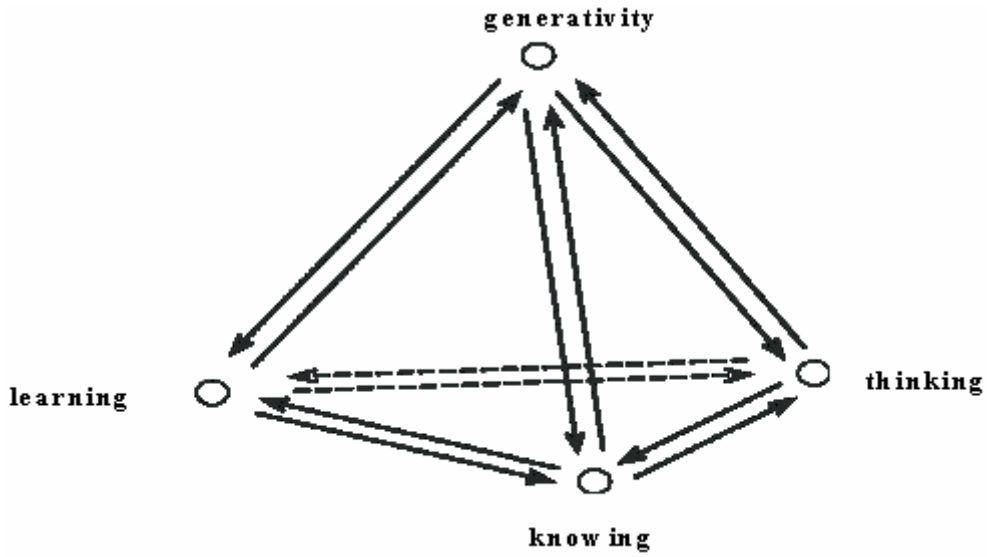


Figure 2
Dynamic, tetrahedrical relationship between learning, thinking, knowing and generativity

To think about thinking, we may consider the notion of thinking as an emergent, self-generated states of affairs. How such a state may emerge is a scientific question, involvingmulti-dimensional processes, enabled through generative structures with potential re-entry, and multi-dimensional effects: of generativity as a complex state of being within multi-dimensional state hyperspaces. These states are closely linked to the complex processes of learning, thinking and knowing, and their complex, dynamic interdependencies. The dynamic effects can be conceived as effects on potential generative states of being of the entities involved, as being ever-evolving entities in interaction.

The nature of thinking itself is generally taken as a kind of linear process with cumulative effects over time, taking place in the mind. This description neglects the complex generative nature of thinking, as linked to the dynamics of a network of different entities. To think of the complexity of thinking and thought, we need to link thinking in complexity with network thinking. Actually, we may think of a complex, multi-dimensional *generative* matrix, with generative processes, like generative learning, taking place within generative structures, of many dimensions. The effects may as well be multi-dimensional, in complex, dynamic state hyperspaces. We have to face this complexity operating within complex dynamic web-like networks of circular causal systems with interconnected loops, with circular causal processes operating within these loops.
The causal model of generative change may be the unique model to encompass the potential nonlinear effects of interaction within the generative matrix. Both the processes and the structuresare interdependent within this complex generative matrix. The quality of interconnectedness enhances the quality of interaction within the network and vice versa. The circular causal model of interaction between entities like complex systems in their dynamics of interaction, shows the possibility of mutual nonlinear effects on the entities in interaction. These systems are systems of affect, cognitive systems and systems of motor activity. The dynamics of interaction may show the possibility of entities bootstrapping each other over time, and the possibility of deviation amplifying processes with potential nonlinear effects, like the Snowball Phenomenon, or the butterfly effect. The effects of the complex dynamic interaction may be taken as enlarging the space of the possible. Different authors seem aware of these nonlinear possibilities, like Maturana (1980) and Kuhn (1999). Maturanaspeaks here about the possibility of unlimited enlargement of cognitive functioning (p. 59) and Kuhn (1999) about "spaces of infinite possibility" (p. 52). They do not offer a framework of complexity that may model the nonlinearities involved. The lack of such a framework seems to confirm the state of art in the field of complexity, lacking an adequate way of modeling of interaction, and the missing of "the conceptual equivalent of a calculus, a way of seeing the consequences of myriad interactions that define a complex system"[xliii].
We may conclude that we need a new calculus that integrates network thinking with thinking in complexity about interaction. It is the complex calculus of the causal modeling of interaction within causal reciprocal relationships that opens new spaces of possibility for modeling interaction (see Jörg, 2011). This calculus may *replace* the traditional calculus of the linear notion of cause and effect.
With the new calculus we may replace the dominant notion of linear unfolding with the notion of generative nonlinear change, with potential nonlinear effects. The use of this calculus is for understanding circular causality operating in complex, dynamic, multi-dimensional. web-like networks, with their processes of complex dynamic interweaving and their effects, manifesting themselves within multi-dimensional state hyperspaces.
It is only by modeling interaction as causal interaction within reciprocal relationships between evolving entities that we are able to conceive of the inherent possibility of nonlinearity of the effects 'produced' in the interaction. The entities involved may be entities like human beings or complex systems like circular causal systems. The complex causal calculus may be linked to the important principle of re-entry, presented by Edelman (1992) in his description of the functioning of the brain. The calculus is a calculus about modeling generative change. The calculus of the causal modeling of interaction is therefore not only opening the social sciences, but also the field of the study of the brain, with its inherent power of thinking. Thinking, then, becomes a generative kind of dynamic complex processes within complex web-like networks of interconnected loops at different levels of functioning within the brain. The thinking manifests itself in its emergent, potential nonlinear effects over time. The thinking manifests itself in generativity as a complex state of being, linked to the complex capacity to create and the complex capability to act as a human being. From this picture we may understand the novelty of thinking as inherently unpredictable.

Our phenomenal nature and reality is body and mind. Not only ours, but also of anyone or anything that is other than us. It would be like admitting that matter and mind are two ways to be of Energy. That we ourselves are Energy, Matter as condensed Energy, and that Thought is the informative wave that surrounds it, that surrounds us, which contains the universe. Matter as a set of fermions (distinguishable particle-waves), Thought as a set of bosons (indistinguishable particle-waves), and each of them simultaneously forming part of a whole, a tensor super-space in which symmetry and antimetry are coexisting with their own rules of which we glimpse only certain specific but only sectorial particularities.

From this point of view, do you think it is possible to envisage a philosophical system which overcomes the Cartesian ambiguities and the idealism tout-court to synchronously manifest and reveal about itself and about the other whichever he/it is?

Or as the rules for the application of the rules don't emerge (see Kant in the Criticism of Judgment), we must resort to the "ingenium"?

Yes, I do think we may overcome the Cartesian ambiguities. But this demands for a new way of thinking, i.e. about interaction and relationships between dynamic entities, like the mind and body. This new way of thinking is about thinking in complexity, based on the shift of paradigm towards a paradigm of complexity, enabling for the use of a new lens: a *complexity* lens[xliv]. The new way of thinking is also in need for a new language: a language of complexity.
Complex entities like the mind and body are not isolated, but inherently relational. These are fundamental web-like entities. Mind and body, being a fluid kind of web-like networks, with their webbed architecture, are *themselves* linked through a fluid web-like network of relationships. Both mind and body may be characterized by a fundamental plasticity[xlv].This plasticity may be ascribed to the self-generative nature of the entities in their interaction. Both entities come into existence through the generative mechanisms, operating in the unit of the ensemble of these two entities. Both mind and body may be taken as web-like, self-generative, fluid kind of networks[xlvi]. So, there is a network of intra-generative processes, of both mind and of body, which are linked by a complex network of inter-generative processes.
The complex entities of mind and body are actually *feeding on* the complex inter-generative processes of interaction, taking place within the complex network of reciprocal relationships between mind and body. It is through the generative power of interaction within web-like relationships that entities *acquire* their entitativity through dynamic

processes of coming into existence, as a consequence of self-generated states of affairs within the fluid kind of network. This process of acquiring entitativity may be viewed as taking place in a web-like, fluid, multi-dimensional network of interconnected loops. Each entity has a characteristic of interactivity and connectivity, of interconnectedness with other entities within the network. These characteristic, in turn, are linked to the generativity of the entities involved. The complete interdependencies of the dynamic characteristics of a *single* entity are shown in Figure 3 (cf. LeDoux, 2002, p. 198, on reciprocal connections between different areas operating *within* the brain). It also shows the reciprocal relationships between these characteristics as dynamic relationships evolving over time. The dynamic interdependencies in Figure 3 are descriptive of the actual dynamics of the mind and the body as complex dynamic entities. Each of the entities, in their interaction, may acquire a different degree of entitativity, confirming the asymmetric relationship between two entities in interaction.

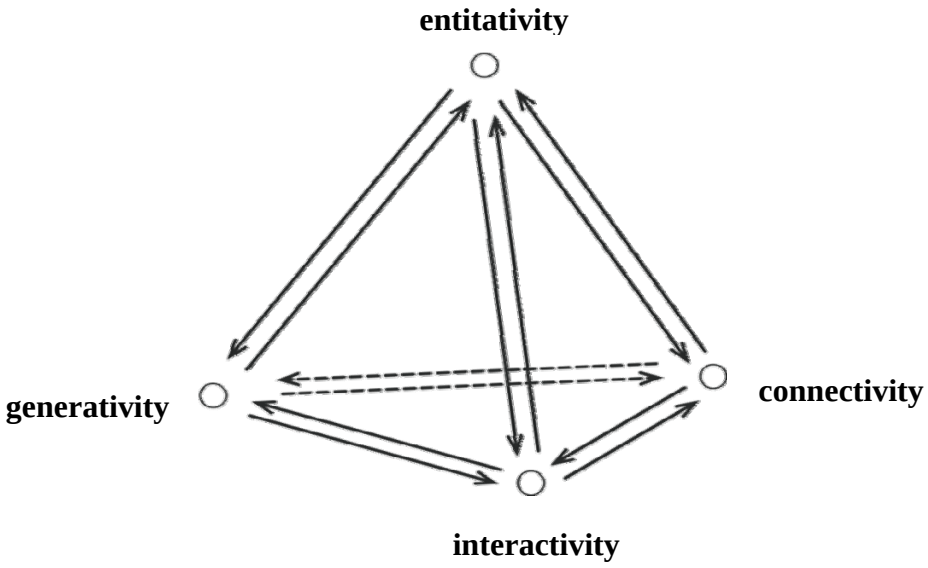


Figure 3
Entitativity and its reciprocal relationships with other characteristics
Of entities within a complex web-like network

This brings us to the notion of the complex dynamics of being of entities. Complex states of being may emerge through the generative processes of complex, dynamic interweaving between the entities of the network, each with their dynamic characteristics. This dynamic interweaving is a kind of potential self-generative process, in which *both* the interaction *and* the generative structures between the entities may change over time. This makes the whole fluid-like, showing the plasticity of the whole. The connectivity of the entities within the network may increase by the very *use* of the connections available in the network. LeDoux (2002) describes this fluid nature of the state of an entity as Hebbian Plasticity (p. 310). Entities are not only thriving on interactions within relationships but may also *strengthen* connections between them (p. 311). He called this the *plasticity* of the network in use by the entities involved (ibid., pp. 310-311). It is possible to link this plasticity with the phenomenon of long-term potentiation (ibid., p. 139). This term may be linked with the concept of generativity, as a capacity to create or capability to perform by an entity. The complexity involved is about interactional complexity and relational complexity, which are linked to generative complexity. The link between complexity and network thinking may be described as *hypercomplexity*. The complex dynamics involved is very much about the processes of (self) generating potential nonlinear effects. The dynamics of mutual causality, responsible for these nonlinear effects, may be conceived as the causal complexity involved. These dynamics may imply the role of deviation amplifying effects and the process of bootstrapping each other over time. With the new calculus of total effects over time, we may encompass the fundamental possibility of nonlinear causal processes within causal loops between entities, complexly evolving over time. The new calculus which is about (self) generative processes within the unit of a reciprocal relationship between two entities, as a dynamic unit of the ensemble, may bring us to a better understanding of the potential nonlinearities involved in the dynamics within such a dynamic unit.

The description above of mind and body as complex dynamic entities is a complex description of the complexity involved indeed, made possible through the use of a complexity lens. The use of a complexity lens, and the use of a language of complexity are urgently needed to understand the coming into existence or the complex evolving of complex dynamic entities like the mind and brain (body). The complexity of generating nonlinearity makes it understandable that the (total) effects over time are themselves not dependent on time but take place over time; that is, with *the help of* time[xlvii]. You indeed need complexity, the tools of a new framework of complexity, to be able to deal with the real complexity of a nonlinear complex reality. The description above may offer the generative foundation for a new understanding of the complex dynamics between mind and body. Although you cannot see complexity 'at work' within this complex dynamics of mind and body, we may know the actual effects of the complex dynamics over time.

The complex description above confirms the assessment by Melanie Mitchell (2011) that "we don't have the right vocabulary to precisely describe what we're studying" (p. 301). The answers, taken together, also confirm that the field of complexity was missing the calculus to describe the generative processes, based on (self) generative mechanisms, producing potential nonlinear effects.

With this calculus we may better be able to understand complex phenomena like the interaction between mind and body, with their emergent effects, now to be taken as a kind of *emergent* realities, as a kind of self-generated states of affairs.

From the answers above, we may derive a possibility of description of the transitory nature of human being, already recognized by Goethe[xlviii]. This transitory nature may now be based on the generative nature of the processes involved in interaction. The transitory nature is also about the transitory nature of the human mind. With the new complexity lens we may not only better describe the very transitory nature of the mind but we may also better understand the mechanisms and the effects 'produced' through the (causal) generative mechanisms involved. We no longer need to be the prisoners of description or the prisoners of our own thinking in our description of reality as a nonlinear complex reality. Based on the paradigm of complexity we may reclaim reality as a kind of complex, dynamic, self-realizing reality. With the new framework of complexity we may also better understand the complex dynamics of *realizing* of the living (cf. Maturana& Varela, 1980).

Comparing Systemic Business Paradigms *(G. Mancini)*

Raimondo Strassoldo: da David a Saatchi. Trattato di sociologia dell'arte contemporanea *(Giuseppe O. Longo)*

Systems Theory against Systematized Law *(Ivar A. M. Hartmann)*

The Divulgation of Complex Notions *(M. Ruzzeddu)*

1. ***Codification: signal, canal, noise, encoding and decoding*** *(M. Infante)*
2. ***Information*** *(M. Infante)*
3. ***Systemic Boundary*** *(M. Infante)*
4. ***Viable System Model (the VSM)*** *(E. Reynolds)*

Systemic perspective of the International Structure of Scientific Knowledge **(***F. Del Canto Viterale)*

The profound changes occurring in the international system over the past 20 years have occasioned new rules and new world patterns characterized by the phenomenon of globalization, by an exceptional technological revolution, by more actors and a new global agenda of topics more complex and interdependent. All this events generated a necessary theoretical debate and empirical investigations on how these changes affect the new international system.

One of the global Agenda new topics is the Scientific Knowledge. At the beginning of the 21st Century, the scientific knowledge has acquired a significant economic value that generates a very strong impact on the economic, social and political system. The new aspect is that it becomes central to this new stage of capitalism, and a main source that generates economics richness, political power and social development.

All these changes have made a deep impact on the geopolitical and geo-economic structure of the scientific knowledge, as well as in the international actors involved in it and in the changing aspects of interaction; as cooperation, conflict or competition that occurring among the different actors, administrators and transmitter of scientific knowledge. The geopolitics of scientific knowledge becomes a key factor that is trying to shape the New World Order characterized by a knowledge society.

This investigation from a systemic perspective and the use of Science and Technology (S&T) indicators could be an academic keys explanation on the field of International Relation and Social Science, using it as a new approach. Pursuing this idea, the present doctoral investigation is working with global system schemes and with variables, dimensions and indicators on S&T in order to discover new answers of the role of scientific knowledge.

Proving Darwin: making biology mathematical *(R. Defez)*

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[i] Ruesch and Bateson (1968), in Luhmann (2002), *Theories of distinction*, p. 50,fn. 27
[ii] Rasch. In Luhmann (2002), *Theories of distinction*,p. 4
[iii] Juarrero (1999). *Dynamics of action*.
[iv] Bhaskar (2011). *Reclaiming reality*.
[v] See Stuart Kauffman. In R. Ulanowicz (2009). *A third window*, p. xi
[vi] See Kuhn (1999). *Adventures in complexity*.
[vii] Kauffman (1995). *At home in the universe*, p. 185
[viii] Morin (2008). *Complexity*.
[ix] Kauffman (1995), *At home in the universe*, p. 186

[x]Hofstadter (2007). *I am a strange loop*.
[xi]See Kuhn (1999), p. 52
[xii]Vygotsky (1997/1926). Collected works of L. S. Vygotsky: Vol. 3. *Problems of the theory and history of psychology*.
[xiii]Luhmann (2002), T*heories of distinction*, p. 157
[xiv]See Mitchell (2011), *Complexity*, p. 301
[xv]See Whitehead (1938). *Process and reality*. See also Mesle (2008). *Process-relational philosophy*.
[xvi]Kauffman (1993). *The Origins of Order*.
[xvii]See Jöreskog&Sörbom (1993). *LISREL 8*; and Hayduk (1996).
[xviii]Joravsky (1999). *Russian psychology*.
[xix]Kauffman (2009).In R. Ulanowicz (2009). *A third window*, p. xi
[xx]Maruyama (1963). *The second cybernetics*.
[xxi]Jörg (2011). *New thinking in complexity*; see also Hayduk (1996) about self-enhanced loops.
[xxii]Kauffman (1993), *The Origins of Order*, p. 428
[xxiii]Kauffman (1993). *The Origins of Order*.
[xxiv]Luhmann (2002), T*heories of distinction*, p. 157
[xxv]Mitchell (2011), *Complexity*, p. 299
[xxvi]Morin (2008). *Complexity*.
[xxvii] Edelman &Tononi (2000). *Consciousness*.
[xxviii]Wallerstein et al. (1996). *Opening the social sciences*.
[xxix]Maruyama (1963). *The second cybernetics*.
[xxx]Wimsatt (1999). *Generativity, entrenchement, evolution, and innateness*.
[xxxi]Mitchell (2011), *Complexity*, p. 295
[xxxii]Buber (1970). *I and Thou*.
[xxxiii]Luhmann&Schorr (2000). *Problems of reflection*.
[xxxiv]Salmon (1993). *Causality: Production and propagation*.
[xxxv] Cf. Valsiner& van der Veer, 1991, p. 231; Hofstadter (2007); and Bechtel & Richardson (1993), on forces operating in (human) interaction
[xxxvi]Lord (1994). *Teacher's professional development*, p. 193
[xxxvii]Senge (1990, pp. 284-286; 2004, p. 463); and Fernandez et al. (2007, p. 183)
[xxxviii]Sewell Wright, in Kauffman (1995, p. 162); see also Sole & Goodwin (2000, p. 256).
[xxxix]Strogatz, in Mitchell (2011, p. 301)
[xl]Kauffman (1993). *The origins of order*, p. 375
[xli]Michell (2011), *Complexity*, p. 299
[xlii]Mitchell (2011), *Complexity*, p. 300
[xliii]Mitchell (2011), *Complexity*, p. 301
[xliv]Kuhn (1999). *Adventures in complexity*.
[xlv]LeDoux (2002). *Synaptic self*.
[xlvi]Sole & Goodwin (2000). *Signs of life*.
[xlvii]Luhmann (2002), *Theories of distinction*, p. 60
[xlviii]See Vygotsky (1987), *Collected volumes*, Vol. 1, p. 91