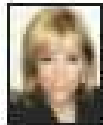




## Paradigmi e simulazioni di homo "socialis et cyberneticus": la società degli specchi

Questo libro, che proviene dalla pluridecennale attività di ricerca di Astolfi ed Errigo, si colloca in modo significativo, lungo la linea indicata di un avanzamento nel cammino verso la costruzione di una teoria dei Sistemi complessi, in chiave sia interdisciplinare sia transdisciplinare. Ciò che rende unico questo contributo, nella letteratura sulla Complessità, è il trattamento che gli Autori riservano alla modellizzazione dei processi sociali e dei processi neurali, utilizzando elementi che provengono da un ampio spettro di discipline: dalla Psicologia alla Sociologia e alle Scienze Sociali, dall'Elettronica dei microcircuiti alla Teoria dei Sistemi e alla Fisica Teorica. (E. Vaio)



**M**aria Rita Astolfi is a Systemic Psycho-Pedagogist and a Human Resources Independent Researcher. She graduated in Foreign Literature and Languages (English and French) and in Pedagogy with an Experimental Pedagogy thesis. She is also specialized in Special Pedagogy. She was Co-Founder and President of WCSA (World Complexity Science Academy) and she was member of the Italian Club of Biological Research Committee. She is joint co-owner and Editorial Manager of "New Atlantis", ex "Nuova Atlantide". She is also Editorial Manager of the "www.cybernetic.eu" website. She is the author of several publications, papers and communications.



**A**fter obtaining the "A Level" Certificate at the Italian "Classic" High School, Demetrio Pietro Errigo graduated in Chemical Engineering (magneto-fluid-dynamic researches and applications) and later in Speculative Philosophy (as the foundation of Cosmology, Epistemology, Sociology, Politics, Ethics and Religion). He is member of the Italian Ex-Parliamentary "Cultural Affairs" Commission, Musician, Journalist, Lecturer, he was Co-Founder and Emeritus President of WCSA (World Complexity Science Academy) and he was member of the Italian Club of Biological Scientific Committee. He is joint co-owner and Editor of "New Atlantis", ex "Nuova Atlantide". He is also Editor of the "www.cybernetic.eu" website. He is the author of several scientific publications, papers, and communications.

In copertina

Henri de Toulouse-Lautrec, *Aspettando un treno in un caffè*, 1891.

ISBN 978-88-548-7533-9



9 788854 875339

euro 19,00

Astolfi, Errigo / Paradigmi e simulazioni di homo "socialis et cyberneticus": la società degli specchi

Amazon

Maria Rita Astolfi  
Demetrio Pietro Errigo

## PARADIGMI E SIMULAZIONI DI HOMO "SOCIALIS ET CYBERNETICUS": LA SOCIETÀ DEGLI SPECCHI

*Prefazione di*  
Franco Vaio



*The simulation model of a complex system:  
the neural system*

*Demetrio P. Errigo*

*Presented in*

**WCSA - WORLD COMPLEXITY SCIENCE ACADEMY**

**III CONFERENCE – VIENNA**

**November 18<sup>Th</sup> - 19<sup>Th</sup>, 2012**

**Hotel AM Konzerthaus**

# Simulation Model of a Complex System: the Neural System

(Demetrio P. Errigo)

tratto da

## Paradigmi e Simulazioni di homo “socialis et cyberneticus”

(Maria Rita Astolfi – Demetrio P. Errigo)

7 **Prefazione**

### PARTE I

#### **Sistemi Sociali e Gestione del Potere (la Società-Specchio)**

(Maria Rita Astolfi, Demetrio P. Errigo)

11 Capitolo Unico  
*Sistemi Sociali e Gestione del Potere*

Prologo, 12 – Abstract, 22 – Keywords, 23 – Introduzione, 24 – § 1. Struttura e Scenari, 32 – § 2. Fondazione teorica del Modello, 52 – § 3. Sistemi Sociali e Società, 69 – § 4. La Gestione del Potere, 76 – Conclusioni, 127

### PARTE II

#### **Simulation Model of a Complex System: the Neural System**

(Demetrio P. Errigo)

139 Capitolo Unico  
*Simulation Model of a Complex System: the Neural System*

**Prologue**, 140, – **Abstract**, 149 – **Keywords**, 150 – § 1. Introductions (1.1 - 1.2 - 1.3), 151 – § 2. Work's Hypotheses and Conditions, 161 – § 3. Technical System Descriptions, 166 – § 4. Main Technical Simulations, 179 – § 5. Results, 182 – Conclusion, 186 – Notes, 190 – Figures, 201

229 Bibliografia Parte 1

253 Bibliografia Parte II

## Prefazione

“Viviamo in un mondo complesso. Non c'è alcun dubbio!”. “Complesso è il mondo studiato dalle scienze che si occupano della natura e complesso è il mondo oggetto di studio delle scienze che si occupano dell'uomo e delle società”. I concetti che frasi di questo tipo veicolano con sé sono entrati da vari anni nel patrimonio culturale comune, almeno superficialmente. Quando non sono addirittura divenuti dei luoghi comuni. ‘Complessità’ è oggi, in altre parole, un termine di moda, non ben definito, ambiguo, in quanto ricco di molti significati: è un termine che si presta a molte interpretazioni differenti, spesso usato impropriamente sia nel linguaggio colloquiale, giornalistico e di costume, sia, talora, seppur più raramente, anche in campo scientifico.

L'idea che la realtà sia complessa, cioè né semplice né prevedibile, ma incontrollabile, imprevedibile e in generale di difficile comprensione a priori, è antica come l'uomo. La scienza, come l'abbiamo conosciuta nel mondo occidentale dalla fine del Cinquecento in poi, ha rivolto il più delle volte la propria attenzione verso l'osservazione e la descrizione delle regolarità osservate nei fenomeni, cercando di smontare questi ultimi in parti più semplici, con l'idea sottostante di descrivere il fenomeno nella sua interezza come somma dei comportamenti delle singole parti. Ciò nel tentativo di esprimere le regolarità osservate in espressioni formali, quelle che Cartesio chiamò ‘leggi’, identificandole con la manifestazione dell'infinita saggezza del Dio Creatore. Ma quest'atteggiamento riduzionistico non è sempre stato di successo, in particolare per i fenomeni osservati nei sistemi sociali, dove, ben prima che nelle scienze della natura e soprattutto nella fisica, si è sempre manifestato evidente l'aspetto ‘complesso’ dei sistemi, il cui comportamento è certamente l'esito dei comportamenti delle singole parti in interazione, ma non appare affatto come la pura somma dei comportamenti individuali. Ciò ormai è entrato nella cultura generale diffusa, così come nella cultura scientifica, nella quale tuttavia, e questo costituisce oggi il vero problema aperto, manca ancora una definizione generale di ‘complessità’ e, a maggior ragione, ne manca una vera e propria teoria di riferimento.

Non stupisce che, in mancanza di una definizione generale, nelle diverse discipline siano state date definizioni differenti della complessità, ciascuna tagliata sulla prospettiva specifica di quella particolare disciplina in cui tale definizione origina. Molte, se non tutte, le definizioni si adattano bene solo a qualche ristretto ambito particolare, dunque, e ciò costituisce tuttora uno dei maggiori problemi che l'approccio della complessità deve affrontare. Difetto e pregio: difetto per il ricercatore che vuole una teoria di riferimento, che non c'è, da applicare alle proprie ricerche, ma anche pregio perché lo stesso ricercatore gode così di una certa qual libertà di movimento, senza doversi scontrare con un paradigma dominante, ma anzi concorrendo con ampia libertà alla costruzione del paradigma mancante stesso, dopo la crisi, se non ancora la vera e propria definitiva caduta, del paradigma del riduzionismo.

La più diffusa posizione storiografica sostiene che il pensiero della complessità sia comparso verso la fine degli anni sessanta per opera di alcuni studiosi come il chimico Ilya Prigogine e il fisico Murray Gell-Mann, e riferiscono al filosofo Edgar Morin il suo inquadramento filosofico. Altri, fra i quali lo scrivente, pur senza affatto sminuire il ruolo assolutamente fondamentale di questi studiosi, così come il fondamentale ruolo svolto da altri studiosi di discipline disparate, fra i quali Herbert Simon, Hermann Haken, Niklas Luhmann e, qualche decennio prima, lo stesso John Maynard Keynes, così come di tanti altri, vedono in un'epoca ben anteriore la nascita del pensiero complesso. Si può affermare che già verso la fine dell'Ottocento si diffonde sempre più, in vari ambiti scientifici, l'idea che il dualismo cartesiano mente-materia e il pensiero riduzionista settecentesco e ottocentesco che, almeno in qualche modo, a esso si rifaceva, siano inadeguati a comprendere il mondo disegnato dalle scienze moderne, caratterizzato dall'evidente onnipresenza di intricate reti di interazioni fra le parti costituenti sistemi della natura più svariata. Idea che, peraltro, per quanto a volte in secondo piano, non era mai sopita nei secoli precedenti, soprattutto presso gli scienziati sociali. Basti pensare, un celeberrimo esempio fra i tanti, all'idea che Adam Smith presenta nella sua *Inquiry into the Nature and Causes of the Wealth of Nations*, già nel 1776, che il benessere economico nelle

società sia l'esito, oggi diremmo emergente, autorganizzativo, cioè 'complesso', della somma dei tanti egoismi individuali di agenti sociali in interazione fra loro.

La complessità fornisce una prospettiva epistemologica nuova rispetto al pensiero scientifico riduzionistico, dunque, una prospettiva fondamentale nel pensiero contemporaneo, che introduce rilevanti novità. Importantissima è, fra queste novità, la nuova collaborazione che si forma tra scienza e filosofia. Ad esempio, le scienze cognitive, il contesto scientifico che si propone, fra le altre cose, di comprendere i processi decisionali individuali all'origine delle dinamiche dei sistemi sociali, hanno consentito a studiosi di discipline diverse, neuroscienziati, informatici, filosofi della mente, linguisti, psicologi, economisti, sociologi, antropologi e, in anni più recenti, financo fisici teorici, di unire le forze nella realizzazione di modelli dell'attività cognitiva, invadendo territori che da sempre sono stati di competenza quasi esclusiva dell'indagine filosofica.

Questo libro di Demetrio Errigo e Maria Rita Astolfi si colloca in modo estremamente significativo, per l'appunto, lungo la linea indicata di un avanzamento nel cammino verso la costruzione di una teoria della complessità e in particolare dei sistemi complessi, in chiave sia interdisciplinare sia trans-disciplinare. L'importante contributo di questo libro, che proviene in modo evidente dalla pluridecennale attività di ricerca degli autori, ciò che, a parere dello scrivente, rende unico tale contributo nella ormai ampia letteratura pubblicata sulla complessità, è il trattamento che gli autori riservano in chiave, per l'appunto, interdisciplinare e transdisciplinare, alla modellizzazione, nelle due parti del libro, dei processi sociali e dei processi neurali. E ciò, utilizzando elementi che provengono da un ampio spettro di discipline: dalla psicologia alla sociologia e alle scienze sociali, dall'elettronica dei microcircuiti alla teoria dei sistemi e alla fisica teorica. Non si tratta di un testo di divulgazione, né di rassegna. È un testo che espone la ricerca originale condotta dagli autori, esito, come detto, della loro lunga attività. Non si tratta di una lettura da affrontare in modo superficiale. Il libro contiene importanti contributi di ricerca e fa riferimento, doverosamente, dati i temi affrontati, a conoscenze pluridisciplinari, estese in ampi tratti di territorio intellettuale. Il lettore probabilmente incontrerà discussioni di argomenti su cui egli è poco competente: ciò sicuramente costituirà per lui, oltre al resto, un'importante e utilissima occasione di stimolo intellettuale, di studio e di approfondimento. Gli autori opportunamente introducono formulazioni matematiche, per la necessità di essere precisi: il lettore comprenderà sicuramente le ragioni e gli scopi per i quali gli autori presentano in tal modo le proprie discussioni e in particolare gli elementi utili per l'originale modellizzazione di sistemi complessi in chiave interdisciplinare che nel libro si propone.

Torino, settembre 2014

**Franco Vaio**

**Franco Vaio** (francovaio@yahoo.it). Physicist, he was engaged in high energy physics experimental Research at CERN and at the University of Turin. He spent then several years in applied research at Telecom and at Olivetti laboratories, where he was engaged in systems and networks research and in language processing and recognition. He was Adjunct Professor of mathematics at Turin Polytechnic. In the last two decades he has been engaged in complex Systems research, in particular in the social and economic areas, at Turin Polytechnic, formerly, and now at the University of Bergamo. He is the Author with Cristoforo Sergio Bertuglia of several articles on economics and on urban and regional sciences, and coauthored with Cristoforo Sergio Bertuglia the following books: (2011) *Complessità e Modelli. Un nuovo quadro interpretativo per la modellizzazione nelle scienze della natura e della società*, Bollati Boringhieri, Torino; (2005) *Non Linearity, Chaos and Complexity. The Dynamics of Natural and Social Systems*, Oxford University Press, Oxford; (2003) *Non linearità, caos e complessità*, Bollati Boringhieri, Torino; (1997) *La città e le sue scienze* (a cura di), Vol. 1: *La città come entità altamente complessa*, Vol. 2: *Le scienze della città*, Vol. 3: *La programmazione della città*, Vol. 4: *Le metodologie delle scienze della città*, Franco Angeli, Milano.

## Prologue

1

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 skillfully 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.

2

We are quite convinced that a change of state corresponds to a change of a point-event. It is irrelevant that this "does move" or not. It is that its "weight" in the universal web has changed and so the energy-momentum impulse varies: the same impulse acting on (or because of) that point. As a result we also need to give a topological definition of the entropy.

If any transformation occurs, because of the web existing among all the (adjacent or not) Systems, they are informed. This means that if there is an information that runs along the axes of the connection among the points, then any transformation will as well vary the amount of information that will be exchanged, varying also the entropy.

It is quite interesting to see to what this function is actually linked.

It depends only on the initial and final states and it should also give information on what type of path it is pursuing.

This is what happens in our nervous System, since the biochemistry is fully involved.

3

The biological speeds are of the order of meters per second. In reality, however, there are conditions of synchronicity that may lead to the conclusion that probably the physical conditions are not fully known.

These synchronicity conditions lead to the assumption that the parts of the System are connected to each other in terms of complementarity or subsidiarity, almost at photon frequencies.

We know that gaining speed is equivalent to make more and more rotate the space-time of a body in motion relative to an observer who lives in a four-dimensional universe .

At the limit, at the speed of light (i.e. the photons), the observation requires that the observer is perpendicular to the time axis rotation that is the fourth dimension.

By definition the photon moves at the speed of light. The universe is flat, a flat disk for him.

It arrives as soon as it departs, because for him there is no distance to cover.

It is not living because it has a null time, starting from somewhere (but there is no distance) it reaches the observer at zero time.

We have just only an apparent time expansion.

The photon is energy and therefore it is inertial mass; who emits it, is automatically a watch, and gives rise to masses.

From this the hypotheses of the biological synchronicities in our interior.

There must be something: a kind of mechanism, a physical law, a particular situation, which allows the body to create simultaneously neuro-transmitters in the different sub-volumes in which the body

is divided.

And the information of this something must be of a photonic or a muonic kind, and moreover we have assumed Geometry as the source of gravitation, or better it is all the same with it: there is no gravitational relationship, there is a geometric space-time distortion.

Given these basic assumptions, we know, for example, that the inter-synaptic exchange takes place through matter, energy and information.

The set of neurons, we examine of in this paper, can neither receive nor transmit matter.

So it has to by-pass this interchange: that is it will get information and energy immediately before the source of the neuron-transmitter and will give information and energy immediately after the receiver-neuron.

Biologically, the neuron is characterized by a large surface to facilitate this transaction.

Artificially this can be achieved only by increasing the number of probes in reception and in transmission, articulating and facilitating their mutual inter-relations and making as much as possible easier the codification and the digitalisation.

It is important to specify that these are not digital signals but digitized: that is, the analogical artificial signals that the bionic set generates, are associated with the wave trains as series of standard nerve impulses and they so approach to reality.

There is a remarkable coincidence with reality if we take into account the nervous circuits and centres; but the artificial nervous tracks and centres, which are in growth and more and more specific, are not currently able to transform the various neuro-states in psycho-states.

In this work we consider the human body in general as a geometric structure inside which there is the same configuration of the universe: ie the biological communicative signals move within the body as the photons outside the body, throughout the whole universe.

In short, "inside the same that outside".

4

Considering a generic informative signal in very high dilutions, we can preferably use the molecular quantum mechanics (QM). It allows the study of configurational changes of potential target macromolecules, due to energy flows that activate the Tunnel Effect in disturbance conditions.

That is that an informative electromagnetic flow due to a very high dilution has a very high probability of interfering on the information generated by the compounds (the target) that constitute the cell or whatever.

They are not substances but informations that their active forms are able to emit irradiating in a quasi-spherical space all around them.

If within this quasi-spherical space there is the target (the only one able to receive the message, while other types of target that interact with different information frequencies can't read it) then there is the unidirectional communication.

A minimum quantity of information can excite the reception, and can obtain a higher result avoiding what in chemistry is called the "activation barrier", which would require a higher energy to get the same (Tunnel Effect).

In this paper we don't deal with a quasi-spherical space but with the analogy with the flux-cone of an arc-jet that is emitted.

With the directionality, which can vary in intensity in function of the three spatial dimensions, this flux-cone guarantees the informative certainty on the target (receiving axon and its around i.e. the various collateral axons that are also receiving, even if in diversified quantities).

The guarantee is given by the same conditions as above.

With the artificial information exchange, obtained using nanotechnologies, we simulate the presence of:

- the transmitting sources,
- the neurotransmitters,
- the receiver wells,
- the astrocytes' action in the natural exchange,

just to analyze only the inter-synaptic space.

5

In our Weltanschauung it is not available the absolute NOT (i.e. the false in itself), but only the true NOT, that is what might be negative (i.e. false, but in certain conditions).

On the other hand "falsum" -etymologically- designates what has fallen from a higher position to a lower one. Then the falsehood is not the untrue, but simply the deprived of the true.

That is the word falsehood contains the previous state, where the real and the true coincided and where, now, the true does not appear.

We derive that if, from a Logical point of view, the connotation "Real" precedes that of "True", from the phenomenological point of view, that of "Not True" follows.

The "Real" gives continuity between what appeared to be True and now seems (is) to be False, but the False appears after false has passed over. So the False is past, and the Real is a Present in which "it is true" and it may also appear "not true".

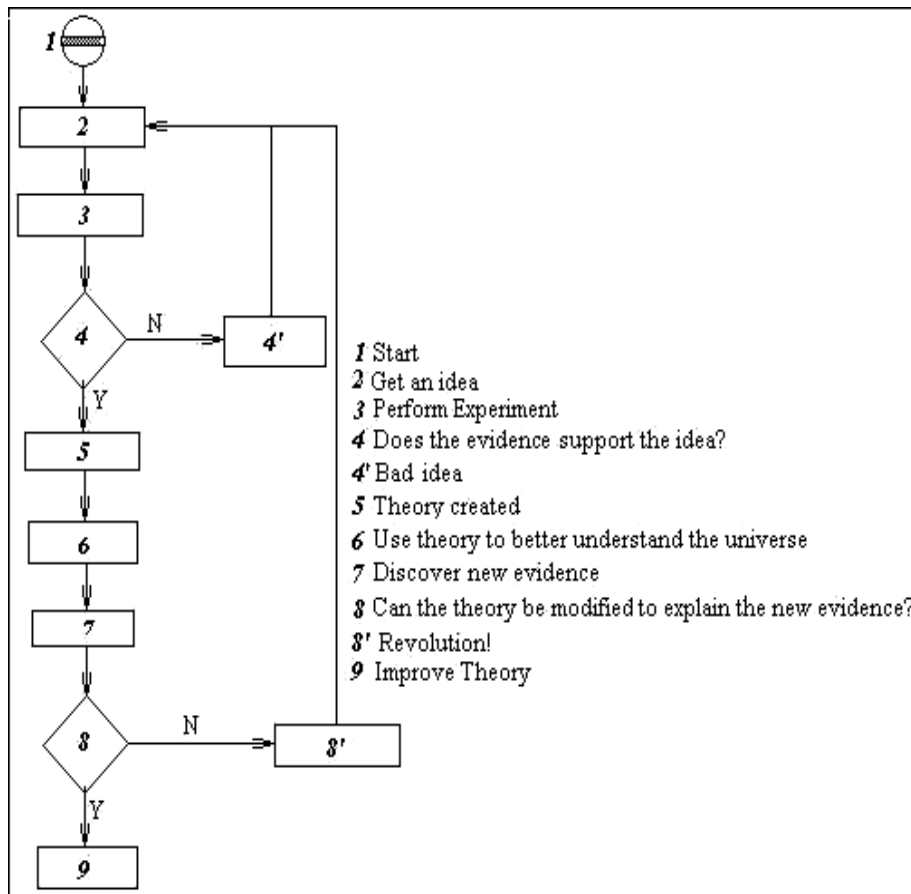
In the Logic of our global vision the law of inclusion is valid as in QM and also in the string theory and in sociology. So we speak of an and/and Logic, and not of or/or Logic, and also of the translation from the uncertainty principle (in QM) to the principle of indifference (in the biological and social action).

6

A last general (for Social Systems and Cybernetic System) Consideration.

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





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

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;

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 .

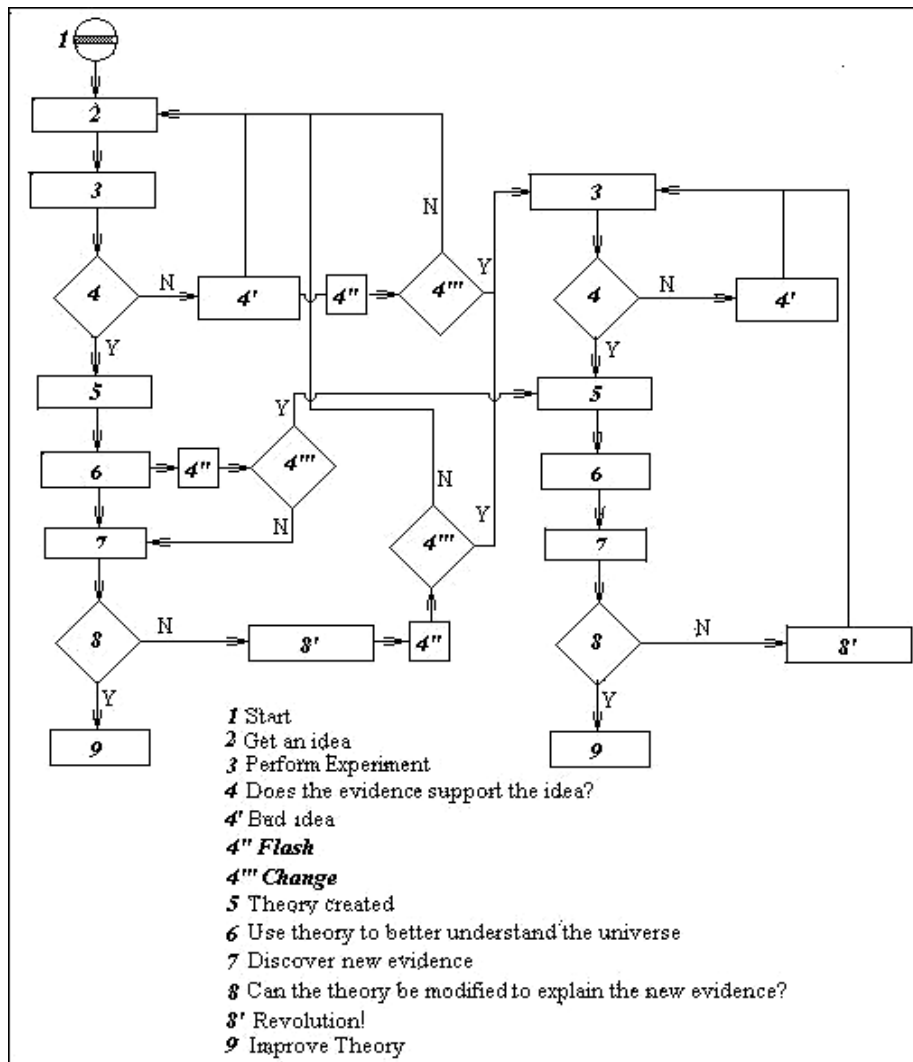
And also for the difficulties of the equations that causes restrictive solutions with reductive hypothesis. See for example assumption of the existence of an (internal and/or external) intelligence within the System; in this way it is possible to convert the chaos in a deterministic way: an obvious oxymoron.

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 behavior, becomes discontinuous (digital) and therefore not natural and therefore still not plausible.

But there is another way to deal with the problem of Modeling

It is accessible by the lateral thinking, that is the thought that does not favor 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:



The Figures 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 Wissen-schaft* , 1910).

A new sociologic (and cybernetic) 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.

## **Abstract**

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, a hardware that works autonomously with no need of an external software because it self-creates it. In this paper I describe an artificial, and/or bionic, neural structure formed by the simulation of modular similar-analogic electronic elements for generating and/or re-establishing correct communication between components of a biological structure, in particular a nervous System. I present a series of data, which derive from a simulation of what becomes a very simple electronic and informational elementary circuit. This circuit is extrapolated from many other circuits which are supported by a universal model and, working together, give coherent answers and are able to help or replace a neuron or a group of neurons. The simulated structure includes a plurality of modular electronic devices interconnected together to form at least one pair of meshes and is able to generate analogic electrical signals of various waveforms and various electric powers.

I have so realized an simulator System as a quasi-Boolean net, but functional only, because the omni-directional reaction to an operative, at a perturbation level action, gives origin to different functionalities in a similar structure, which exists in a non-digital way, or, it might be better to say, which lives in an analogical quasi-digital way, with molecular code and decode factors, to which, at present, I approximate in an quasi-complete way. I have obtained an almost perfect correlation between those signals that are generated in nature and those that we have artificially produced. I have 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 biological and not "vice/versa", can, in the meantime, define the "how", hoping it becomes even the "why". The fundamentals ideas that lead to the new electro-informatics model construction are examined either from a theoretical point of view (that is the basis for my researches and which describes the production and the direction bus of the informative signals) and from the point of view of the structure realization.

## **Keywords (in alphabetical order)**

Automata; Chaos; Complexity; Cyborg; Models; Neurons; Robotics; Systems; Uncertainty.