

**THE PROCESS FROM OBSERVED SYSTEMS
TO OBSERVING SYSTEMS**

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FROM OBSERVED SYSTEMS TO OBSERVING SYSTEMS

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*"It is the theory that decides
what we can observe"*

Albert Einstein

IN A PERSONAL STANCE I

The translation from spanish into english of the paper "The Process of Systemic - Cybernetic Ideas" has given me the opportunity to connect with different experiences. In this case, a plus was added to the many ways of reading a paper, as I was reading my past production 10 years later: content and process, past and present ways of understanding, reflecting on differences.

Ten years ago I was still writing *about* living systems, not yet totally feeling as a member of a community of observers. During one of Humberto Maturana's visits as professor at the Instituto de Terapia Sistémica, I said to him "Every time you come, you take out a piece of the floor where I'm standing. I'm scared; there's no floor left.". A full and tense silence followed and then he very calmly replied "*Yes, but, how much freedom!*". Today I find myself immersed in the natural flow of these ideas internalized as a constitutive part of daily life. It is a constant learning experience of growing freedom connected to the acceptance of amplified uncertainties.

In this translation- revision some ideas have been added and/or changed.

I want to thank Bruce Gorden, MFT, for his dedicated collaboration in the revision of this paper english translation.

In the present paper I intend to describe some of the founding systemic cybernetic ideas starting from the second half of the XXth century up to the present.

I have therefore limited the focus to what I consider the more representative concepts of General Systems Theory, Communication Theory and Cybernetics, plus the important contributions of renowned scientists such as Gregory Bateson, Heinz von Foerster and Humberto Maturana, who, I consider, constitute the spine of systemic- cybernetic thinking.

In the second half of the XXth century, the scientific field has started to be enriched with a new *weltanschauung*, embedded in epistemological premises that differ substantially from traditional thinking.

The word "epistemology" derives from the greek root *epistemein* which means to stand above, and is defined as a treaty or theory of knowledge (*logos*). Different criteria have been applied to the concept of epistemology. Traditionally, it was often considered a branch of Philosophy, dealing with scientific knowledge. Von Foerster presents the question *where does knowledge come from?* in order to define an ontogenetic position, or "*theory of knowledge acquisition*, to differentiate it from an ontological position assumed by the traditional theory of knowledge. "In fact, Greek has in its vocabulary several words on knowing with various shades of meaning. *Gnosis*, for instance, refers to a seeking of knowledge, that is, knowledge acquisition through cognitive processes; *praxis* is knowledge acquisition by doing and acting; and *epistemein* is to become skilled in a craft. The great Swiss 'genetic epistemologist' Jean Piaget combines *gnosis and praxis* as a necessary condition for knowledge acquisition." (25). Von Foerster considers himself very fond of one of Piaget's opening sentences in a famous debate with Noam Chomsky where Piaget defines conceptualization as recursively operating sensory-motor processes.(25)

According to Bradford Keeney (8) epistemology exits the field of Philosophy to enter into the field of Biology through the work of contemporary experimental biologists such as Mc.Culloch, Lettvin, Maturana, Varela and von Foerster.(...) Mc.Culloch defined it(...) as "experimental epistemology " (8), considering that "in the sociocultural domain, epistemology is equivalent to the study of how people or people systems know things and how they think they know things." For Bateson it is "a branch of science combined with a branch of philosophy. As science, epistemology is the study of how particular organisms or aggregates of organisms *know, think, and decide*. As a philosophy, epistemology is the study of the necessary limits and other characteristics of the processes of knowing, thinking, and deciding." (2).

At the present time, epistemology, from this point of view, is focusing on *how* do we know, that is, *the properties of the observer*; instead of *what* we know, that is, *the properties of the observed*. . The second position belongs to what is considered objective knowledge in traditional science.

In the first position "Epistemology(...) is not a map, a description, theory, model, paradigm, nor paradigm of paradigms. It is a process of knowing, constructing and maintaining a world of experience" (9).

If we assume that, as human beings, it is impossible to perceive reality as it is, the answer to the question *how do we know* is offered by the *Theory of the Observer*.

INTRODUCTION TO GENERAL SYSTEMS THEORY

According to Meadows, P. "A scientific generation patterns its models upon its dominant metaphors. Scientific figures of speech in the nineteenth century concerned linear effects rather than field forces.(...). The twentieth century characteristically has drawn its metaphors from Einstein's relativistic field theory. (...). Field theory, Gestalt theory and systems theory, in spite of their differences, all recognize that the interrelationships among coacting components of an organized whole are of fundamental importance in understanding a totality." (17).

The concept of systems as totalities can be found in aristotelian thinking, but disappears with Descartes. Reality starts then to be dismembered and reduced to an increasing fragmentation.

According to Ludwig von Bertalanffy " It is a natural philosophy'. and hearkens back to earlier influences like Leibniz, and to Nicolás de Cusa with his concept of *coincidence of opposites* ; Paracelsus and *mystic medicine*; Vico and Ibn-Kaldun with their *vision of history as a succession of entities or cultural 'systems'*; to Marx and Hegel and *dialectics* - just to mention a few names from a rich panoply of thinkers".(3)

After World War II a growing interest in a totalizing and less fragmented way of thinking begins to consolidate in different places and fields of thought. Besides the scientists mentioned in this paper, the developments of:

Wertheimer, Kohler and Koffka: *Gestalt Theory* (1924);
 Von Neumann y Morgenstern: *Theory of Games*(1947);
 Rashevsky and Rosen *Graphics Theory*(1956 & 1960);
 Ashby, *Design for a brain*(1952);
 Cannon, work on "*homeostasis*" (1929 & 1932);

It is impossible to leave aside the transcendent influence of: Albert Einstein, Max Planck and their scientific developments, Werner von Heisenberg, *Principle of Uncertainty*,1; Niels Bohr *Complementarity Principle*,2; Ilya Prigogine *Order through fluctuation'* .3.

1 Principle of Uncertainty: As the position and velocity of an object cannot be measured AT the same time, the momentum of an observable changes with respect to the observer, thus, the exact measure of an object is uncertain. The observer is always included in the observable.

2 Complementarity Principle: Extension of the Uncertainty Principle. Different possible languages and different points of view about a system are complementary. There is no possibility of a unique point of view of reality.

3 Order through Chaos Principle: "Non equilibrium thermodynamics" refers to the concept of order through fluctuation. Systems evolve through discontinuous leaps towards new organizations, achieved by fluctuations inside the system. Systems discontinuous transformation follows the unpredictable amplification of anyone of its fluctuations.

FIRST PERIOD

LUDWIG VON BERTALANFFY

General Systems Theory (1968) developed by Ludwig von Bertalanffy, the austro-canadian biologist, intends to find correspondences or isomorphisms among all types of systems to create a General System Model. His theory offers similar, formal properties that can be applied to disciplines even though they are totally different.

General Systems Theory as a criticism of already constructed models and a proposal on how to construct models, regarding its uses and limitations, considers that, in the conceptual world, models cannot be isomorphic with reality but can be among them, assuming that we are the ones who create them with our mind. To Alfred Korzybski, a polish scientist and philosopher, we owe the concept: "the map is not the territory" (1). According to Korzybski, all human attempts to explain reality are and have been constructions, representations, models of reality, maps of territories. Every concept starts and derives from a perception, thus, it is limited by our own human structure, our biology. It is then a human "construction" a map of reality; it is not reality itself. What is in the map is the production of our senses, our perceptions of reality. As it is impossible for us, human beings, to capture totalities in which we ourselves are included, and due to the limitations of our perceptive capacities, a perception is a model, a map of reality. Too often perceptions are considered as reality, thus, we tend to believe there is no difference between what we perceive - the models - and reality.

General Systems Theory intends to unify scientific knowledge, favoring the development of interdisciplinary work, to achieve a larger integration and unity in science. Bertalanffy searches for "principles and laws applicable to general systems or its subclasses without taking into account its particular genre, the nature of its composing elements and relations or 'forces' that prevail among them" (3). Thus, structural similarities emerge, isomorphisms in different discipline fields. Isomorphism or correspondence among models allows to apply the same characteristics to the most diverse disciplines.

Bertalanffy defines systems as "complex entities of elements in interaction" (3) and establishes a distinction between closed and open systems. He considers all human systems open to the exchange of matter, energy and information with the environment. He takes from Cannon the concept of homeostasis or dynamic equilibrium between inputs and out-puts, which allows for continuous changes in the system while predominant relatively uniform conditions prevail. He considers that there is a tendency towards higher levels of heterogeneity and organization in human systems, as a counterpart to closed systems, in which there is a continuous tendency towards disorganization and destruction of order. Thus the 'apparent contradiction between entropy and evolution disappears'"(3). Starting from notions of adaptability, intentionality and goal pursuit, he considers living systems

teleological behavior as something definable in scientific terms. He coins the term *equifinality* and defines it as "... a final state of any living system that may be reached from different initial conditions and in different ways.."(17)

As a consequence, living systems, being open, cannot be explained in terms of causality, as initial circumstances do not determine them.

An open system reaches an independent state with respect to its initial conditions, which is determined by the system organization.

Bertalanffy uses the concept of organization as an important element to understand the complexity of living systems, and takes from Cybernetics the concept of feedback and its positive and negative control mechanisms which amplify and correct deviation respectively, to maintain the system in a dynamic balance. He intends to erase the sacred absolute postulates of Physics by stating that the "relationship between language and worldview is not unidirectional but reciprocal (...) Language structure seems to determine which features of reality will be abstracted, and thus, which format thought categories will adopt. On the other side, how the world will be seen determines and shapes language." (3)

Bertalanffy as much as Bateson and Communication theorists share Korzybski's concept "the map is not the territory". Two decades will be needed for the new advances of Cybernetic ideas to seduce human science with a new way of thinking about itself with concepts such as operational closure, self-reference and self-organization.

GREGORY BATESON

Biologist, anthropologist and epistemologist Gregory Bateson, was considered a universalist; the complexity and richness of his THOUGHTS have influenced and will continue influencing the most diverse fields of modern science. Multiple subjects caught his interest, among others, he had a vast erudition in zoology, psychiatry, anthropology, esthetics, linguistics, communication, education, evolution, cybernetics and epistemology. "Stephen Toulmin, (in Wilder-Mott and Weakland, p.365,1981) declares that 'what renders so meaningful the work of Gregory Bateson is that he was the prophet of <postmodern> science(...) and saw that in order to take the first step towards the essential philosophical reorientation of human sciences, a new epistemology was needed'"(8).

He was a revolutionary for his generation and as such, not much accepted nor understood.

One of the fundamental concepts of batesonian production is "the pattern that connects". Bateson questioned himself about the pattern connecting all living creatures; which are the configurations, forms, and relations that can be observed in all phenomena. He discarded concepts such as matter and substance in relation to the living, giving priority to concepts like form and pattern to search for a totalizing conception of mind. "(...)as I

was writing, mind became, for me, a reflection of large parts and many parts of the natural world outside the thinker." (2) "The individual mind is immanent but not only in the body; and it is immanent also in the pathways and messages outside the body; and there is a larger mind of which the individual mind is only a subsystem (...), but it is still immanent in the total interconnected social system and planetary ecology." (4).

In his work, the notion of context became a fundamental element of all communication and meaning. "I offer you the notion of *context, of pattern through time*." (6) He considered that no phenomenon must be isolated from its context, as each phenomenon has a sense and a meaning only within the context in which it arises.

"(...) *context*, a crucial concept, partly undefined and therefore to be examined. And 'context' is linked to another undefined notion called 'meaning'. Without context, words and actions have no meaning at all." (2)

He took from Jung's book *Septem Sermones ad Mortuos*, the concept of *pleroma* and *creatura*. "(...) there are two worlds. We might call them two worlds of explanation. (...) The *pleroma* is the world in which events are caused by forces and impacts and in which there are no 'distinctions'. Or, as I would say, no 'differences'. In the *creatura*, effects are brought about precisely by difference." (1)

He uses the term "creatura" to define the world of the living, considering it cannot be explained through newtonian physics, nor linear causality which implies unidirectionality of its acting forces. In the world of living forms, it is necessary to think about information and relationship. It is also fundamental to find a new language that can describe recursivity of every element participating conjointly in a process.

At this point the concept of circularity starts to advance in detriment of linear causality as a new way of conceptualizing human relations.

As an anthropologist in New Guinea in 1927, studying the Iatmul tribe, Bateson coins the term 'schismogenesis', defined as a "*process of differentiation in the norms of individual behavior resulting from cumulative interaction between individuals* (...). This term describes the kind of escalation found throughout the natural world, exemplified by the vicious circle and called by other researchers 'mutual reaction processes', 'deviation - amplifying mutual causal processes', 'positive feedback chains', and the like." (6)

Bateson considers all interactions as symmetric or complementary and views the genesis of a schism in social systems as produced by an escalation of symmetric processes, e.g. armaments race, or complementary processes, e.g. tensions among social classes. "I applied the term *symmetric* to all those forms of interaction that could be described in terms of competition, rivalry, mutual emulation, and so on (...). In contrast I applied the term *complementary* to interactional sequences in which the actions of A and B were different but mutually fitted each other (e.g., dominance-submission, exhibition-spectatorship, dependence-nurturance)." (2) "Bateson was thinking at that point that in social groups there could be an internal self - balanced order,

maintaining the complementary and symmetric schismogenesis movements under control." as these two types of schismogenesis could neutralize each other.(6)

In 1950, he is one of the Macy Conference leaders on "Circular Causal and Feedback Mechanisms in Biological and Social Systems" which gathers Norbert Wiener, Arturo Rosenblueth and a group of neurophysiologists, physicists and mathematicians, pioneers of the cybernetics american movement. Among them, a recent immigrant from Viena, Heinz von Foerster, appointed secretary and editor of the Conference presentations. During the Josiah Macy Jr. Conferences, Bateson starts to be interested in Cybernetics which possibly made him change his idea of schismogenesis for the cybernetic concept of error-activated feedback cycles in self-governing systems.(6)

After his meeting with Don Jackson and other researchers at the, Macy Conference, Bateson dedicates with them several years to study communication. The renowned and controversial "Double Bind Theory" will be their product. From this theory arises "(...) the so called double bind hypothesis which provided a framework for the formal description of schizophrenic symptoms and the experience of the schizophrenic in his family"(4). This theory was later reviewed by one of the authors, John Weakland who in "The Double Bind Theory, by Self Reflexive Hindsight", Norton, 1977, suggests they had previously focused too closely on schizophrenia and the double-bind theory, considering that the most important notion to take into account was that behavior and communication are closely tied.

Bateson is also interested in the study of dolphins and other cetacean behaviors, developing his theory about different learning levels. He coins the term "deutero-learning" to describe the concept of 'learning to learn'.

In 1972 *Steps to an Ecology of Mind* is published. It is a compilation of his essays initiated with the renowned "Metalogues" - imaginary dialogues between a father and a daughter -, and five more areas: "Form and pattern in anthropology", "Form and pathology in relationship", "Biology and evolution", "Epistemology and ecology" and "Crisis in the ecology of mind".

"Bateson believes that the cybernetic explanation is the most important, fundamental, intellectual advance of the last two thousand years." (4).

There is no one better than him to define his epistemological position in a letter to John Brockman: "Many people claim to have no epistemology and must just overcome this optimism.(...)We all cling fast to the illusion that we are capable of direct perception, uncoded and not mediated by epistemology.(...) Let me start by trying to characterize my epistemology(...). It is a branch of natural history. It was McCulloch who, for me, pulled epistemology down out of the realms of abstract philosophy into the much more simple realm of natural history. This was dramatically done in the paper by McCulloch and his friends (* Maturana, Lettvin, Pitts) entitled 'What the Frog's Eye Tells the Frog's Brain'. In that paper he showed that any answer to the question 'How can a frog know anything?' would be delimited by the

sensory machinery of the frog; and that the sensory machinery of the frog could, indeed, be investigated by experimental and other means. It turned out that the frog could only receive news of such moving objects as subtended less than ten degrees at the eye. All else was invisible and produced no impulses on the optic nerve. From this paper it followed that, to understand human beings, even at a very elementary level, you had to know the limitations of their sensory input. (...). The epistemology that I am building is *monistic*. (...). Materialism in general was an effort to exclude mind. (...). When I was preparing the Korzybski Lecture, (...) I suddenly realized that of course the bridge between map and territory is *difference*. It is only *news of difference* that can get from the territory to the map, and this fact is the basic epistemological statement about the relationship between reality out there and all perception in here; that the bridge must always be in the form of difference. (...). Mind, dealing in difference, will always be intangible, will always deal in intangibles, and will always have certain limitations because it can never encounter what Immanuel Kant called the *Ding an Sich*, the thing in itself. It can only encounter news of boundaries-news of the contexts of difference. (...) To continue my sketch of the epistemology that grew out of my work, the next point is recursiveness. Here there seems to be two species of recursiveness, of somewhat different nature, of which the first goes back to Norbert Wiener, and is well known, the 'feedback' that is perhaps the best-known feature of the whole cybernetic syndrome. (...). The second type of recursiveness has been proposed by Varela and Maturana. (...)

Whoever creates an image of an object does so in depth using various cues for that creation. (...) But most people are not aware that they do this, and as you become aware that you are doing it, you become in a curious way much closer to the world around you. The word 'objective' becomes, of course, quite quietly obsolete; and at the same time the word 'subjective', which normally confines 'you' within your skin, disappears as well. (...). The world is no longer 'out there' in quite the same way that it used to be. Without being fully conscious or thinking about it all the time, I still know all the time that my images-especially the visual, but also the auditive, gustatory, pain, and fatigue- I know the images are 'mine' and that I am responsible for these images in a quite peculiar way. (...) There is a combining or marriage between an objectivity that is *passive* to the outside world and a creative subjectivity, neither pure solipsism nor its opposite. (...).

In solipsism, you are ultimately isolated and alone, isolated by the premise 'I make it all up'. But at the other extreme, the opposite of solipsism, you would cease to exist, becoming nothing but a metaphoric feather blown by the winds of external 'reality'. (But in that region there are no metaphors!). Somewhere between these two is a region where you are partly blown by the winds of reality and partly an artist creating a composite out of the inner and outer events." (4)

COMMUNICATION THEORY

Communication, understood as an exchange of meanings among individuals through a common system of symbols has been the preoccupation of scholars since Ancient Greece.

Until the middle of the twentieth century the subject was included inside other disciplines, but since then a growing interest arose in relation to different ways and processes of communication. The question posed by Harold D. Laswell, a specialist in political sciences: *Who says what, to whom, and with which effect* was answered by two americans, Claude Shannon, electronic engineer and Warren Weaver, a mathematician, who developed a Communication Model in 1949. The object of their study was the analysis of information efficiency. It was aimed at establishing quantitative measures about the capacity of diverse systems to transmit, gather, and process information. Their goal was to discover the mathematical laws governing these systems to establish the minimum quantitative measure which reduces uncertainty in a message. It was named "bit".

Originally, this theory considered that in order for a communication to be produced, five elements organized in a linear sequence should be taken into account. 1. *Source* of information. 2. *Transmitter*. 3. *Transmission channel*. 4. *Receiver*. 5. *Destiny*. Later on, these names were changed to specify the elements of other communication modes. The source was divided into *source* and *message* for a better accessibility to other application fields. Thus, they considered six elements:

1. *Source*, 2. *Encodifier*, 3. *Message*, 4. *Channel*, 5. *Decodifier*, 6. *Receptor*.

Eager to find a relation between information and noise they included another concept, first defined by Shannon as "*source of noise*". This term was related to the interference or perturbation in the clarity of information transmission.

The concept of 'noise' was related to the notion of 'entropy' from the Second Law of Thermodynamics (4) This notion was considered analogous to 'statics' in visual and auditive communication, in relation to external influences that diminish communication integrity and distort the reception of the message.

In fact, *redundance*- the repetition of elements inside a message - prevents distortion and failure of information. It was considered negative entropy or negentropy, being an indispensable element to eliminate noise distortion effects to favor efficient communication.

4 Thermodynamics Second Law: Clausius concept of entropy considers that energy does not transform itself, but is wasted away in the transformation process; there is a tendency towards an increasing energy degradation and a maximum disorder.

The model developed by Shannon and Weaver offers a linear and dyadic reading of communication as it is centered in messages sent from one point to the other and the results or possible influences between emitter and receptor. Yves Winkin defines it as the Information Model or "Telegraphic Communication Model". (32).

Upon including the Cybernetic concept of circularity through 'feedback', a new way of observing complex interpersonal communications appears in social sciences. The qualitative leap from linearity to circularity initiates an amplification of the field.

The great influence of the theory among engineers and physicists, sociologists, psychologists and language theorists lead to the creation of a Pragmatics of Human Communication changing its previous meaning from information to the concept of interaction.

The "invisible university" was the term designing a group of researchers from diverse disciplines, Gregory Bateson, Margaret Mead, Ray Birdwhistell, the Palo Alto group, Albert Scheflen, Edward Hall and Erving Goffman, all of them interested in pragmatics of communication and the development of general models.

Bateson writes with Jurgen Ruesch in 1951, "*Communication, the social matrix of psychiatry*". They consider that "communication is the matrix in which all human activities are embedded" (19). This book anticipates 16 years before, "*Pragmatics of Human Communication*" authored by Watzlawick, Beavin & Jackson. Bateson and Ruesch establish different levels in communication transmission: a) verbal, linguistic and extralinguistic; b) non verbal, and contextual, plus a second level of abstraction: *metacommunication*, communication about communication.

After the Macy Conference (1950) Bateson is interested in applying cybernetic concepts to the study of communication. He gets funds (from the Macy Foundation) to work on a General Communication Theory and organizes a group with John Weakland, Jay Haley, Virginia Satir, Jules Riskin, William Fry and Paul Watzlawick. Later on Don Jackson, a psychiatrist interested in "family homeostasis" (7) joins the group, proposing to study the family as an homeostatic system, in internal equilibrium through negative feedback mechanisms.

Working at the Veterans Administration Hospital the group starts going to the Zoo to observe animal communication and learning processes, but soon, watching a group of schizophrenics talking outside their working room at the Hospital, they saw it as an opportunity to study communication in schizophrenic patients (already at the Hospital) and their families.

The paper *Towards a theory of Schizophrenia* (1956) is the product of this interdisciplinary work which develops the famous and controversial double bind theory.

In 1959, Jackson, creates the Mental Research Institute in Palo Alto, California. He wants to apply the group research to psychotherapy, studying families as systems governed by a group of rules. He organizes a team with Jules Riskin and Virginia Satir. Later on, the group is joined by Paul Watzlawick, John Weakland, Jay Haley, Richard Fisch and Arthur Bodin.

The M.R.I., internationally known as the Palo Alto group, becomes one of the first main centers dedicated to research,

training and psychotherapy in the field of brief systemic family therapies.

In 1967 Paul Watzlawick, Don Jackson and Janet Beavin write *Pragmatics of Human Communication*, presenting their ideas about human communication and its pathology interwoven with cybernetics concepts and General Systems Theory. The authors design these ideas in the form of axioms:

- Impossibility of not communicating.
- Two levels of communication: report and command (Mc. Culloch) which change into message content and definition of relationship.
- Punctuation of facts sequence. According to the distinction drawn by each participant, each one has a different reading of a same situation.
- Differentiation between digital and analogical communication, verbal and non verbal respectively.
- Symmetric and complementary relations between participants. Concepts taken from Bateson's classification on schismogenesis. which consider symmetric interactions, those in which participants equal their reciprocal behavioral patterns, and complementary, those based in maximum difference patterns.

Taking these axioms as a starting point, the authors develop a theory about human communication and its pathology as circular interaction which becomes the basis of the M.R.I. Brief Therapy Approach. This book can be considered a classic in the field of systemic therapy.

After World War II anthropologists Ray L. Birdwhistell and Margaret Mead study love rituals in two different cultures, English and American.

They focused in relationships between American Army men staying in England and British women. Men complained about British women being too prudish, and British women complained about men being too daring. In their research they found that the conflict was related to different cultural courting rituals.

Birdwhistell, interested in understanding gesture language: *kinesic*, meets afterwards with Bateson to produce together "the natural history of an interview"; a therapy session conducted by Bateson with a mother and her son. For 10 years, Birdwhistell works on a psychological, linguistic and kinesic analysis of this 9" sequence turned into the famous "cigarette scene" where Bateson lights a cigarette to the mother. Birdwhistell develops a theory in which gestuality and language form a system organized by multiple modes of communication: touching, smelling, space and time. He considers (...) "behavior among individuals as a 'communication stream'..." (32), in which a person does not communicate with, but participates in a communication.

Albert Schefflen, a psychiatrist, also dedicates 10 years to study a 30' first session with a young schizophrenic woman and her mother. He works with more extended units than Birdwhistell and, as him, makes a "context analysis"(32). Focusing on how people relate with respect to postures, he considers communication as a 'ballet', danced according to complementary or parallel roles (...) related to an invisible score"(32)

Anthropologist Edward Hall studies *proxemics*, the social organization of interpersonal space and codes governing the way it is used. He considers that each culture organizes space in a different way, and tries to discover the "silent language" of culture - title of one of his books - as a communication system. Dedicated to study structure and meaning of furniture and doors he defines them as "space of semi- permanent organization". Later on he widens his study field to buildings and cities, defined as "space of permanent organizations".

Sociologist Erwin Goffman, in his book *Stigma* and *Asylums* studies the handicapped and the people placed in institutions respectively, to obtain information about the "normal" communication rules among them. "Social interactions are considered by Goffman, as the plot of a certain social order level, because they are embedded in rules and norms as it happens in major institutions, like family, State, Church, etc" (32).

All the scientists belonging to the "invisible university" share the concept that communication is "...a permanent social process integrating multiple behavioral modes, word, gesture, visual perception, sign language, interpersonal space, etc.", (32) considering it as an integrated whole governed by a set of codes and rules, determined by each culture. The telegraphic model developed by Shannon and Weaver which considers communication as interchange or transmission of information opened a door to new concepts which fostered the idea of communication as a social phenomenon. Yves Winkin defines it as "the orchestral communication model"(32).

CYBERNETICS

"Cybernetics, from the greek *kybernetiké*, means "a governing art"; it was used for the first time in 1834 by André-Marie Ampère. In a wide sense "Cybernetics belongs to the science of pattern and organization" (8).

According to Heinz von Forester (15) cybernetics history can be observed as a process with three levels of complexity:

1. "0 Order Cybernetics": implicit.
2. "1st. Order Cybernetics": Norbert Wiener explicit conceptualization.(1948)
3. "2nd. Order Cybernetics": reflection on the reflection on Cybernetics.

Von Forester considers it is impossible to attain a higher level, as when one *reflects about reflection* the circle of argumentation is closed, therefore, the organizational closure may only transcend itself inside itself.(15).

"0 ORDER CYBERNETICS"

Herón of Alexandria in 62 B.C. developed a float regulator for water clocks, already invented by the Greek Ktesibios about -270. It seems the Greek, besides the main reason of this invention, which was the need for the accurate determination of time, also used them for the automatic dispensing of wine and the opening of temple doors. It consisted of a negative feedback mechanism which regulated the liquid quantity of a jar to fill a vase. The liquid stopped at a previously fixed moment. The self regulation system was invented and used at that time, but there was no theory or reflections about it.

1ST.ORDER CYBERNETICS

First Cybernetics

From Ktesibios and Herón (V. Century, B.C.) until 1st. Order Cybernetics two thousand years will elapse. In 1932, biologist Claude Bernard uses the concept of internal medium to define the organism as a system and raise the issue that it is not possible to consider one part of the organism separated from the others. All parts are interdependent in a dynamics that cannot be described in common causal terms.

We owe the concept of *homeostasis* to Walter Cannon. He was Norbert Wiener's direct predecessor. Starting from Claude Bernard notion of internal medium, he considers it as physiological mechanisms in relation to the medium constancy. Cannon is interested in regulating mechanisms, thus, homeostasis arises from his description of a network of reciprocal interactions in which different internal medium components are in dynamic equilibrium.

Different people in the field of biology, mathematics, physics, anthropologists, sociologists and electronic engineers were stimulated by these ideas; among them, Gregory Bateson, Warren Mc. Culloch, Margaret Mead, John von Neumann and Norbert Wiener.

Circularity

Norbert Wiener (between 1954 and 1967) studied anti-aircraft cannon shooting behavior to optimize their functioning with respect to their target. He used the feedback principle as one of the basis of his theory. This principle refers to a mechanism that reintroduces into the system the end product of its performance. Therefore, information about the effects retroacts on the causes, transforming the process from linear into circular. For this control movement to function, it is necessary to have a *sensor* giving information about the system's continuous present position in relation to the desired state, in order for counteracting deviation mechanisms to function between one, the present position, and the other, the desired state. Wiener considered that the error activated principle is similar in machines and human beings.

This principle is based in error activated and error corrective mechanisms. Wiener defined it as "control and communication in animal and machine" and coined the term "*cybernetics*" in 1948. Circularity arised as its central theme promoting ramifications in

various fields and planting a seed that would later be of significance for Second Order Cybernetics.

"Warren Mc. Culloch (1965) described Cybernetics as an experimental epistemology centered in 'communication inside the observer and between observer and medium'"(21).

At this point in the cybernetic process, scholars thought that deviation counteracting processes (*negative feedback*) allowed to maintain systems organization, while amplifying deviation processes led to systems disorganization, chaos, and destruction. Consequently, homeostasis, as a self corrective process became the dominant concept in those days.

Second Cybernetics

It was sociologist Magoroh Maruyama (1963) the one who defined this stage as "second cybernetics" (6) to differentiate it from "first cybernetics" which places its emphasis on negative feedback processes. He considered that every living system depends, for its survival, on two processes: "morphostasis" and "morphogenesis". The first one referring to the maintenance of system constancy through negative feedback mechanisms. "The system must maintain constancy in the face of environmental vagaries"(6) The second one, referring to deviation and system variability through positive feedback mechanisms. "...which means that at times a system must change its basic structure"(6) According to Maruyama, "...it is possible to have both positive and negative mutual causal loops counterbalancing one another in any given situation (by 'loops' he means a series of mutually caused events in which the influence of any element comes back to itself through other elements)"(6).

The ideas presented by Chemistry Nobel Prize winner Ilya Prigogine in his formulation of *dissipative structures* in far from equilibrium processes captures the interest of scientists who consider deviation processes promoting disorder and disorganization as not necessarily destructive. In his work on "thermodynamics of irreversible processes" Ilya Prigogine develops the notion that structures evolve out of fluctuations. Deviations and fluctuations, if maintained and not counteracted by corrective mechanisms, produce a *bifurcation* generating a new organization.

In this second stage of cybernetic ideas, amplification and positive feedback processes favoring change, acquire a new status, considered as essential for living systems evolution.

SECOND PERIOD

SECOND ORDER CYBERNETICS.

HEINZ VON FOERSTER

The qualitative leap in the process of epistemological ideas involves developments in quantum physics, and important contributions of, philosopher Ludwig von Wittgenstein,

neurophysiologist Warren Mc. Culloch, physicist, cybernetician, biomathematician, and philosopher Heinz von Foerster, Chilean biologists Humberto Maturana and Francisco Varela among other renowned scientists. These scholars constructed the pillars of second order cybernetics.

In 1972, president of American Cybernetics Association, Margaret Mead, presented a speech whose title was prepared to be "Cybernetics of cybernetics". Taking into consideration Prof. von Foerster's suggestion, she changed it to "Second Order Cybernetics". or "Cybernetics of *Observing Systems*".

His intention was to create a difference between First Order Cybernetics, the science of *Observed Systems* and Second Order Cybernetics, the science of *Observing Systems*. ("second order concepts" are "concepts that can be applied to themselves"(25)).

From then on, von Foerster has been identified as the architect of second order observation, the observation of the observer.

According to traditional epistemology reality knowledge should be observer independent. Based on this premise, objectivity is essential to scientific thought; therefore, observers' properties should not be included in their descriptions/explanations.

Von Foerster writes, "While in the first quarter of this century, physicists and cosmologists were obliged to re-examine fundamental concepts governing natural sciences, in the last quarter of this century, it will be biologists to impose a revision of fundamental concepts which govern science in itself. In the early XX century it was clear that the classic concept of a 'definite science' that is, a science which would mean an objective world description, in which there were no subjects, (a 'universe without subjects') contained contradictions. (...)

In order to eliminate these contradictions, it was necessary to take into account one 'observer'(at least one individual):

- i) Observations are not absolute but relative to the observer's point of view (that is, to his/her coordinates system : *Einstein Relativity Theory*);
- ii) The act of observing affects the observed object to the point of canceling any hope of prediction on the side of the observer (therefore, *uncertainty*, indetermination turns into an absolute: Heisenberg).(...) in other words, we need a theory of the observer.(...) The reintroduction of the observer, the loss of neutrality and objectivity are fundamental requirements for an epistemology of living systems." (24).

According to von Foerster, the answer to the question: "Order, mathematics equations, numbers, objects, laws, are discoveries or inventions?"(24) defines the observer epistemological position; if the observer considers the existence of a transcendent reality or, if he/she will define him/herself as inventor or constructor of an observed reality. From this last position the only thing an observer can do is "...talk about himself/herself. (...) **anyway what else can one do?**" (26).

He therefore suggests to modify Korszyski's statement: "The map is not the territory" for "The map **IS** the territory", defining an epistemology that takes into account the observer. Maturana will

also say: "Everything said is said by an observer to another observer, or to oneself" (12).

Second Order Cybernetic introduces us to the observation of the observer observing his/her own observations; that is, cybernetics turns into cybernetics of cybernetics, or second order cybernetics.

Von Forester is interested in explaining the nature of life, cognitive processes, the problem of perception, of objects knowledge and the nature of language, so he dives into mathematics, neurophysiology, computation and cybernetics, reflecting upon nominalizations, logic syllogisms, paradoxes, causality and explanations, to develop concepts as recursivity, self-reference, self-organization, organizational closure, complexity and autonomy of living systems.

"Cybernetics central subjects, circularity and feedback, are represented by the *ouroborus*, the mythical snake biting its own tail. These concepts are implicit in the notion of *recursivity*: operations that repeat themselves upon themselves." (24) *Self reference* IS a particular notion of the more general recursivity concept.

With respect to self-reference, von Forester analyzes the exclusion of paradoxes from aristotelian logical thought - every proposition must be either true or false - given that paradoxes are false when they are true and true when they are false. Whitehead and Russell "Logical Types Theory" consider that paradoxes arise from self referential or reflexive propositions, and also exclude them ("I'm a liar" Epiménides of Crete).

Von Forester asks "what happens if self-reference is *modus operandi* of a human organism?" (20) The positive answer to this question dilutes the paradox dilemma, and concludes that it is impossible to exclude ourselves from our observations, out thinking, our language and our actions.

The constructivist position states that "there is, in fact, a continuous circular and repetitive process in which epistemology determines what we see; this establishes what we do; at the same time our actions organize what happens in our world, which determines then our epistemology". (24)

According to Von Forester, objects are constructed through motor actions, therefore, knowledge is undivisible from action. "Other Piagetian point, (...) cognition emerging from the acquisition of senso-motoric skills, he had developed already in 1937: *La construction du réel chez l'enfant* (15). The recursive nature of these processes he made clear by drawing our attention to the circular actions of the sensorium being interpreted by the motorium and, likewise, those of the motorium being interpreted by the sensorium". (25) In accordance with Piaget's Epistemological Postulate 'He who organizes his experience organizes the world'; von Forester offers us his Esthetic Imperative "If you decide to see, learn how to act". (25)

Among his innumerable contributions, he incorporates the term *computation* to cognitive processes, thus, knowledge to him is the computation of reality descriptions. "I shall use this term in this most general sense to indicate any operation (not necessarily numerical) that transforms, modifies, rearranges, and so on,

observed physical entities ('objects') or their representations ('symbols')". (27)

Upon postulating that every description is based on other descriptions that are also computations, he proposes to define knowledge as unlimited recursive calculus processes, that is, the computation of the computation of the computation of the computation, etc.

In his analysis of language he states that it can be considered from two different points of view: language in its appearance, which refers to things as they are, or language in its function, which refers to the notions each one has about things. From the first position one is an independent observer, separated from the Universe and language is monologic, denotative, descriptive, syntactic; it says how *it is*. From the second position one is a participant actor in a mutual interaction with others, and language is dialogic, connotative, constructive, semantic, participative, it is as *one says*. "When I pronounce something, I'm not referring to something out there. Rather, I generate in you, I touch, let's say - as a violinist pulsing a chord touches you with his music - a whole resonance of semantic correlates." (20).

The nervous system operational closure, (Maturana - Mc Culloch) self-organization and self-reference are inextricably connected to the autonomy of living systems, but "autonomy implies responsibility. If I am the only one who decides how to act, I am also responsible for it" (20).

Second order cybernetics opens a space for reflection on one's own behavior and enters directly into the territory of responsibility and ethics. Based on the premise that we are not discoverers of a world outside ourselves, but inventors or constructors of one's own reality, all of us and each of us is totally responsible for their/our own inventions. According to von Foerster, radical change, implying the assumption of this position, not only manifests itself in scientific work, teaching, enterprise and so many others, but extends into the comprehension of daily life human relations. If one considers oneself an independent observer he/she 'can say to the other how to think and act: 'You must, you must not,': this is the origin of moral codes (...). If one considers oneself a participant actor in the drama of mutual interaction, of giving and receiving in the circularity of human relations(...), assuming my interdependence, I can only tell myself how to think and act: 'I must', 'I must not': This is the origin of ethics". (26)

Professor Heinz von Foerster has accepted to participate in this paper. "Sara Jutoran has invited me to give my point of view with respect to systemic ideas related to Systemic Therapy. The mythology I grew up with, the mythology that tells about the emergence of Systemic Therapy, begins with Gregory Bateson, the anthropologist, whose interest in form and pathology of relationships brought him in contact with psychiatrists. Once he was asked to look at a boy, the 'identified patient' in a family, whose behavior was apparently unbearable for his teachers, class mates, parents, etc. Bateson refused to see the boy alone; what could he see in this kid in isolation, separated from the world in which he was embedded? That would be like asking for the meaning of a word taken out of context. When the boy arrived with his family, it became clear that it was

indeed the entire family that needed help, with the boy, perhaps, the most sane one in that 'system'.

"Probably because of my friendship with Bateson going back to the late Forties, and his knowledge about my interest in the more formal aspects of philosophy and epistemology, I was once invited by the people of the Mental Research Institute of Palo Alto, California, to talk to family therapists about logical anomalies which arise when one looks at systems of which one is oneself a part. I chose for my talk the title: 'Paradoxes, Contradictions, Vicious Circles, and Other Creative Devices'".

Apparently, the audience liked what I had to say and, for reasons unpenetrable to me at that time, I was invited by others to address myself to these and related epistemological problems. Slowly I began to understand that the experiences and perceptions which emerged in therapeutic practice, and some of the ideas that grew out from the work of an interdisciplinary research group of which I was a member, the Biological Computer Laboratory at the University of Illinois, who studied cognitive processes from an experimental, theoretical, and epistemological point of view, were conceptually so tightly interlaced that new insights and perspectives were born at this productive interface.

It was, of course, the authority of Aristotelian logic that made therapists hesitant to enter the paradoxical world of closure, self-reference, and systems, 'systems' in the original Greek sense of 'syn-histamein', that is, 'standing together' in the sense of 'we' rather than 'you there - I here'; and it was, of course, the empathy of the practicing therapists that made the formalists to see the deeper meaning of their work. I am grateful for having been invited to participate in building a bridge between consciousness and conscience, that is, a bridge between knowledge and ethics." (personal letter, Heinz von Foerster, 1992).

Some von Foerster's aphorisms and principles:

Socratic Ignorance: I know that I don't know; but many don't know even that.

Ethical Imperative: Act always so as to increase the number of choices.

The Esthetical Imperative: If you want to see, learn to act.

The Hermeneutic Principle: The hearer, not the speaker determines the meaning of an utterance.

The Principle of the Double Bind: The blind spot: One does not see what one does not see.

Metaphysics Fundamental Theorem: Only those questions which are in principle undecidable, we can decide.

The Constructivist Postulate: Experience is the cause, the world is the consequence.

The Realist Postulate: The World is the cause, experience is the consequence.

H. von Foerster.

17-21 may 1995)

CONSTRUCTIVISM

The term constructivism, in a strict sense, can be traced to architecture and a plastic art movement in the Soviet Union around 1920. Jean Piaget is considered the initiator of this school of thought in his work *"The child construction of reality"* although the philosophical roots are found in Plato, Gianbattista Vico and Kant.

One of constructivism's fundamental characteristics is the replacement of the notion of discovery for construction or invention.

Gregory Bateson, in one of his metalogues "What is an instinct?" (1) mentions Newton as not discovering gravity but inventing it. From this position it is sustained that it is not possible to access directly to an observer independent reality and that it is not necessary to assume an independent existence of an external world in order to explain it.

Differing from traditional epistemology based on "what do we know" constructivism is based on an epistemology of the observer, raising the question "how do we know?" This qualitative leap leads us to the Theory of the Observer.

"Constructivism is - as von Foerster suggests - an epistemology of epistemology, that is, an epistemology that has to account for itself" (24).

"Constructivists discard objectivity and intend to develop an epistemology 'from the inside out'. It starts with the observer and chooses to postulate or stipulate the external world" (20). Albert Einstein will say "...in a conversation with Heisenberg: In a theory it is impossible to accept just observable magnitudes. It is rather *the theory that decides what we can observe*" (31).

Radical constructivism proposed by Ernst von Glasersfeld to explain rational thought is based in four sources: language, skepticism, Darwin evolution theory and cybernetics. He considers the world is different according to language. From this position, constructivism is based in two basic principles: " 1) Knowledge is not passively received through our senses or by communication, but constructed actively by a knowing subject. 2) Cognitive function is adaptative and it serves for the organization of our experiential world, not for the discovery of an ontological objective reality." (28).

Knowledge is, thereby, the end product of rational activity; it is a construction of the subject; not a reality representation. It is impossible to have an access to a knowledge of reality and the experience of the impossibility of knowing reality appears only when obstacles arise that do not allow *viability* with respect to a desired goal.

Radical constructivism does not deny ontological reality, but raises the impossibility of its true representation. Knowledge is "(...) the map of all action and thought roads that, at that moment, in the course of our experience, has become *viable* for us. (...) *viability* and *fit* must always refer to the experiential world of the

knowing if the object is at the service or behaves as it is expected, therefore, if it 'fits' or not to the situation" (29). Von Glasersfeld's theory, based in evolution theory, considers that "organisms or our ideas can never adjust to reality, but it is reality the one that, with its *limitations of the possible* eliminates what is not apt for life. (...) at the same time one can consider knowledge as capable of surviving if resisting the world of experience and train us to make some predictions or to make that certain phenomena (aparitions, events, experiences) occur or to avoid its occurrence " (29). The world appears to the individual only when instructions do not fit and he/she fails or obstacles arise to achieve a goal. He defines constructivism as radical because "it breaks with conventions and develops a theory of knowledge in which this makes no reference to an ontological 'objective' reality but exclusively to the ordering and organization of a constituted world of our experiences" (29).

HUMBERTO MATURANA

The ideas of Biologist Humberto Maturana R. can be rooted in three main questions: "Which is the living system organization? Which is the nervous system organization? Which is the social system organization?"

He develops a biological theory of cognition as an exploratory proposition on the organization of the living system, on how human cognitive processes arise and the nature of knowledge phenomena, based in the operational autonomy of ,living beings, postulating a description of cognitive operations without a reference to external reality.

"(...) He intends to understand living systems operations, language as a biological phenomenon, the nature of explanations and the origin of humanness." (Maturana, H. in Randall Whitaker **)

Perception and Illusion , Nervous System and Cognition.

Starting from his research on chromatic distinctions in the perception of colors, Maturana questions scientific objectivity considering the impossibility to distinguish, in experience, between perception and illusion, between truth and error. The distinction is made comparatively, in reference to another experience considered as valid. He maintains that to explain perception it is necessary to understand how the nervous system operates. He defines this operating as a closed circular network of changes in neuronal activity relations.

Autopoiesis

In his studies about the organization of the living, Maturana, in collaboration with Francisco Varela, postulates that the living are constituted by and operate as closed systems of molecular productions, open to matter and energy flow but closed to information. He coins the term "autopoiesis" to describe the organization defining and constituting the living. (*auto: self;*

poiesis: production). "An organization that re-constitutes itself at each operation" is von Foerster's definition.(25)

Therefore, Maturana says: "An autopoietic system is a composite unity, whose organization can be described as a closed network of component productions, which, in their interactions, form the network of productions that produce them, and specify their extension by forming its borders in their existing domain".(15). Maturana and Varela explain in their book *The tree of knowledge* that, the living are autonomous systems because of their autopoietic organization, and the living exist as they realize themselves as molecular autopoietic systems.

Structural Determinism

Maturana applies the notion of *structural determinism* to the living, pointing out that, being molecular systems, the living are systems determined in their structure. That is, they cannot be other than molecular systems.

Living systems are such that whatever happens in them is determined in their structural dynamics, in such a way that the external can only trigger, structural changes already determined in themselves. This means that human beings, as living creatures, will only be able to do, listen and act from within themselves due to the operational closure of their nervous system, thus they are systems closed to information.

As Maturana explains, the coincidence seen by an observer, between operations of the living system and its circumstance is related to the fact that the living system structural dynamics is concordant with the environment in which it operates. This is so because the living has a plastic structure that changes in constant relation with the environment structure, defined as *structural coupling*. If this does not happen the living dies.

Structural Coupling

It is the term of structure-determined engagement of a given unity with either its environment or another unity. The notion of structural coupling is fundamental because it refers to the dynamics that make it possible for the living and its environment, to change their structures in a coherent way, even though they are structurally determined, so that the living, while living, generate behaviors in accordance with the environment, but always determined by their own structure.

In order to understand Maturana's ideas one must operate with the notion of *structural determinism*. Maturana does not consider it an ontological assumption, but an abstraction from the coherence of experiences.

There are as many domains (realms brought forth by the observers' distinctions) of structural determinism as domains of experiential coherences. (ex. domain of interactions, linguistic domain, consensual domain), Each domain of experiential coherences is a domain of structural determinism. In the multiple domains of structural coupling, systems change together in their recurrent interactions and maintain their operational coherence as a result of their structural plasticity. This means that the living, even though

closed autopoietic systems, change their way of operating according to the contingencies of their interactions and its course, because of the changes in their plastic structure.

It is from this understanding that Maturana has generated the concepts of *organizational closure of the nervous system - we are closed to information-; structural determinism - what happens to us depends on our structure - ; structural coupling: - we live in congruence with the medium and with others and in constant structural change- . "Organism and medium mutually trigger each other'S structural changes". (...) One exists, as a living being, in a coherent operational space with his/her circumstance, in structural coupling.(...)Thus, nothing just happens, what can happen is always in accordance to the structural dynamics of the system and its circumstance". (16)

Ontology of Observing

To explain the phenomena of knowledge, Maturana begins with the experience of observing and asks himself about the origin of the observer capacities, accepting the question: "¿how can the observer abilities or capacities be explained? In the process of answering to this question he develops what he calls "The ontology of observing".

G.Spencer Brown, in his book *Laws of Form* considers that the starting point of all cognition implies *drawing a distinction*: "A Universe is engendered when one separates or moves a space" and "the limits can be drawn wherever we want to"(22). Maturana will also state: "Every act of knowing brings forth a world (to the hand)" (11) to refer himself to the observer operations of distinction that bring forth what is distinguished. The operation of distinction specifies the distinguished, and the distinguished arises from nowhere, with the operation that distinguishes and configures it.

To the observer, the distinguished arises as it would have existed before the distinction, and as it were to exist always after the distinction. It is in the explanation of the distinction experience that the difficulty with reality arises.

Explanations

Maturana considers that, what the observer explains is his/her experience, and that experience is what the observer distinguishes that is happening to him/her in the circumstances that, explaining, is also an experience. He defines experience as "*the praxis of living*" stating that we are closed systems in our experiencing, and the only way to let our experience be known to others or ourselves is through languaging.

He postulates that the notion of reality is an explicative proposition. Therefore he says: 'Whatever is said, is said by an observer to another observer that can be him or herself'".(12) In this process he shows that scientific explanations do not have to refer to an observer independent reality and that the assumption of a reality is not required.

In his proposal of suspending the conviction of our perceptual objectivity, (impossibility of distinguishing between perception

and illusion) he is "inviting us to put objectivity in parenthesis in the process of explaining."(13).

From this point of view we observe that two explicative paths arise, upon accepting or not accepting the question about the observer and observing.

NOT ACCEPTING THE QUESTION
ABOUT THE OBSERVER & OBSERVING

OBJECTIVITY WITHOUT PARENTHESIS

ACCESS TO A TRANSCENDENT REALITY
IS POSSIBLE

REALITY CAN BE DISCOVERED
AND EXPLAINED

ONE REALITY

ACCEPTING THE QUESTION
ABOUT THE OBSERVER & OBSERVING

OBJECTIVITY IN PARENTHESIS

ACCESS TO A TRANSCENDENT REALITY
IS NOT POSSIBLE

REALITY CANNOT BE DISCOVERED
IT IS CREATED THROUGH CONSENSUS
IN LANGUAGE WITH OTHERS

MULTIPLE REALITIES

One path is the explicative road of *objectivity without parenthesis*, that arises if the observer accepts his/her own inherent capacity to refer to a transcendent reality in order to validate his explanations (13). The other path is the explicative road of *objectivity in parenthesis*, that arises upon the observer's acceptance that his/her abilities as such, arise from his operating as a living in language, and recognizes that as a living being he/she cannot distinguish in experience between illusion and perception.

The objectivity in parenthesis position does not correspond to subjectivity, it rather points out an acknowledging. The observer acknowledges that in his/her experience he/she cannot distinguish between illusion and perception and accepts he/she cannot use a supposed access to a transcendent reality in order to validate his explanations as this is not possible. The observer, thus recognizes, that he/she explains experience with coherences of experience and these validate his/her explanations.

With respect to scientific explanations, Maturana demonstrates that the validation criteria does not require the assumption of an independent reality. Therefore, science as an explicative domain, operating with coherences of experience, becomes a generating domain of experiential worlds.

Maturana's ideas create a fundamental change in the understanding of human relations upon accepting as a constitutive human condition that the access to an independent reality by the observer and his/her observing, is not possible.

There is no human being that can have a privileged access to Reality and/or Truth. Each experiential domain and its respective explicative domain are legitimately valid, even though they can be not desired.

If one accepts the existence of an independent reality and of objective knowledge of reality, one enters into a domain where one implies having an access to it; consequently one can impose one's own arguments to others, therefore justifying all kind of violence. If the invitation to put objectivity in parenthesis is accepted, then "reality appears as it is, an explicative argument"(16). One is not a

part of the universe, but participates in a *multiverse*, considered as the totality of all reality domains that arise in our distinctions and explanations.

In the multiverses, each reality, that is, each experiential explanatory domain is legitimate, thus, one is always responsible for the consequences of one's own acts.

He considers that we create the world in *linguaging*. We are human in our conversations, the intertwining of our emotioning and our languaging.

He makes us realize that ethical preoccupations do not arise from rationality or a transcendental argument but from the biology of love, of perceiving the other as a legitimate other, as someone whom we care for. This is the meaning of ethics in our living together and has fundamental reverberations for the future of human relationships. "Responsibility arises when we take charge of wanting or not wanting the consequences of our actions; and freedom arises when we take charge of wanting or not wanting our wanting or not wanting the consequences of our actions" (13). "When we operate with objectivity in parenthesis, as we know we cannot refer to an independent reality, we know that we *can just operate in human relationships either in consensus or in agreement in order to be able to live together*" (16).

BRINGFORTHISM

It has been Heinz von Foerster the one who coined the term *bringforthist* to refer himself to Maturana, and it is Karl Tomm (1990) the one who proposes the notion of *bringforthism*. According to Karl Tomm, "Maturana is the principal originator of *bringforthism*, as he offers an heuristic explanation of the observing phenomenon, and how the observer arises. He also explains how observations and constructions are brought forth in language, in conversation and into consciousness". Maturana considers he is not a constructivist. If we compare him with Von Glasersfeld, Maturana takes into account the construct and its existence domain and the viability of both, while von Glasersfeld "...tends to center himself in constructs and their viability. That is, Maturana considers simultaneity of 'figure and background' upon making a distinction in its bringing forth. Any distinction or construction cannot appear alone; it needs a context or existence domain if one brings it forth to experience with certain degree of coherence and authenticity. The construction has to couple experientially with its medium, in a complementary way, before appearing in the first place, and only then it can couple to the flux of our experience" says Karl Tomm. But, Maturana insists that what is distinguished and the medium arise

The Theory of the Observer offers a different worldview, an epistemology considered as a new way of knowing about us and the world we live in.

If we choose to ask ourselves about us - observers raising the question "How do we know" then we may enter into Constructivism based on Biology, and Social Constructionism, based on Sociology.

Both ways of punctuating observations, be it from individual human beings biology or from human beings social contexts bring forth different distinctions but they are both founded in a Theory of the Observer.

From the second half of the XXth. century up to the present, Constructivism and Social Constructionism have had great influence in most sciences, among them Psychology theories and practices.

The decision to think and act from this epistemology has a fundamental consequence, the loss of certainty and the resulting openness for humankind to a *participatory, ethical and responsible life in the mutual construction of possible worlds.*

TRADITIONAL THOUGHT

Matter Metaphors:

Physics
Linearity
Body
Matter
Energy, watt
Physical World
Atomism
Elements of totality
Quantitative analysis

SYSTEMIC-CYBERNETIC THOUGHT

Pattern Metaphors:

Cybernetics
Circularity
Mind
Form
Communication, bits
Biological World
Holism
Organization of totality
Qualitative analysis

FIRST PERIOD

EPISTEMOLOGY OF OBSERVED SYSTEMS

SECOND PERIOD

EPISTEMOLOGY OF OBSERVING SYSTEMS

FIRST ORDER CYBERNETICS.
 THE MAP IS NOT THE TERRITORY
 LIVING SYSTEMS OPEN TO INFORMATION

SECOND ORDER CYBERNETICS
 THE **MAP** IS THE TERRITORY
 NERVOUS SYSTEM OPERATIONAL CLOSURE
 AUTOPOIESIS
 AUTONOMY
 SELF-REFERENCE
 RECURSIVITY
 SELF-ORGANIZATION
 BRINGFORTHISM
 BIOLOGY OF COGNITION
 CONSTRUCTIVISM -- SOCIAL CONSTRUCTIONISM
 BIOLOGY OF COGNITION SOCIOLOGY
THEORY OF THE OBSERVER

PERSONAL STANCE II

The aftermath of a translation

In my reflection upon reading and translating the paper I wrote 10 years ago I realized that unfortunately, it is much easier to fall in love with these ideas than to turn them into daily life experience and action. I cannot but ask myself why these ideas have not promoted any changes in human relations. We have chosen to remain blind to our own possibilities to become more responsible human beings. We have chosen to remain blind to the possibilities of constructing a less violent world. We have chosen to wait for others to do what we all have to do.

I ask myself why it is so easy to fall into considering our ideas into objective realities ready to impose to others.

I ask myself why it is so difficult for us to take an "I - Thou - Us" stance, respecting the legitimacy of other human beings, children, spouses, families, friends, neighbours, fellow citizens, clients, patients, people with different beliefs and different cultures.

I ask myself if we are going to choose taking full responsibility for whatever we say and/or do.

Heinz von Foerster used to start his presentations with a powerful question to his audience: "Do you think the Laws of Nature are discoveries or inventions?" This is what he calls an in principle undecidable question; "those questions that only we can decide."(26) The choice is left to each of us. We are free to take a decision but we have to assume full responsibility for it. Two different worlds can be created by our choice. If I choose to be a discoverer I will see myself as a "citizen of an independent universe, whose regularities, rules and customs I may eventually discover."(26) If I

choose to be an inventor, "I am a part of the universe. That is, whenever I act, I am changing myself and the universe as well." (26)

I assume myself as a part of the universe. I assume that as a human being I cannot be but self-referent. Even if and when I speak about others, I will always speak from myself.

I will always be participating with others in the multilevel dance of human relationships.

Whatever these relationships will turn out to be, will only depend on us.

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