

THE CONTRIBUTION OF HUMBERTO MATURANA TO THE SCIENCES OF COMPLEXITY AND PSYCHOLOGY

ALFREDO B. RUIZ

aruiz@inteco.cl

Instituto de Terapia Cognitiva, Santiago, Chile

This work attempts to present the most important contributions of Humberto R. Maturana to the field of psychology, in an effort to reveal them directly. The main conclusion is that Maturana has expanded the understanding of humanness and therapy through the biology of the observer.

Contemporary psychology still appears very much influenced by empiricist paradigms, those that accept a unique and universal reality that is alike for everyone, existing independently from the observer. According to this of thinking, the cognitive abilities of an organism are essentially passive, responding to an external order in which the meaning of things has already been previously and objectively defined. In this view, the human mind evolves essentially as a passive receptor of the external order, which would determine it almost in its entirety (Guidano, 1991b; Ruiz, 1992). The rigid simplicity of this position, however, has entered into a profound crisis in the last 20 years. As result of the conceptual breakdown of this empiricist paradigm, psychology is now witnessing an interdisciplinary convergence, from which a space is opening toward a completely different perspective: that of the science of complexity (Guidano, 1991b; Mahoney, 1991) on the one hand and the biology of cognition (Maturana, 1987) on the other.

As these alternative perspectives consider living organisms in terms of their complexity, there is from the very beginning an emphasis on self-determination and self-organization, as well as on the organisms' open and plastic course of evolution and development (Guidano, 1991). The basic element in this perspective is a change in the notions of reality and of the observer. This has led to a radical shift in the view.

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Address correspondence to Alfredo B. Ruiz, e-mail aruiz@inteco.cl

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A. B. RUIZ

Of the relation between observer and observed, in which access to a unique and independent reality apart from the observer is no longer accepted, and instead the contrary position is considered – that there are as many realities as forms of living emerging from each being (Guidano, 1991 a; Ruiz, 1992) or as many realities as domains of explanations the observer may propose (Maturana, 1987).

The contribution of Humberto R. Maturana to the science of complexity is recognized, as well as his influence on the thought and research of many scientists (Mahoney, 1991). When at the end of his life Bateson was asked who else was carrying forward the study of living creatures, he answered that “The center for this study is now in Santiago, Chile, under a man named Maturana” (cited in Dell, 1985, p.5). In the same vein theoreticians and psychotherapists such as Guidano (1991a) and Arciero (1989), referring specifically to Maturana’s views, speak of the Chilean school. The contribution of Maturana’s theory to psychotherapy is also fully recognized. In fact, he is frequently a guest at psychotherapy conferences in Chile and abroad. In addition, his contribution is put forth directly through his teaching in training programs for psychotherapists at several institutes in Chile. The purpose of this article is to discuss some of the more important aspects of Maturana’s contributions to psychology and psychotherapy.

THE BIOLOGICAL THEORY OF KNOWLEDGE AS A UNITARY EXPLANATORY SYSTEM OF LIFE

As previously mentioned an interdisciplinary convergence has led to epistemological changes in the relation of observer and observed. The contribution of Maturana to this new epistemological proposition is fundamental. He is, along with Lorenz (1973), among the first biological scientists to propose that knowledge is a biological phenomenon that can only be studied and known as such and who have developed a fully biological theory consistent with this view. Furthermore, Maturana proposed that life itself should be understood as a process of knowing, in the realization of living in congruence with the medium. Maturana’s work can therefore be characterized as a unitary ontological explanatory system of life and human experiencing. It is ontological because it visualizes human experience from a point of view situated within the conditions of the constitution of humanness and not from an external view, and it is explanatory because it proposes a view of the relational dynamics that generate cognitive phenomena.

As Maturana’s approach emerges from his understanding of biological systems, it leads us to reflect on the basic conditions that permit us to explain everything that occurs in life as a phenomenon of living. From this point of view, psychology is part of biology because the phenomena it studies occur in the process of living of human beings. At the same time, Maturana has recognized that psychology has its own domain – the study of the dynamic relations and interactions occurring between whole organisms – and he has not attempted a reductionist approach (Maturana, 1995). In Maturana’s thinking, the mind is a phenomenon that pertains to the relational dynamics of the organism. In his view, the mind, as a relational phenomenon, arises in the relation between the organisms and the medium in the same way that walking arises from the movement of the legs in relation to the ground or as a body displacement. Maturana has also proposed that because the human nervous system changes along with the growth of the child (and during the whole life of the person) in a manner contingent to his or her living in language, languaging behavior is generated even when humans are alone. Moreover, it is possible and it so happens that in our human solitude we can have experiences that we can distinguish as mental experiences because they make sense in our domain of relations as languaging beings.

This view of mind, and this general manner of thinking of Maturana, has incalculable consequences for psychotherapy. To start with, any emerging in human systems from the intervention of a psychotherapist is always to be understood as a reorganization of the experience of the patient determined by the patient himself or herself and not by the therapist. Thus, the therapist can only generate perturbations in the patient that may trigger his or her mental reorganization but never specify it. Directly said, the therapist can only trigger, but not specify, what happens in the patient.

EPISTEMOLOGICAL CONSIDERATIONS

I suggested earlier that what Maturana has proposed is an explanatory theory of human experience. For this reason I now analyze how he has dealt with the following epistemological problems: scientific explanation, structural determinism, and living beings as structurally determined systems.

Scientific Explanations

According to Maturana (1987, 1990), a scientific explanation consists of the proposition of a process or mechanism which, if left to operate, gives rise in the domain of experiences of the observer to the experience that he or she wants to explain, in a way that satisfies what Maturana has termed criterion of validation of scientific explanations. This criterion of validation requires satisfaction of the following four conditions:

1. Description of what an observer must do to live the experience to be explained.
2. Proposition of a generative mechanism that if allowed to operate generates in the observer the experience to be explained.
3. Deduction of other possible experiences from all the operational coherences entailed in (2) and of what an observer must do to live them.
4. The realization of what is deduced in (3); if this happens, Point 3 becomes a scientific explanation.

The application of the criterion of validation of a scientific explanations has two basic consequences: (a) The experience of the phenomenon to be explained and the generative mechanism belong to two nonintersecting phenomenal domains, and (b) scientific explanation does not constitute a phenomenal reduction and is constitutively nonreductionistic. Accordingly, if my propose was to provide a scientific explanation of how psychotherapy works. I would have to propose a generative mechanism for the therapeutic effects in the context of the satisfaction of the criterion of validation of a scientific explanation.

The Notion of Structural Determinism

According to Maturana, every explanatory argument is founded on an implicit acceptance of the notion of structural determinism. That is, it is founded on the understanding that the operation of every system, both in its internal dynamics and in its relational dynamics, depends on its structure. The notion of structural determinism is a descriptive abstraction of the coherence of the experiences of the observer in his or her operation as a living being and of what the observer does as he or she reflects on the regularities of experience in living

as he or she tries to explain them. Even the notion of probability has value only in the implicit or acceptance that an observer operates in a background domain of structural determinism that is directly unobservable. The notions of system and mechanism imply in themselves the notion of structural determinism. Scientific explanations are founded on structural determinism, as they consist of the proposition of generative mechanisms that if left to operate give rise to the experiences to be explained (Maturana, 1990). Every system operates according to its structure, that is, according to how it is made, in the interplay of the properties of its components. A system operating in this manner is a structurally determined system. The structure of such a system determines everything that occurs in it or to it in terms of its internal changes as well as in terms of its internal changes as well as in terms of what it can encounter in an interaction (Maturana & Mpodozis, 1992).

Living Systems as Autopoietic Structure-Determined Systems

Living Systems and Physiology

According to Maturana, from a biological standpoint, living beings are structurally determined systems. Therefore, all that occurs in them or to them occurs at every instant as a part of their structural dynamics at that moment and is determined by it. This implies that all the structural changes that a living system undergoes as the consequence of its interactions with its environment are not determined by the external agents that the observer sees acting on the system but are determined by the structural dynamics of the living being (see Maturana, 1975). Therefore, in its dynamics of interactions a living system is only touched by those external agents that its structure admits and thus specifies. Therefore, the structural becoming of the living being follows a course that is indifferent to the characterization that an observer makes of its environment, but in a manner contingent on the course of its structural encounters with the medium in which it lives (Maturana & Mpodozis, 1992).

According to Maturana, living systems as all systems are structure-determined composite entities that exist in two nonintersecting phenomenal domains, namely, (a) the domain of operation of their components (i.e., the domain of their structural dynamics) and (b) the domain in which they are wholes and operate as such. As these two phenomenal domains do not intersect, no phenomenal reduction is possible between them. In the particular case of a living system, these two phenomenal domains are the domain of anatomy and physiology and the domain of behavior (Maturana, 1995). This view invalidates any intention of reducing behavior to the physiology that makes it possible.

Maturana (1995) said that the individual life history of a living system follows a path in which both the living system and the medium undergo congruent structural changes until the living system dies. The phenomenal domain of the structural dynamics of a system is operationally self-contained in the sense that everything that happens in the system, takes place as structural changes in the system, and occurs in the system, are at every instant determined by the system's structure at that instant in contrast, the phenomenal domain in which a system exists as a totality is not operationally self-contained because the phenomena in it arises in the encounter of the system with the medium, which operates as an independent structure-determined system itself. Yet, although these two phenomenal domains do not

intersect and, hence, cannot be mutually reduced one to the other, changes in one affect what happens in the other. This is because there is a mutually generative relation between them though the actual structural interactions of the living system and the medium. According to Maturana (1987), although the wholeness of a system is operationally constituted by its organization (the relations between its components that specify its class identity), its actual operation as a whole, as it exists as a totality, is realized in and through the operation of its structure (the components plus the relations between them that realize the particular system as a case of a particular class), so that as a system interact a totality, it does so though the operation of its components. Accordingly, even though the domain of interactions and relations of a system as a totality is determined by its organization, its actual interactions and relations as such take place through the operation of its components. The result of this situation is twofold. On the one hand, as a system interacts as a totality, its structure undergoes changes triggered by those interactions but not specified by them. On the other hand, as the structure of the system changes, either as a result of its own dynamics or as a result of the interactions of the system as a totality, the domain of interactions and relations of the system as a totality changes too. Put in other terms, there are two basic consequences of this dynamic of reciprocal generation of changes between the two phenomenal domains: First, the structural changes that a system undergoes in its individual history necessarily follow a course contingent on the sequence of interactions of the system as it operates as a totality in its domain of existence; second, the actual interactions that a system undergoes and hence, the structural changes triggered in it follow a course contingent on the structural changes of the medium as this changes in a manner operationally independent from the systems that it contains (Maturana, 1987).

Maturana has indicated that the course of continuous structural changes a living system undergoes during its life is contingent on the course of its internal dynamics as well as its interactions and that the course followed by the interactions of a living system throughout its life is contingent on the course of its structural changes and on the structural changes that take place medium. In these circumstances, the observer can understand a living system only if he or she remains aware that it exists in two nonintersecting phenomenal domains while maintaining a double look that does not confuse them and if he or she also remains aware of the manner of mutual modulation of the phenomena of two domains.

Maturana has further maintained that what an observer sees as behavior is a dynamic of changes that involves two operationally in dependent systems: the living system and the medium. The behavior, therefore, pertains to the domain of relations of the organism, not to the organism itself.

Behavior as a relation between a living system operating as a whole and the medium operating as an independent entity, does not take place in the anatomo/physiological domain of the organism, but depends on it. In other words, anatomo/physiological phenomena are necessary for behavior to happen, but do not determine it because they are involved in the operation of only one of the participants of the dynamics of relations that constitute behavior, namely, the living system. It is only the observer that conserves a double look by attending simultaneously, or in succession, to the structural dynamics of system and to its relations as a whole, who can speak of a

generative relation between the processes of the structural dynamics of a living system and the phenomena of its domain of behavior.

What the observer sees is that each of the different behaviours that a living system may exhibit as phenomena of its domain of relations and interactions, arises in each case only when there is a coincidence between a particular structural dynamics in the organism, and a particular structural configuration in the medium (Maturana, 1995, p.151).

Accordingly, the behavior that a living system exhibits is neither determined by it nor by the medium alone, even when a particular structural change in a living system may specifically interfere with its ability to generate a particular behavior. Behavior arises and takes place in the flow of the interaction of the organism and the medium; it is a dynamic relation between the two.

Living Systems and Medium

According to Maturana, the living of the living system is a process of recursive interactions between the living system and the medium that courses as a flow of reciprocally congruent structural change. This process takes place as a matter of course, without effort or external direction, as a systemic result of their recurrent interaction as operationally independent structure-determined systems (Maturana, 1987). In other words, the living systems and the medium change together in dynamic structural congruence through their mutual recursive triggering of structural changes, while the living system conserves its living organization (autopoiesis) and its adaptation to the medium (operational dynamic structural congruence with it). The observer that sees both the living system and the medium sees that the living system slides in the medium through its continuous structural changes, following a path in which it conserves its living organization (autopoiesis) and its dynamic structural congruence with the medium (adaptation) or that the system disintegrates. Because of this systemic relation between a living system and medium, the structural dynamics of a living system is always, while it lives, in an adequate structural coincidence with the medium for the realization of its living. When such coincidence disappears, the living system dies (Maturana & Mpodozis, 1992).

Maturana has proposed that a living system exist both in the domain of its structural dynamics and in the domains of its actions and interactions as a whole and that these two domains cannot be reduced one to the other. In this sense, the domain of behavior cannot be reduced to the domain of physiology. Biological theories of depression do so by maintaining that depression is due to a biochemical deficiency in the brain. Certainly, the latter makes the phenomenon possible, but the depression itself belongs only to the relationship. For example, a depressed being who is sheltered and fed in utero is not truly depressed, and what appear to be restrictions of its activity are its normal ways of being as a fetus. Therefore, the depression is not located in the biochemical situation but in the relationship between organism and medium. Furthermore, Maturana has maintained that the nonintersection of the physiological and the behavioral domains does not permit genetic determinism of behavior and that understanding that opens a space for accepting the possibility of change in the system and thus for psychotherapy. In other words, from

Maturana's standpoint, one cannot speak of genetic determinism of behavior because the constitution of an organism's being, as a whole behaving entity, is systemic. Thus, the identity of a living being as a particular kind of living being is a systemic phenomenon, which arises and is conserved as its realization participates in the creation and conservation of the conditions that make it possible.

In the same sense, if the structural changes of a living system are not determined by the medium, but the living system and medium undergo congruent structural changes, the behavior of a person cannot be claimed to be determined by the social system to which he or she belongs, as implied by theories emphasizing environmental determinism. Nor could any psychotherapy or therapist determine the changes that take place in the patient's system. Psychotherapy deserves a further comment at this point in relation to systemic identities. A systemic dynamic – as already stated – is a relational dynamic that maintains a certain identity in a system. But no person is unidimensional because there are many dimensions of interaction for any living being. From a psychotherapeutic point of view, the difficulty in a client's asking for help lies in finding a dimension of interaction that does not belong to the domain of conservation of the undesired identity, through which the therapist may trigger internal structural changes in the client that will result in an interference with the dynamics of conservation of that undesired identity.

The concept of Autopoiesis

According to Maturana and Varela (1972), a living being is an Autopoietic system, a system organized as a closed network of molecular productions, such that the molecules produced generate the same network that produced them and specify its extension. Autopoiesis is the manner of existence of a living system and its manner of being an autonomous entity. As such, living systems live as long as their Autopoietic organization is conserved, and all their structural changes occur with conservation of their adaptation to the medium in which they exist. For an observer, this organization appears self-referential.

In these circumstances, I believe that Guidano is correct in stating:

The temporal becoming of any individual knowing system should be regarded as the unfolding of a self-organizing process that, through the maturational development of higher cognitive abilities, progressively constructs a sense of self-identity endowed with inherent unique features and historical continuity, whose maintenance becomes as important as life itself. (Guidano, 1991a.p.9)

The maintenance of a sense of individuality and personal uniqueness throughout the life span, results from the individual's Autopoietic activity. (Guidano, 1991b, p.52)

But Maturana has stated that the existence and conservation of human self-identity is a social phenomenon deriving from human existence in language. He has also stated that because the self is a manner of existing in language, it is possible to change the self through language, hence therapy is possible. Of course, all this takes place within the bounds of the conservation of autopoiesis, because otherwise the living being dies. According to Maturana, to an observer the final dependency of the living human being on the conservation

of its autopoiesis may obscure the realization that the human self and its conservation are features of the human existence in language.

Furthermore, according to Maturana, the major issues in relation to the notion of autopoiesis are, on the one side, the answer to the question, "What is a living being?" and, on the other side, a change in the way of looking at living being so that structural determinism appears fundamental for understanding them in all their dimensions. Once this is accomplished, the reference to autopoiesis is no longer necessary because it is implied when speaking of living systems and the biology of knowledge can be fully developed as a biological explanation of cognition by respecting the structural determinism of living beings. If living systems could not be understood as structure determined systems, cognition could not be explained as a biological phenomenon. According to Maturana, structural determinism, as an abstraction of the coherence of the experiences of the observer, is prior to the notion of autopoiesis because it is necessary to accept structural determinism to understand living systems as Autopoietic systems. Once the living being is understood as an Autopoietic system, all the domains of its existence can be handled. When Maturana spoke of a living system as a structure-determined system, he was already implying. In other words, Maturana spoke of structural determinism when he spoke of the living being as an Autopoietic system, and once he considered the living being as an Autopoietic system, he spoke of its two domains of existence. Once he considered the two domains of existence, he spoke of the space of relations. And once he considered the latter and physiology, he could speak of the identity of a living system as a systemic phenomenon and no longer needed to appeal to autopoiesis.

In psychotherapy, this view of Maturana permits us to see that the changes that a client might experience are bounded by his or her systemic identity; in other words, the patient will change only to the point that the realization of his organization as a living system will not be at risk. In this way, the effectiveness of psychotherapy always has a limit, and the boundaries are set by the patient, not by the therapist or the therapeutic system.

BIOLOGICAL CONSIDERATIONS

Recursiveness

According to Maturana (1995), there is a recursion whenever the observer can claim that the reapplication of an operation occurs as a consequence of its previous application. There is a repetition whenever an observer can claim that a given operation is realized again, independently of the consequences of its previous realization. Therefore, what makes the recurrent occurrence of a given operation a recursion or a repetition is its manner of association with some other process. A consequence of this condition is that any circular process can be recursive or repetitive according to its association with another process in the same or in a different domain. Another consequence is that whenever the observer sees a repetition, he or she sees that everything remains otherwise the same, and that whenever the observer sees a recursion, he or she sees the appearance of a new phenomenal domain. Maturana (1995, p. 153) clarified this distinction by way of an example:

If the wheels of a car turn sliding, the car does not move, it remains in the same place, and the observer sees the turning of the wheels as repetitive. However, if the wheels of a car turn so that their point of contact with the ground changes, and in each new turn the wheels start from a different position than the previous one as a result of that change, the observer sees a new phenomenon, the movement of the car, and considers the turning of the wheels as recursive. Another example is what happens in a field with the nutrients of the soil, when the same crops are planted in it year after year. When the latter is done, the recurrent planting becomes recursive as it gives rise to a new phenomenon, namely, the depletion of nutrients in the mentioned field.

Another example of Recursiveness is psychotherapy. In psychotherapy each encounter of the therapist with the client occurs in the new state reached by the client occurs in the new state reached by the client and the therapist after the previous meeting. This is obvious, but what is interesting is this happens, a new phenomenon appears, which is a change in the way the client sees him- or herself and the world that he or she lives. Depending on the nature of this change, the therapy is successful or not.

The Notion of Language

Another of the most important contributions of Maturana's view to contemporary psychology is his theory of language. For Maturana, language as a phenomenon of life belongs to the evolutionary history of human beings.

Maturana has shown that language occurs in the flow of consensual coordination of consensual coordination of behavior. Accordingly, each word (as a sound or gesture) does not indicate anything external to us but is an element in the flow of the coordinations of doings and emotions that take place in living together in language. Indeed, it is precisely these coordinations of doings and emotions that take place in coexistence in language that constitute the meanings of the words. Maturana has used the word languaging to emphasize the dynamic relational character of language. But, Maturana went further and used the term conversations to refer to the interlacing of the coordinations of coordinations of consensual behavior and emotions that occur in living together in language (1988).

Maturana's position reverses the classic empiricist standpoint, which views language as a simple transmission of information from one individual to another. The language theory of Maturana explains the conditions of constitution of the phenomenon of language. Present empiricist perspectives are not explanatory because they do not describe the conditions of constitutions of language and only describe the regularities of its operation. The consensual coordinations of consensual coordinations of behaviors is the operability that constitutes languaging and what takes place in it.

Maturana's view that all human life occurs in conversations has two basic implications with respect to temporality. One is that it explains human existence as taking place in a continuous flow of languaging and emotioning; the other is that human life is lived in the present, in the here and now. According to him, temporality is a manner of explaining

the experience of the flow of events and not a dimension of the universe. Part of modern humans' existential problem arises from not realizing this.

Language and Languageing

Maturana has proposed in other articles (Maturana, 1978, 1990) that the operations that constitute that which we human beings live as language and languageing in the process of our living take place in our relational domain as a manner of living in recurrent interactions in what an observer sees as recursive consensual coordinations of consensual coordinations of behavior. In other words. Maturana has claimed that language and languageing are not physiological or structural phenomena of the organism or of its nervous system and that what happens in language and languageing cannot be explained or understood as structural, functional, or dynamic features of the structural dynamics of the organism and its nervous system because they are relational phenomena of the domain of operation of organism as a whole in the medium. Moreover, Maturana's position is that what he has said in relation to language and languageing applies to all the phenomena that arise in the historical recursive expansion of the operation in language of a languageing community.

Maturana's claim is that as languageing beings, humans live in a world of objects that arise in languageing. In fact, Maturana (1995) claimed that objects arise in languageing in the first recursion of the flow of consensual coordinations of consensual coordination of behavior that language is. Each recursion in the flow of consensual coordinations of behavior in which we are as we language brings forth an object, and each recursion brings forth a different kind of object according to the relational circumstances in which it takes place. In this dynamic, as an object arises in the first recursion in the consensual coordinations of behavior, the distinction of an object arises in the second recursion. As objects are distinguished, another recursion in the flow of consensual coordinations of behavior (a third recursion) distinguishes relations between objects, and the possibility is open for the constitution of a domain of relations as relations of relations are distinguished in a next recursion. In more general terms, because at any level of recursion the consensual behaviours coordinated become objects, and thus a fundament for further recursive distinctions, any level or recursion may recursively become a domain of objects that operates as a ground level for further recursions.

According to Maturana, as languageing expands as a manner of living together in the recurrent interactions of living together as members of a languageing community, languageing follows the changing complexities of living together and becomes a source for further complexities constituting a network of crisscrossing consensual coordinations of behavior that generate all the complexities of living in language. In relation to observing he said:

Observing arises as an operation in a second recursion that distinguishes distinguishing; that is, in the distinction of observing, the observer appears, a self-consciousness arises in a fourth order recursion in which observing the observer takes place. In more general terms, the operation in any domain of objects may become the

ground for the generation of a domain of consciousness and self-consciousness (Maturana, 1955, p.154)

According to this, the therapist operates by guiding his or her client to operate in the self-consciousness that takes place in the fourth recursion.

Emotion and Emotioning

According to Maturana, what is implied when we speak of emotions are dynamic body dispositions that specify the domain of actions in which the organism moves. For Maturana the emotion defines the action. It is the emotion that defines when a given gesture is an aggression or a caress. Humans are always in emotional dynamics, in a flow from one domain of actions to another in the history of recurrent interactions in which we live. Indeed, Maturana has claimed that we learn our emotioning as we live together with others from the uterus on (Maturana & Verden-Zöller, 1993).

According to Maturana, as humans language, our languaging and our emotioning are braided, so that our emotional flow is affected by our languaging and our languaging is affected by our emotional flow. Our emotions, as well as those of the other, change as a result of our words; our words change as a result of our emotions. In my opinion, this is what happens in psychotherapy in the interaction between the psychotherapist and the client, where the emotioning and words of both client and psychotherapist change as a result of their interaction. According to Maturana, there is an integral interrelation between emotioning and languaging, beginning in childhood, so what is known as a cognitive phenomenon is from the start a unity between emotioning and intellect (Maturana & Vender-Zöller, in press).

Role of the Nervous System in the Conservation of the Structural Coupling Between a living System and Medium

The living system as a structure-determined system operates in a dynamic structural coupling with the medium (Maturana, 1978, 1987). If that dynamic structural coupling is lost, the living system dies. The behavior of a living system in the realization of its living as it takes place in the relations and interactions of the living system and the medium occurs through the structural changes of the living system in the conservation of that structural coupling.

Maturana (1995) proposed that the nervous system operates as a closed neuronal network that participates in the conservation of the structural coupling between living system and medium through the structural changes that it undergoes contingent to the flow of living of the living system. Moreover, Maturana claimed that the nervous system participates in the realization of the living of a living system through the sensory-effector correlations that it generates, by giving rise to structural changes in the living system that match the structural changes of the medium because its structure has changed contingent to the flow of the interactions of the living system as it realized its living in that medium.

Furthermore, Maturana claimed that the nervous system does not operate with representations of the medium and that it operates generating external and internal sensory-effector correlations in the organism that are operationally effective in relation to the realization of its manner of living.

For an observer of an organism in the flow of its interactions in the realization of its manner of living, it appears as if the nervous system were making computations to accommodate the behaviours of the organism to the features that he or she sees in the medium, but it is not. The organism and the nervous system in it operate as structure determined systems that slide in structural congruence with the medium in the realization of the living of the living system, because their respective structures change in structural coupling with each other and the medium through the realization of the manner of living of the organism, and both, the organism and the nervous system, disintegrate when that structural coupling is lost. (Maturana, 1995, p.162)

Notion of Self-Consciousness

As I mentioned above, Maturana has proposed that self-consciousness is an operation in language that takes place as a fourth recursion in the flow of consensual coordinations of consensual coordinations of behavior. Self-consciousness as a relational operation in language, therefore, does not take place in the brain, and it is not a neurophysiological phenomenon, nor a product of the operation of the nervous system, even if the operation of the nervous system is necessary for it to occur. In human experience, however, as we distinguish ourselves distinguishing ourselves, consciousness appears as a property or ability of the self that appears as an entity that requires a location. It is the manner of operation of the nervous system in us a languaging nervous system, and to the extent that it has become so in each of us in our particular histories as languaging beings, it allows us to live the experiences of self-consciousness in solitude and, as a consequence, to experience the self and consciousness as being localized in our bodies.

Maturana (1995) maintained that self-identity arises as an object in a reflexive view and that it is language that makes this possible. Self-consciousness is the distinction of a relational identity that arises in language treated as an object through a reflexion in language. That is, self-consciousness is an operation in language in which both the bodyhood and the relational dynamics of the languaging being appear as objects. For this to happen, object distinction should have arisen in observing already, so that relations can be objects too.

Perception and Illusion

Another basic contribution of Maturana to the understanding of human existence is that human experience (self-distinction) is a primary condition to explain cognition as a biological phenomenon. This means that we explain our experiences with our experiences. At this level of experience it is not possible to distinguish between perception and illusion. As it is only through language that human beings can explain their experiences and assimilate them

to their praxis of life, to understand is to see an experience in a larger context of experiences in a domain of conversations. All the rational cognitive reordering that can be elaborated is based on tacit premises that have been furnished by immediate experiences as they arise in languaging and emotioning. In Maturana's words: "Every rational system is grounded on basic premises accepted a priori through one's preferences (emotion), and this is why it is not possible to convince anyone with a logical argument if there is not an a priori common acceptance of those basic premises" (Maturana, 1988, p.17). From the perspective of therapy, this statement invalidates the rationalistic view, claims that through the practice of human logic it is possible to change the emotions of the patient (Beck, 1976, Ellis, 1985). Such change is possible only if the patient changes his or her emotionally accepted premises through the emotioning entailed in the interactions with the therapist during the rational and logical conversation.

The Multiverse

If, as Maturana has pointed out, the observer cannot claim access to an independent objective reality, and if as Maturana stated in his "Biological Foundations of Self-Consciousness" (Maturana, 1987), the observer is a constitutive participant of what he or she observes, then Maturana's proposition is evidently radical: The passage from a universe, that is, from an objective unique reality that is the same for everyone, to a multiverse, in which there are as many domains of realities as domains of experiential coherences of the observer is lived as domains of explanation of experiences with coherence of experiences. As Maturana has pointed out, in the view of the universe as a single domain of reality, the validity of a statement rests on its connections with the objective reality of the universe. In contrast, in the view of the multiverse, the validity of a statement rests on its connection with the experiential coherences of the domain of reality to which it belongs. In these circumstances, from the point of view of therapy, the existence of these two ways of facing the question of reality (and therefore the existence of two differing visions of what happens in the daily lives of those consulting psychotherapists, of two differing conceptions of what occurs in the transformations taking place as a result of therapy) imply two different ways of doing therapy. In the first case, as the therapist believes that there exists a universe to which he or she has a privileged access, he or she will act as the bearer of a truth that can be directly transmitted to the patient. In the other case, the therapist does not see himself or herself as a bearer of a truth and will consider that the world brought forth by the patient is the only possible world for him or her under his or her present circumstances. In the latter case, the task of the therapist is to help the patient understand the world that that she or he brings as an opening for the dissolution of his or her suffering. The first case corresponds to a rationalistic approach (Beck, 1976; Ellis, 1985), and the second to an evolutionary constructivist or postrationalistic approach to psychotherapy (Guidano, 1991a; Mahoney, 1991; Ruiz, 1992).

The Concept of Culture

For Maturana and Verden-Zöller (1993), human existence takes place in the relational space of conversation. This means that, even though from a biological perspective we are Homo sapiens, our way of living – that is, our human condition – takes place in our form of relating to each other and the world we in our daily living through conversation. Maturana maintained that a culture is a closed network of conversations and that cultural change takes place in a human community when the network of conversation that defines it as such changes. A culture as a network of conversations (coordination of languaging and emotioning) is conserved as the members of the culture become members of it and realize it by living it. As such, the identity of the members of a culture arises continuously anew as they live the culture that they integrate. Such an identity can change as the persons change the network of conversations in which they participate. Their identity (emotional and behavioral) does not preexist as a feature of the culture but arises moment by moment as they generate with their behavior the culture to which they belong.

The Biology of Love

Maturana and Verden-Zöller (1993) are the first scientists to explain love. In their proposition, love is not a quality or a gift or virtue but a relational biological phenomenon, consisting of a behavior or class of behaviors through which another emerges as a legitimate other in coexistence with oneself in circumstances where the other could be oneself. According to Maturana and Verden-Zöller, it is not a matter of legitimizing the other or of doing things intentionally to legitimize the other. It is a matter of the behavior through which the legitimacy of the other is not denied, even in disagreement. Love is a basic biological phenomenon, and it is the emotion that constitutes social existence. They believe that people get sick by living a way of life that systematically denies love.

Maturana has stated that the therapeutic process is always the same, whatever the form of psychotherapy, and that it is achieved when the therapist succeeds, through interaction with the patient, in guiding him or her, consciously or unconsciously, to abandon the systematic denial of himself and of others through recovering the biology of love as the central thread of his or her living (cited in Ruiz, 1994, p.13).

SUMMARY

The contribution of Humberto R. Maturana to the sciences of complexity and the understanding of the human experience derives from his explanation of the observer through what he called the domain of constitutive ontologies. The latter emerged when Maturana sought to answer the question of what humans do as observers. In his view, the observer is revealed as someone who operates in language as a constitutive participant in all that he or she does as a human being. Maturana's recursive, circular, and systemic view is present in all his explanatory arguments and reflections. Keeping this in mind, his contributions can be summarized as follows:

1. A circular, nonlinear, systemic view of a living system that leads us to understand life as process of knowledge in the realization of living in congruence with a medium.
2. The ontological nontranscendent character (constitutive ontology in Maturana's terms) and the explicative potency of Maturana's proposal in relation to the understanding of human experience.
3. A conception of the observer as a constitutive and active participant in all that he or she observes. The observer as well as reality emerges as explanations of the experiences of the observer and not as transcendental entities.
4. A negation of the separation of mind and body and the supposition that the mind has location in the brain. The mind is understood as a relational phenomenon that belongs to the dynamic relations of the organism.
5. Fully consistent, nonreductionistic understanding.
6. A conception of the nervous system as a closed neuronal network that does not operate with representations of the medium or with symbols.
7. A view of knowledge as affective action and not as a representation of an independent reality.
8. A theory of emotions and language.
9. A view of cognition as a biological as a phenomenon that puts an end to the belief in objective knowledge.

In addition as a result of his theory of cognition and his understanding of human beings as languaging beings, Maturana has contributed what he called the biology of love.

Ultimately, Maturana's systemic view of human experience leads to a change in the understanding of humanness. I think that one of the main consequences of this is a reevaluation of emotions as the fundament of human life and even of rationality. Furthermore, in these circumstances the therapeutic act appears obviously as an act on the emotions of the patient. In the words of Guidano (1991a), the therapist must be recognized as a strategically oriented perturber of the emotions of his or her clients.

More time must pass before we can evaluate the enormous contribution of Maturana to the understanding of the human experience and to the field of psychology. This work attempts to present his most important contributions in an effort to make them better understood. I am conscious that my inclination to choose these contributions also represents my own personal bias or, in Maturana's terms, my *a priori* premises.

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