

## METADESIGN

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### Human beings versus machines, or machines as instruments of human designs?

The answers to these two questions would have been obvious years ago: Human beings, of course, machines are instruments of human design! But now days when we speak so much of progress, science and technology as if progress, science and technology were in themselves values to be venerated, there are many people that think that machines as they become more and more complex and intelligent through human design, may in fact become alive so that they may supplant us as a natural outcome of that very venerated progress and expansion of intelligence. Also many people seems to think that evolution is changing its nature so that technology is becoming the guiding force in the flow of the cosmic change in relation to us. I do not hold this view. I do not look at progress, science or technology as if they were values in themselves, nor do I think that biological or cosmic evolution is changing its nature or character. I think that the question that we human beings must face is that of what do we want to happen to us, not a question of knowledge or progress. The question that we must face is not about the relation of biology with technology, or about the relation between art and technology, nor about the relation between knowledge and reality, nor even about whether or not metadesign shapes our brains. I think that the question that we must face at this moment of our history is about our desires and about whether we want or not to be responsible of our desires.

I wish to speak about this question, but in order to do so I want first to say a few things about **living systems, human beings, technology, reality, robots, design and art** as the general fundaments for what I shall say in relation to **desires and responsibility**. Let us proceed.

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## **PART I**

### **\* Living systems.**

#### **Conditions of existence.**

Living systems are structure determined systems, that is, they are systems such that all that happens to them at any instant depends on their structure (which is how they are made at that instant). Structure determined systems are systems such that any agent impinging on them only triggers in them structural changes determined in them. This we know from daily life. Furthermore, structural determinism is an abstraction that we make from the regularities and coherences of our daily living as we explain our daily living with the regularities and coherences of our daily living. So, the notion of structural determinism reflects the regularities and coherences of our living as we explain our living with the regularities and coherences of our living, and not any transcendental aspect of an independent reality.

No doubt we frequently speak as if what we see as an external agent impinging on a system did determine what happens in the system on which it impinges, but at the same time we also know that this is not so. Furthermore, we also know from our daily life that as we listen to some one else what we hear is as an internal happening in us, not what the other says, although what we hear is triggered by him or her. No doubt we would like that the other hears what we say, but that does not happen unless we have been interacting recursively with each other sufficiently long to have become structurally congruent in a way that results in that we become capable of coherent behavior through talking with each other. When that happens we say that we understand each other. Structural determinism is so basic a feature of our existence, that even the catholic church recognizes it by accepting as miraculous a happening that violates structural determinism.

In this sense living systems are machines. Yet, they are a particular kind of machines: they are molecular machines that operate as closed networks of molecular productions such that the molecules produced through their interactions produce the same molecular network that produced them, specifying at any instant its extension. In a previous publication with Francisco Varela (The tree of Knowledge) I have called this kind of systems, autopoietic systems. Living systems are molecular autopoietic systems. As molecular systems living systems are open to the flow of matter and energy. As an autopoietic systems living systems are systems closed in their dynamics of states in the sense that they are alive only while all their structural changes are structural changes that conserve their autopoiesis. That is, a living system dies when its autopoiesis stops being conserved through its structural changes.

Living systems have a plastic structure, and the course that their structural changes follows while they stay alive is contingent to their own internal dynamics of structural change modulated by the structural changes triggered in them by their interactions in the medium they exist as such. What I have just said means that a living system remains alive only as long as it slides in the medium following a path of interactions in which the structural changes triggered in it are structural changes that conserve its autopoiesis ( its living). Furthermore, what I have said also means that while a living system lives both the living system and the circumstances in which it operates appear to an observer as changing together congruently. In fact, this is a general condition for structure determined systems, namely: the conservation of the operational congruence between a particular structure determined system and the medium in which it exists in recursive interactions, as well as the conservation of the system's identity (its defining organization), are both at the same time conditions for the spontaneous arising and spontaneous conservation of a structure determined system, and the systemic result of its actual existing in recursive interactions in the medium while its defining organization is conserved.

#### **Domains of existence.**

Living systems exist in two operational domains, namely: the domain of their composition that is where their autopoiesis exists and in fact operates as a closed network of molecular productions, and the domain or medium where they arise and exist as totalities in recursive interactions. The first domain is domain where the observer sees them in their anatomy and physiology, the second domain is where the observer distinguishes them as organisms or living systems. These two domains do not intersect, and cannot be deduced one from the other, although the composition of the living system as an autopoietic system by constituting it as a bounded or singular totality, makes possible the other as the domain in which it operates as such totality or discrete entity. That is, as the two domains of existence of living systems (or of composite entities in general) do not intersect, there is no causal relation, or what an observer could call causal relations, between them, all that there is reciprocal generative relations that the observer may see as he or she distinguishes dynamic correlations between the operations, phenomena or processes that take place in them. And what the observer sees, is that the structural changes in the domain of composition (anatomy and physiology) of a living system result in changes in its dynamic configuration as a totality, and therefore in changes in the manner in which it interacts with the medium, and that the interactions of the living system with the medium trigger in it structural changes in its composition which result in turn in changes in the configuration of the living system as a totality ..... Indeed, I have described in the previous section this dynamics and some of its consequences for the constitution and conservation of composite entities (systems) in general.

The operational domain in which living systems exist as wholes or totalities is where each living system exists in the realization of its living as the particular kind of discrete or singular entity that we distinguish as we distinguish it. In these circumstances, what is fundamental to remark after all that I have said in relation to the existence of living systems, is that all that occurs in or to a living system is operationally subordinated to the conservation of the manner of living that defines and realizes it in the domain in which it operates as a whole or totality. Or in other words, the bodyhood which is where the autopoiesis of the living system in fact occurs, is the condition of possibility of the living system, but the manner of its constitution and continuous realization is itself continuously modulated by the flow of the living of the living system in the domain in which it operates as a totality. It is, for example, in that operational domain where an elephant exists as an elephant, and it is in that operational domain where we human beings exist as human beings. Therefore, bodyhood and manner of operating as a totality are intrinsically dynamically interlaced; so that none is possible without the other, and both modulate each other in the flow of living. The body becomes according to the manner the living system (organism) operates as a whole, and the manner the organism operates as a whole depends on the way the bodyhood operates.

### **The medium.**

The medium as the space in which a system operates as whole, has a structural dynamics independent of the structural dynamics of the systems that it contains, although it is modulated through its encounters with them. So, the medium and the systems that it contains are in continuous structural changes, each according to its own structural dynamics, and each modulated by the structural changes that they trigger on each other through their recursive encounters. In these circumstances all systems that interact with a living system constitute its medium. Furthermore, according to the recursive dynamics of reciprocal interactions described above, all systems in recursive interactions change together congruently.

### **\* Human beings.**

#### **Languageing.**

We human beings as living systems are structure determined systems, and all that applies to structure determined systems also applies to us. What is peculiar to us human beings though, is that we exist as such in language as the operational space in which we realize our living as such. That is, we exist in the flow of living together in the recursive coordinations of behavior that language is. Let me expand this.

Language is a manner of living together in a flow of consensual coordination of coordinations of consensual behaviors, and it is as such a domain of coordinations of coordinations of doings. So, all that we human beings do we do it in language. Thus, objects arise in language as manners of coordination of our doings in language; the different worlds that we live arise in language as different domains of doings in coordinations of our doings in language; the different domains of doings that we live as different kinds of human activities, be these concrete or abstract, manipulative or imagined, practical or theoretical, occur as domains of consensual coordinations of coordinations of doings in the different domains of doings that arise in our living in language. So, languageing is our manner of existence as human beings.

At the same time our bodyhood is that of languageing primates, and it is as such both our condition of possibility as the languageing beings that we are, and the outcome of the particular evolutionary history of living in languageing to which we belong. That history must have begun at more than 3 millions of years ago as living in consensual coordinations of coordinations of behavior begun to be conserved generation after generation through the learning of the children. Our ancestors of 3 million years ago had a biological life very similar to ours now, but lived a different world and had a different brain. What defines a lineage in biological evolutionary history is the conservation generation after generation of a way or manner of living which remains constant while every thing else becomes open to change through the succession of generations. As this was happening in the constitution of our lineage through the conservation of living in language, the bodies of our ancestors changed, and the worlds that they lived changed too. So that we are in our bodyhoods as we are now, and we live as we live now, as a result of the history of living in language that begun 3 million years ago. But there is something more.

When our ancestors begun to live in language, their living in language occurred interlaced with their living in the flow of their emotions. Previous to the recursive coordinations of consensual behaviors of language, our ancestors as all non-languageing animals do, coordinated their behaviors through their consensual and innate emotioning. That which we connote as we claim that we distinguish an emotion in other human beings, in non-languageing animals, or in ourselves, is the domain of relational behaviors in which we think that we are, or that that other being is. That is, we connote in the others or in ourselves the kind of relational behaviors that the others or ourselves may generate, and not any particular behavior. Therefore, in the flow of our emotions (that is, in our emotioning) we move from one kind or class of relational behaviors to another. If we change emotion, we go from one class of relational behaviors to another. Moreover, most animals learn the manner of the emotioning that they live along their individual lives in the flow of their interactions, and if they live in recurrent interactions in a community, they learn their manner of flowing in their emotions as a feature of their consensual living together. So, non-languageing animals coordinate their behavior through their innate or consensual emotioning. I call the consensual braiding of language and emotions, *conversation*.

As humanness begun with the conservation generation after generation of living in language as the basic relational feature that defined our lineage, what indeed begun was the transgenerational conservation of living in conversations. We human beings live in conversations, and all that we do as such we do it in conversations as networks of consensual braiding of emotions and coordinations of coordinations of consensual behaviors. In these circumstances, a culture is a

closed network of conversations which is learned as well as conserved by the children that live in it. Accordingly, the worlds that we live as human beings arise through our living in conversations as particular domains of consensual coordinations of coordinations of consensual behaviors and emotions, and whatever configuration of conversations that begins to be conserved in our living, becomes henceforth the world that we live, or one of the world that we live. This is what has happened and happens in the course of our history as human beings. Moreover, in the course of this history, we live in the conservation of each world that we live as if it were the very ground of our existence, and we do so in a dynamics of conservation that results in that all in us begins to change around the conserved manner of living that the conserved world entails.

But what we require to remain human beings is not very different in the different worlds that we live. The difference is in the kind of human being that we become in each of them because we become one kind of being or another according to how we live.

### **Identity.**

The identity of a system, that is, that which defines a system as a system of a particular kind, is not a feature intrinsic to it. The identity of a system is constituted and is conserved as a manner of operating as a whole in the system's recursive interactions in the medium that contains it. The constitution and the conservation of the identity of a system, are dynamic systemic phenomena that occur through the recursive interactions of the system with the elements of the medium.

Furthermore, a system arises when the configuration of relations and interactions that define it begins to be systemically conserved through the same system's interactions in the medium, in a process that I call spontaneous organization. As this occurs, the flow of the internal of structural changes in the system becomes subordinated to the conservation of the operation of the system as a whole in the terms I described above as I spoke about our human origin. In the flow of the successive generations of living systems the result of this is that the inner structure (the bodyhood) of the members of a particular lineage becomes more and more subordinated to the realization of the identity conserved in the lineage.

In us human beings the culture in which we live constitutes the medium in which we are realized as human beings, and we become transformed in our bodyhoods in the course of the history of our culture according to the human identity that arises and is conserved in that culture. But, at the same time, as human beings that live in conversations we are reflective beings that can become aware of the way they live, and of the kind of human beings that they become. And as we become aware we may chose the course that our living follows according to our aesthetic preferences, and live in one way or another according to the human identity we wish to conserve. So, our human identity is constituted as well as conserved in a systemic dynamics defined by the network of conversations of the culture that we live. Thus we can be **Homo sapiens sapiens, Homo sapiens amans, Homo sapiens aggressans or Homo sapiens arrogans**, according to the culture that we live and conserve in our living, but at the same time we may stop being human beings of one kind or another as we change culture depending on the configuration of emotions that gives the culture that we live its particular character.

### **Emotions and rationality.**

Emotions are kinds of relational behaviors, I have said above. As such our emotions guide moment after moment our doings by specifying the relational domain in which we operate at any instant, and give to our doings their character as actions. It is the configuration of emotioning that we live as **Homo sapiens** what specifies our human identity, not our rational behavior or our use of one kind of technology or another. Rational behavior begun as a feature of the living of our ancestors with language in the use that they made of the abstractions of the coherences of their daily living as they operated as languaging beings. But it was then as it is now emotions what specified the domain of rational behavior in which they operated at any instant. They were not aware of this then, but now we know that every rational domain is founded on basic premises accepted a priory, that is, on emotional grounds, and that it is our emotions what determines the rational domain in which we operate as rational beings at any instant. Similarly, we use different technologies as different domains of operational coherences according to what we want to obtain with our doings, that is, we use different technologies according to our preferences or desires. Thus, it is our emotions what guides our technological living not technology itself, even though we speak as if technology did determine our doings regardless of our desires. I maintain that we can see this in the technological history of our ancestors. Indeed, I claim that if we are careful we can see that different technological procedures were used by our ancestors for thousands of years, and that the technological changes that they made were related to changes in their desires, taste, or aesthetic preferences, regardless of how their manner of living changed afterwards.

Two things happen with our rational living, though. One is that that we use our reason to support or to hide our emotions, and we do so frequently not being aware of what we do. The other is that usually we are not fully aware of the emotions under which we chose our different rational arguments. The result of this is that we are rarely aware of the fact that it is our emotions what guides our living even when we claim that we are being rational.

And, as we do not understand the emotional fundaments of our doings, we become trapped in the belief that human conflicts and problems are rational and, therefore, must be solved through reason, as well as in the belief that emotions destroy rationality and are a source of arbitrariness and disorder in human life. And in the long run we do not understand our cultural existence.

### **The nervous system.**

In general, a nervous system is a closed network of interacting elements that operates as a closed network of changing

relations of activities, and exists as such in structural intersection with a larger system at the sensory and effector areas through which this interacts in a medium in which it is a dynamic totality. In multi-cellular animals, one usually finds a nervous system composed as a closed network of neuronal elements some of which intersect structurally with the sensory and effector surfaces of the animal. I shall call this kind of nervous system, neuronal nervous system. Unicellular living systems such as organisms like protozoans, have a molecular nervous system. Let me now describe some of the operational consequences of the manner of constitution of a nervous system, and let me do so by speaking in general terms of the neuronal nervous system.

1. The nervous system operates as a closed network of active neuronal elements that interact with each other in such a way that any change in the relations of activity between the neuronal elements in one part of the network gives rise to changes in the relations of activities of the neuronal elements in other parts of it. Moreover, this happens in the operation of the nervous system in a manner determined at every instant by its total cellular and molecular structure (architectural connectivity, features of the membrane of the neuronal elements, etc.).
2. The nervous system as a component of a multicellular living system intersects structurally with the sensors and effectors of the latter's sensory and effector surfaces. As a result, the sensors and effectors of a multicellular organism have a dual character and operate both as elements components of the organism and as elements components of the nervous system. Yet, their manner of operation is not confused, and they operate differently when they operate as components of the organism and when they operate as components of the nervous system. Thus, acting as components of the organism "sensors" and "effectors" operate in the interactions of the organism in its domain of existence as its sensors and its effectors, but acting as components of the nervous system they operate in its closed dynamics of changing relations of activities as other neuronal elements. The fundamental result of this situation, is that the organism interacts with the medium, but the nervous system does not.
3. Organism and nervous system exist operationally in different non intersecting domains, namely: the organism in the domain in which the living system exists as such, that is, as a totality (as an elephant or as a human being, for example), and the nervous system in the domain in which it exists as a closed neuronal network, that is, in the domain in which it operates as a closed network of changing relations of activities. The interrelation or connection between these two domains takes place at the sensory and effector elements where organism and nervous system are in structural intersection. At the sensory elements what happens is, a) that as the organism encounters the medium at its sensory surfaces, b) that encounter triggers in sensory elements of the organism structural changes that trigger structural changes in the neuronal elements that intersect with them, and finally, c) those structural changes result in changes in the manner of participation of those neuronal element in the closed dynamics of changing relations of activities that they integrate as components of the nervous system. At the effector surfaces what happens is, a) that as the neuronal elements that intersect with the effector elements change their state of activity, they trigger in these a structural change that, b) changes the structural configuration through which they act on the medium as the organism interacts in it.
4. The nervous system as a closed neuronal network does only one kind of things, it generates changes of relations of activities between the neuronal elements components that compose it. That is, the nervous system does not operate with information about the medium or with representations of it. All that the nervous system does as a component of the organism, is to generate in it sensory/effector correlations that will give rise to the behavior of the organism in the course of the latter's interactions with the medium. Furthermore, the sensory/effector correlations that the nervous system generates change as the flow of activity of the nervous system changes, and the flow of activity of the nervous system changes as its structure changes.
5. The structure of the nervous system is not fixed, and changes continuously in the following ways: a) at the level of its neuronal elements that intersect with the internal and external sensors of the organism through the structural changes triggered in them either through the interactions of the organism in the external medium, or through the latter's internal organic activity as its internal medium; b) through the structural changes triggered in its neuronal components by hormones secreted by the endocrine cells of the organism, or by other neuronal elements that operate as neuroendocrine cells; c) through recursive structural changes triggered in its neuronal components as a result of their own participation in its operation as a closed network of changing relations of activities; and d) as a result of its intrinsic growth and differentiation structural dynamics.

The fundamental consequence of the structural and dynamic aspects of the operation of the nervous system is that although the nervous system does not interact with the medium, the structure of the nervous system follows a path of change that is contingent to the flow of the interactions of the organism in the realization and conservation of its living. A consequence of this consequence, is that although all that the nervous system does as a component of the organism is to generate moment after moment sensory/effector correlations that result in the generation of the adequate behavior of the organism in its domain of existence in a manner determined at every moment by its structure, it remains doing so through its continuous change because it changes in a manner contingent to realization of the living of the organism. I call this historical dynamics of coherent structural changes of the organism and the medium as well as their condition of dynamic structural congruence, **structural coupling**.

Due to the manner of operation of the nervous system, all occurs in it as processes of the same kind, namely, dynamics of changing relations of neuronal activities. In the operation of the nervous system, to walk or to talk about the name of a flower are processes of the same kind, even though they are different flows of changing relations of neuronal activities that eventually give rise to different sensory effector correlations. Yet, to walk and to talk about the name of a flower,

are different phenomena in the relational dynamics of the organism, and are seen by an observer as different behaviors. Due to its manner of operation the nervous system does not act on representations of the medium, and the operational congruence between organism and medium is the result of the structural coupling between medium and organism (nervous system included) that results of their evolutionary and ontogenic history of coherent structural changes. Finally, due to the nature of the dynamics of structural between organism and medium, any dimension of structural interaction of the organism and the medium that couples with the flow of structural changes of the nervous system can become a sensory dimension, and an expansion of the behavioral space of the organism.

#### **\* Organisms and Robots.**

Both, the living system (organism) as a natural entity, and a robot as a product of human design, are structure determined systems in dynamic operational coherences with the structure determined medium or circumstance in which they exist as what they are. The difference between them is in the way in which their respective operational coherences with their circumstance arose in their history of origin. The robot arises through design. An artist or an engineer makes a design by disposing a set of elements and a configuration of relations between them in a way that they constitute a dynamic totality in dynamic congruence with a medium that has also been designed as such ad hoc. So, the robot, the medium or circumstances in which it operates, and the dynamic congruence between the two is the consequence of an intended design in what one might say is an ahistorical process. Robots, therefore, are ahistorical entities. Yet, since they are the product of an attempt to obtain some operational result in the future, they exist in a historical domain.

Living systems originated in a different manner. All living systems living now on the earth, are the present of a still going on history of production of lineages of living systems through the reproductive conservation of living as well as of variations in the manner of realization of the living. This historical process is what is usually called biological or philogenic evolution. In this history, and according to what I have said above as I was talking about structural determinism, the living systems and the circumstances in which they lived changed together congruently, so that they always find themselves spontaneously in dynamic congruence with the medium in the realization of their living. Living systems are historical systems. Yet, even though living systems are historical systems in their manner of existing in a philogenic evolution, as they exist in the flow of their living in circumstances that change congruently with them, they exist in no-time in a continuously changing present.

It is their historical character what makes living systems different from robots, and not that they are molecular autopoietic systems. It is that robots are ahistorical in their origin, what makes them basically different from living systems, not only that they are not autopoietic systems. At the same time, that living systems are molecular systems makes them manipulable in the same way that any other molecular system is, if the operational coherences of their constitution as such are respected.

That we living systems are structure determined systems, is both our possibility for well being if we so desire, and our bane if we careless and irresponsible of our condition of historical beings that exist in a changing present. Let us come now to the central purpose of this article.

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## **PART II**

### **\* Technology and reality.**

#### **Technology.**

Technology is operation according to the structural coherences of the different domains of doings in which one may participate as a human being. As such technology can be lived as an instrument for effective intentional action, or as a value that justifies or gives orientation to a manner of living in which all is subordinated to the pleasure lived through doing it. When it is lived in this last manner, technology becomes an addiction whose presence those addicted wish to justify through rational arguments founded on the historical reality of its great expansion in modern times.

Lived as an instrument for effective action technology has led to the progressive expansion of our operational abilities in all the domains in which there is knowledge and understanding of their structural coherences. Biotechnology is a case in which such an expansion has had recursive consequences. Thus, the expansion of biotechnology has resulted in an expansion of the knowledge of living systems as structure determined systems, and the reverse, the expansion of the knowledge of living systems as structure determined systems has led to the expansion of biotechnology. However, the expansion of biotechnology has not expanded our understanding of living systems as systems, nor has it expanded our understanding of ourselves as human beings. Quite on the contrary. The expansion of biotechnology interlaced with the explicit or implicit belief in a reductionistic genetic determination, as well as our immersion in a mercantile culture that penetrates all dimensions of our psychic existence, has obscured our view of ourselves as living beings of systemic identity that can become one kind of being or another according to how they live. In these circumstances we modern human beings live under two basic and penetrating cultural inspirations, one is that the market justifies everything, the other is that progress is a value that transcends human existence. This appears expressed in that practically all that we modern humans do is done in relation to its market value, and we talk and act as if we were carried by a trend of progress to which we must submit.

Thus, for example, now days there is much work and research in relation to the design of anthropomorphic machines, and much is argued that we humans should adapt to a time in which evolution is entering a technologic-scientific phase, looking at evolution as a process that carries us regardless of our awareness of it. Does this mean that we must surrender to a cosmic force in which we are irrelevant and will disappear? What are we?

Much is said about a trend towards the technomorphisation of human existence, namely, a trend towards the reorganization of the organic in terms of the model of intelligent machines. May be this is so because the confidence in that what was considered as properly human, like the soul, the spirit, autonomous thought, the condition of self consciousness, could not be realized through machines is eroding away in face of what seems the triumph of technology and science. In the invitation to write this article it is said: *"According to Paul Virilio (a French writer) the new brain frame that is shaped by the adaptation to the electronic media (metadesign), penetrates the human neurological structures more deeply than older formations (relational processes?). Metadesign regenerates the impulses of neural transmission in a living subject and thus creates a sort of cognitive ergonomics. The result is a new anaesthetized relation between the human and the machine. Metadesign is a way of dumbing the infrastructure of human behavior."* But, where are we individual responsible humans in all this that we can be so easily manipulated by other humans through their claims of generating progress in the development of the power of the machine while they satisfy their own ambitions, desires or fantasies?

No doubt that as structure determined systems we exist through our structural dynamics. No doubt as dynamic structure determined systems we exist in continuous structural change and our structure can be manipulated intentionally in order to obtain some intended consequences in our living. In that sense we are machines, molecular machines. But our human existence, our human identity does not take place in our structure. And this statement is valid for any machines as it exists as a totality in a relational space. As I have shown above, we exist as human beings as systemic entities in a relational space under continuous structural change. Furthermore, we are the kind of beings that we are as human beings, **Homo sapiens amans** or **Homo sapiens aggressan**, only as long as we participate of the systemic dynamics in which we arise and are conserved as that kind of human beings by living with other human beings. We are not predetermined genetically or otherwise to become the kind of human being that we become in our living.

We become according to how we live in a systemic manner by contributing with our living to conserve the kind of being that we become. Furthermore, what we think that we are, recursively forms part of the systemic dynamics in which we become and conserve the identity that we become. Moreover, since what we think forms part of the network of conversations that constitutes our living, we become according to our emotioning interlaced with our doings in the flow of our languaging. *So, since our emotions specify the relational domain in which we are at any instant, it is our emotioning what defines the course of our individual living as well as the course of our cultural history, not our reason.* This central role of emotions in defining the course of history, is not peculiar to us as cultural beings. Indeed it is the nature of the evolutionary process that it occurs in the constitution of lineages through the reproductive conservation of manners of living that are in fact defined by the relational preferences or choices of the organisms. Biological

evolution is not entering a new phase with the growth of technology and science, but the evolution of human beings is following a course more and more defined by what we chose to do in front of the pleasures and fears that we live in our enjoyment or distaste of that which we produce through science and technology. This is why the question of what do we want is the central one, not the question about technology or reality.

Thus, since we are structure determined systems we are open to any structural manipulation that respects the structural coherences proper to the structural domain in which it takes place. Or, the same said in more general terms, and in a way that results more remarkable and at the same time more terrifying: *any thing that we may chose to design can be implemented, if the design respects the structural coherences of the domain in which it takes place.*

### **Reality.**

The notion of reality is changing but not our living in relation to it. Reality is a proposition that we use as an explanatory notion to explain our experiences. Moreover, we use it in different ways according to our emotions. This is why there are different notions of reality in different cultures or in different moments of history. Yet, we live in the same manner as the fundament of the validity of our experience that which we connote with the word real when we are not using it as an argument, that is, we live the "real" as the presence of our experience. I saw it, ... I heard it, ... I touched it, ... Indeed, this is why I claim that it is a fundamental condition in our existence as structure determined systems that we cannot distinguish in the experience itself between what we call our daily living perception and illusion. The distinction between perception and illusion is done **a posteriori** by devaluating an experience in relation to an other that is accepted as valid without knowing if it will or will not be devaluated later in relation to another one. In fact, this is why virtual realities are called realities. Yes, what we now call virtual realities have a special character because they are associated to modern technology, and are design to involve many of our sensory dimensions, and ideally all possible ones. But in the strict sense they are nothing special, unless we use them as a powerful procedure to cheat and manipulate the lives of others. In these circumstances, what we call real, that is, that with respect to which virtual realities are virtual, are those experiences that we use as the grounding reference for our explanation of those other experiences that we live equally as real in the flow of our living, but we want to devaluate.

Our human life takes place in the relational dynamics in which we live it by living in conversations as languaging beings. As a consequence of our condition of living in conversations, our history as human beings has occurred in the continuous generation of domains of coordinations of coordinations of behaviors that float on the conservation of our living as biological entities, in a flow of shifting human realities that is possible because it does not matter how our biological living is conserved as long as it is conserved. And this historical dynamics has occurred in a way in which the biological realization of our being continuously disappears from our view as an invisible background in our daily operation as human beings unless it is directly interfered with. So, our history as human beings that begun when our ancestors begun to live in conversations, has been one of recursive creations of new realities which are all virtual with respect to the basic one of our biological existence, but which become **real** (non-virtual) in the flow of our human living as through their operational binding with our basic biological living they become the grounding for some new virtual reality. Therefore, that which should concern us, if we want that concern, is what do we want of our human existence, what course do we want that our humanness should follow.

Reality, when it is not just a manner of explaining our human experience, is that which in our living as human beings we live as the fundament of our living. Under these circumstances, reality is not energy, not information, however powerful these notions may appear to us in the explanation of our experiences. We explain our experiences with our experiences and with the coherences of our experiences. That is, we explain our living with our living, and in that sense we human beings are constitutively the fundament for all that exists, or may exist in our domains of cognition.

### **Expansions of basic reality.**

Changes in the dimensions of structural coupling occurring along the evolutionary history of the different kinds of living systems, have constituted evolutionary transformations of the domains of basic reality in which they exist. The same can occur through design, in the intentional use of prosthetic means that create new dimensions of interactions for an organism which thus become new sensory domains for them. Due to its operation as a closed network of changing relations of activities, the nervous system has no intrinsic limitation for dealing with the expansion of the basic reality of the organism that it integrates. Nor does the nervous system have any intrinsic limitation for dealing with novel sensory dimension that may appear in the lives of organisms if their domains of interactions result expanded as a consequence of some independent structural changes of the medium.

If the manner of living that defines the class identity of a particular living system is conserved through the transformation of the basic biological reality in which it exists, the living system remains of the same kind, but its particular characteristics, and the relational space in which it lives, change. But if the manner of living that defines the class identity of a particular living system is not conserved, the living system disappears as a living system of that kind, and a new one appears in a new relational space. \*\*\*\*\*

### **Human bodyhood.**

The love, the spirit, our consciousness and self-consciousness, responsibility, autonomous thought, are central to our existence as human beings, but not only they, also our bodyhood. The present human bodyhood is the result of the history of transformation of the bodyhood of the members of our human lineage as an outcome of their living in conversations, so it is not just any. If we modern humans were to make a robot that in its behavior is not different from



us showing spiritual concerns, self-consciousness, emotions and autonomous rational thought, it would still be a robot and not a human being due to the history of its bodyhood. In the history of the cosmos such a robot may replace us and we may disappear completely as many other animal species that have become extinct, and that will be our end and the end of humanness in the cosmos. Does it matter? For me, since I do not consider progress or technology as values in themselves, it matters and I do not want that to happen!

It is possible that we human beings are becoming adapted to the interference with the natural processes in our lives through the medical use of organ transplants, artificial organs, or artificial initiation of embryonic development. May be that we accept those practices because it seems to us that they do not alter our human condition as they appear to conserve it. But at the same time it is becoming apparent that what threatens our humanness is in fact the commercial psychic space in which we now live, and in which we are ready to subordinate everything that we do to commerce as if it did not matter what happens in the flow of human history. In a commercial psychic existence, **the commercial value** is the first and most fundamental concern.

But, is this relation to the bodyhood in humanness essential to humanness? I think it is because those features that make us the kind of beings that we are, namely, love, social responsibility, cosmic consciousness, spirituality, ethical behavior, and expanding reflexive thought, arise in us as dynamic features of our human bodyhood conserved and cultivated in a relational human living that conserves that bodyhood. Humanness is not an expression of some computer program that specifies certain ways of operation, it is a manner of relational living that entails its being grounded on a basic bodyhood. Yes, many of our organs can be replaced by artificial ones, but they will be replacement only if they replace the original organs in the realization of the human living. Yes, it is possible to eventually make robots that openly behaves like us, but their history will be tied to their bodyhood, and as they will exist as composite entities in different domains of components than us, the domains of basic realities that they will generate will be different from ours .

#### **\* Art and design.**

Art arises in design, but the aesthetic experience occurs in the well being and joy that we live in being in coherence with our circumstances. So art has the artificiality of intention, expression or purpose, and everything can be a means for its realization. As such art exists in the psychic domain of the culture in which it occurs, unless there is the intention or purpose of breaking with it bringing forth some relational dimensions to human life, or some opportunity for reflection. We humans live aesthetic experiences in all the relational domains in which we dwell. It is due to the biological foundation of aesthetic experience, as well as to the fact that all that we live as human beings belongs to our relational existence, that art intertwines with our social existence and our technological present at all times.

I claim that the emotion that constitutes social coexistence is love. And love is the domain of those relational behaviors through which another being arises as a legitimate other in coexistence with oneself. As different technologies open and close different relational dimensions, they offer different possibilities for social and nonsocial coexistence, as well as different possibilities for the artist to create the relational experience that he or she may want to evoke. In all cases, though, whatever he or she does, the artist will be a participant creator of some virtual reality that may or not become a grounding reality in the course of human history. The artist is not unique in this, of course. We all human beings, and regardless of whether we are aware of this or not, are cocreators in flow of the changing realities that we live, but artists are in a very peculiar situations. Artists are poets of daily life that more than other human beings act in intended design, and, hence, what they do to the course of the history of humanness is usually not trivial. Artists as poets of daily life see or grasp the coherences of the present that the human community to which they belong lives, revealing them, according to their preferences and choices of a manner of living.

#### **\* Desires and responsibility.**

We human beings always do what we want, even when we say that we are forced to do something that we do not like. What happens in this last case, is that we want the consequences that will take place as we do what we claim that we do not want to do. This is why our desires, our conscious and unconscious desires, determine the course of our lives, and the course of our human history. What we conserve, what we wish to conserve in our living, is what determines what can and what cannot change in our lives. At the same time this is why we frequently we do not want to reflect on our desires. If we do not see our desires, we can live feeling no responsibility for most of the consequences of what we do.

Artists, poets of daily life, are some of those people that can be, and frequently are aware of the course that human existence is following. This is particularly evident in science fiction writers that reveal a future that arises from their extrapolations of the coherences of our relational present. At the same time artists can be, and frequently are aware of what is missing in present human relations, such as love, honesty, social responsibility, and mutual respect, but the works in which they reveal or evoke what they see, are frequently dismissed as utopia. But in both cases it is not the medium what is central for the work of the artist, it is what they want to do. The medium is always a domain of possibilities that can be used with great or little knowledge of what can be done with it, but it is always a matter of dedication and aesthetics whether one manages or not to use it at will. What concerns me however, is the purpose, the emotioning that the artist wants to evoke.

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### **PART III**

#### **\* Reflections.**

Technological transformations do not impress me, biological technology does not impress me, Internet does not impress me. I say this not out of arrogance. No doubt much of what we do will change if we adopt the different technological options at hand, but our actions will not change unless our emotioning changes. We live a culture centered in domination and submission, mistrust and control, dishonesty, commerce and greediness, appropriation and mutual manipulation ... and unless our emotioning changes all that will change in our lives will be the way in which we continue in wars, greediness, mistrust, dishonesty, and abuse of others and of nature. Indeed, we shall remain the same. Technology is not the solution for human problems because human problems belong to the emotional domain as they are conflicts in our relational living that arise when we have desires that lead to contradictory actions. It is the kind of human being, **Homo sapiens amans, Homo sapiens aggressans, or Homo sapiens arrogans**, at the moment in which we have access to a new technology, either as users or observers, what determines how we use it or what we see in it.

We frequently speak as if the course that human history is following were independent from us as individual human beings, and as if we were carried by powerful forces beyond our control. But, to what extent such a manner of thinking is valid? Our life is guided by our emotions because our emotions define the relational domain in which we act, and hence, what we do. Each culture is defined by a particular configuration of emotioning that guides the actions of its members, and is conserved by those actions and the learning of the configuration of emotioning that defines it by the children of its members. If this systemic dynamics of constitution and conservation of a culture is broken, the culture comes to an end. So, we are not trapped, it is not what we do, but the emotion under which we do what we do. It is not technology what guides modern life, but the emotions, that is the desires of power, riches, or fame, ... under which we use or invent it. We human beings can do whatever we imagine if we respect the structural coherences of the domain in which we operate. But we do not have to do all that we imagine, we can chose, and it is there where our behavior as socially conscious human beings matters.

Our brains are not being changed by technology, and what is in fact happening to us through it, is that we change what we do while we conserve the culture (the configuration of emotioning) to which we belong. Unless, of course, our emotioning changes as we reflect on what happens to us through using or contemplating it and we undergo a cultural change. In fact our brain needs not to change for us human beings to be able to manage and understand whatever technological change that the future may offer us if we are willing to start from the beginning. What our brain does is to abstract configurations of relations of activities in itself, which if coupled with our operation in language permit us to treat any situation that we live as a starting point for recursive reflections in a process in fact open to any degree of complication. It is what happens in our emotions what determines the course of our living, and since emotions as kinds of relational behaviors occur in the relational space, it is through the conservation of cultural changes (as changes in the configuration of emotioning that are conserved generation after generation in the learning of children) that the course of our biological history may result in changes in our brain.

Biological evolution is not changing its character as the constitution, conservation and diversification of lineages which are defined by the systemic conservation generation after generation of manners of living that extend from the inception to the death of the reproducing organisms. The same occurs with the evolution of cultures. Cultures are closed networks of conversations conserved generation after generation through the learning of the children that live in them. As such cultures change if the closed network of conversations that the children learn as they live in them changes, and a new closed network of conversations begins to be conserved generation after generation through their living. One can say in general systemic terms, that what is conserved in a system or in the relations between the members of a group of systems what determines what can or not change in the system or in the group of systems.

Biotechnology is not a new practice, although what we can do now is very, very different from what we humans could do in that area hundred or fifty years ago. Internet with all its richness as a network not something basically different from other systems of interactions that facilitates the use of libraries and museums. No doubt the interconnectedness reached through Internet is much greater than the interconnectedness that we lived a hundred or fifty years ago through telegraph, radio, or telephone. However, we still do with Internet no more no less than what we desire in the domain of the options that it offers, and if our desires do not change, nothing changes in fact because we go on living through it the same configuration of actions (of emotioning) that we used to live. Certainly I know much of what is said and is happening in the domain of globalization of the flow of information, but it is not information what constitutes the reality that we live. The reality that we live arises instant after instant through the configuration of emotions that we live, and which we conserve with our living instant after instant. But if we know this, if we know that the reality that we live arises through our emotioning, and we know that we know, we shall be able to act according to our awareness of our liking or not liking the reality that we are bringing forth with our living. That is, we shall become responsible of what we do.

I want a cultural change, I want to contribute to a work of art

in the domain of human existence, I want to contribute to evoke a manner of coexistence in which love, mutual respect,

honesty and social responsibility arise spontaneously from living instant after instant such configuration of emotioning because we all cocreate it in our living together. That configuration of emotioning cannot be imposed, nor can it be demanded without denying it, it must be lived spontaneously as a matter of course because that is the way we learned to live in our childhood. Violations of such manner of living will be legitimate mistakes that can be corrected because there will be no intrinsic shame in them, they will be only errors. If indeed we were to live such a cultural change, what would be most remarkable, is that the configuration of emotioning that such a manner of living entails, would arise in us without effort as we begin to live in it by living in it. Moreover, such configuration of emotioning will be conserved generation after generation as our manner of cultural living if our children live it because we live it with them. Indeed, such a manner of living is what we all want to live in our desire for material and spiritual well being. Utopia? yes because it correspond to a way of living that has been ours in our evolutionary history, and most of us know it as an experience or as a yearning of our childhood. Anyway, to do that would be, no doubt, a magnificent work of dynamic art, and a responsible creative act as well if we want to live as **Homo sapiens amans**.

**Humberto R. Maturana.**

August 1, 1997.

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