A Systems Holistic Interpretation of the Present State of the Contemporary Society and its Possible Futures

Eric Schwarz

Autogenesis, Université de Neuchâtel, Switzerland.
email: eric.schwarz@unine.ch

Abstract:
In this communication, we use a general holistic framework developed to interpret the dynamics of complex self-organizing systems and presented in another paper to this congress. We apply it to the case of contemporary society, dominated by the logics of technological innovation, industrial production and commercial prosperity. To interpret the present situation as pertinently as possible, we contextualize the present Western-type civilization by considering it as one step in the long history of the development of mankind. We interpret this history as a particular manifestation of the general evolution of complex systems. We conclude that modern society is at a crucial transition between a dualist rationalist and reductionist paradigm producing fragmentation, and a holistic paradigm which implies a more integrated society.

Keywords:
holistic epistemology, modern society in historical perspective, society's possible futures

1. Introduction

The point of departure of this contribution is the inadequacy of the analytical and reductionist methods and of the linear way of thinking usually practiced by decision makers, on one hand, and the increasing complexity of the problematics met in ecology, in economy, in politics and in technology, on the other hand. This situation is highly deplorable since conceptual tools do exist to deal with complex situations: first and second order cybernetics, general system theories, non-linear dynamics, complex adaptive systems theories, etc. Unfortunatly, this knowledge is not yet used to handle practical complex problems, but it seems to us that the ontological and epistemological presuppositions of the sciences should also be questioned and critically reviewed.

It is becoming evident, probably also for the most confident adepts of the progress through technology and liberal market economy - and more generally for the adepts of the mainstream objectivist and materialist scientific paradigm - that we have been witnessing in the last decade an amazing accumulation of unexpected, challenging and disturbing events.

The most visible events took place in the field of politics and economy like the collapse of the planned economy systems in Eastern Europe, the globalization of the economy and finance, the increasing priority of the commercial over the political, the shrinking of the democratic decisional field in favor of the financial, the privatization of the commons (territorial collective infrastructures and networks), the decreasing returns of capital due to environmental and social costs increase.

In the social, psychological and cultural fields, transformations are also accelerating: increased gap between rich and poor people and between rich and poor countries,

frustration and aggressivity (terrorism) associated with these inequalities, confrontations between Western and other cultures, increased strain between civil society aspirations and economical logic, lack of consensual purpose for the future of society and no project for a coherent society management.

The ecological problems due to the explosion of matter and energy fluxes in society are well known: climatic changes, depletion of non-renewable resources, pollution of air, ground and waters

Finally, we notice, in the year since September 11th, 2001, an acceleration of violence, accidents, instabilities and cascades of causes and consequences spreading over the whole Western world and its associated partners. Recession, tensions, corruption – on a larger scale than expected - and illegal activities destabilize the world economic system. The fear of terrorism has triggered security measures (Big Brother) that threaten the basic individual freedom and invade the privacy associated with democracy.

Many people are just spectators of these phenomena and do not see any correlations between them; they wait for the progress to recover as it was the case in the 1960's. Others begin to question the real efficiency of our way of doing things but few question the implicit philosophical presuppositions, which are at the root of the Western Weltanschauung.

We think - or rather hope - that the systems science, and the systems epistemology, by questioning the limitations of the dominant mechanist paradigm, will help to reconcile our actions and representations with the way nature really works The purpose of this paper is to contribute to develop and apply a general systemic framework more adequate to interpret and manage the complex problems of today. More precisely, this paper presents an application of a general systems metamodel introduced in another communication to this congress [Schwarz (2002b)]. In that paper we describe the main features of a metamodel, based on a holistic (non dualist) ontology and epistemology, which can then be used to make specific models of real life concrete systems. In the present paper, starting from this general metamodel, we introduce a specific model to interpret the state of the modern techno-economical society and make projections of some possible futures.

2. The Systemic Holistic Metamodel Used to Interpret Natural Systems Evolving Toward Increased Complexity and Autonomy

It has been a long tradition of Western culture to consider that the world is composed of two irreducible worlds, nature and culture, the first being ruled by the blind laws studied by the natural sciences, the second being produced by the human actions and free will. In the last 50 years, mainly under the influence of systems thinking, man has been reintegrated inside nature. Obviously, man's behavior is not to be reduced to the laws of the disciplines like physics, chemistry or even biology. More general and deeper principles should be searched for, which the particular laws of the disciplines must respect. That is the motivation of the General Systems Theory initiated by L. von Bertalanffy and his colleagues in the middle of the 20th century. Today the need appears to go forward with this work by discussing critically the science's ontological foundations and its epistemological presuppositions.

The metamodel proposed is a contribution to this effort. It applies in particular to the case of the spontaneous emergence of complexity and order, where the mechanist sciences are particularly inefficient. The main features of this systemic framework can be found in

another communication to this Congress [Schwarz (2002b)]. Let us only note here that the basic mechanist picture of the world, constituted of grains of matter moving in space and time according to some invariant laws, has been replaced by a world of systems, described by three primordial non separable categories: objects, relations (source of interactions) and wholes (systems). An important point is that "reality" is not only made up of matter but has two aspects: actual matter and virtual relations whose interplay generates systems, existential entities characterized by oneness and wholeness. To illustrate the consequences of this ontology/epistemology on the case of the human being, let us say that the body is the instantiation of matter, the mind of the virtual network of relations, and consciousness of the existential identity. Body, mind and consciousness are inseparable; not only have they no meaning when taken alone, but they create false problems, like the famous mind-body problem.

According to the proposed metamodel, two types of changes in time characterize the dynamics of complex systems:

1. on a medium time scale, conditions far from equilibrium (described by non-linear dynamics) often trigger self-organization through four stages that can be represented by four sectors in a spiral pattern (see fig.2 in [Schwart 2002b]): 1) morphogenesis, i.e. emergence of structures (Prigogine's dissipative structures for example); 2) phase of stability (by self-regulation), 3) entropic drift (the omnipresent increase of disorder), 4) bifurcation and new structuration (or destructuration/destruction) of the medium, this last step corresponds to the birth of a new – sort of child – system.
2. on the long run, and in favorable conditions, the iteration of the above spiraling cycle and its four sectors, generates an evolution toward complexity and autonomy that goes over six stages showing properties of increasing abstraction: 1) self-organization, if conditions far from equilibrium prevail (non linear dynamics), 2) vortex or oscillation: emergence of circular fluxes of matter within the medium, minimum physical conditions of sustainability, 3) feedbacks (for example self-regulation), dynamical (cybernetic) conditions of sustainability, 4) autopoiesis: self-production of the system, 5) self-reference, which means that the system is its own reference (road toward autonomy), 6) autogenesis (the system generates its own rules).

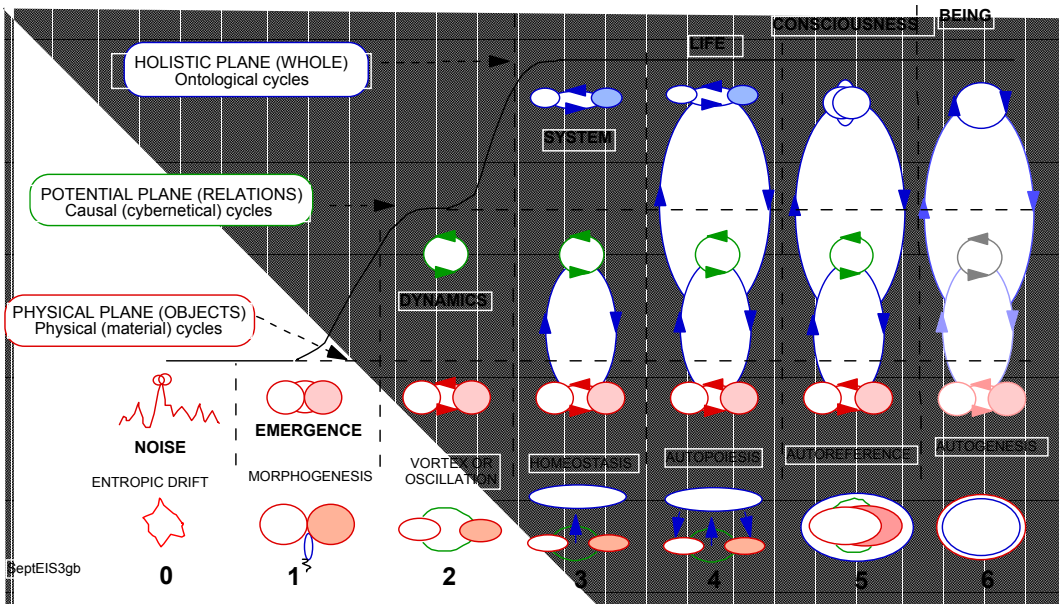

fig.1. The six steps of the emergence and unfolding of the prototypical viable system
The initial condition (0) corresponds to the entropic drift, the general thermodynamical trend toward the more probable. It is followed by the successive appearance of the six basic cycles inside and between the three ontological planes: physical, logical, and existential planes. After the emergence of structures (1), of exchanges (2),and of the system as a whole (3), significant steps are the apppearance of life (4), of consciousness (6) and finally of pure existence (6).

On fig.1 the sequence of steps in the build-up of the structure-organization of viable systems toward complexity and autonomy is symbolized by the successive switching on of the six logical loops. Steps 0 and 1 are purely physical, then circular relationships appear with vortices (2), at step 3 the system as a whole comes into existence. The last more abstract and holistic stages correspond to the successive emergence of the three qualitatively new holistic modes of existence known as life (4), andconsciousness (5); the last one (6) could be described as pure being.

When applied to a medium where the minimum physical conditions are satisfied (availability of energy, of components able to realize complex structures, and enough time), this model indicates that the evolution that took place on planet Earth in the last four billion years, from an initial energetic thermo-chemical environment, toward increasing complexity (morphogenesis, emergence of dissipative structures), through the emergence of life (autopoiesis) to consciousness (self-reference), is a very natural and coherent process. It is important to notice that such processes, whose broad evolutive tendencies display some regularities, as we have mentioned above, are in no way deterministic, which would imply a dualist behavior (concrete changes ruled by eternal pre-existing laws). In the case of partially autonomous systems – which means they can influence their own laws – and which, furthermore, are sensitive to noise, to random fluctuations, history never occurs twice.

3. Application of the Holistic Metamodel to the Evolution of Human Societies

In this paper we apply the metamodel to a more limited case, i.e. to interpret the emergence and evolution of what could be called the "Human System", which is the dyad constituted by the human individuals and the human society. We examine this history starting with the emergence of the species Homo as a bifurcation from the global parent "Living System", marked by the hypertrophy of the brain of Homo erectus, and try to interpret the significance of the appearance of each of the six above-mentioned cycles. In this approach we consider the "human phenomenon" (Teilhard de Chardin's "phénomène

humain") as a sort of coherent complex super-dissipative structure ruled by a self-produced logic, emerging in the general context of the evolving living medium on this planet.

We will show that, in the case of the human system, the general pattern proposed, gave rise to an evolution from a mainly biological organic and instinctive functioning to the appearance of language and of the associated social collective life. Later, the confrontation with intensification of non-human challenges (protection against dangers, tool manufacture, artefacts production, etc.) transformed gradually beliefs and myths, - conveyed by natural language, and used by shamans, priests, and later, politicians - into coherent (non-contradictive and verifiable) reasoning, fed by the reaction of nature to the human actions, and allowing to make predictions. We will next see that the metamodel also gives some hints about the possible further stages in the case of the human evolution.

After this broad time-scale panorama, we will focus on the present stage of reason (1500-2000), characterized by the extensive use of the binary logic built according to Aristotle's three principles. In the last part we will zoom even more on the last part of the rationalist paradigm (1800-2000) and on its concrete effects on society and economy and discuss the possible outcomes provided by the model.

3.1. Evolution of the "Human System" From the Emergence of Homo Sapiens to Modern Society

As can be seen on fig.2, the time span starting 2 to 3 million years ago with the emergence of species Homo has been divided into six periods corresponding to the appearance of each of the six cycles of the model. The dates given are only approximations. The curve raising from left to right symbolizes the emergence of new features in the human system under study; each step is continued to the right by a horizontal line which corresponds to a level of functioning in the modern human system, from organic survival, through cognitive faculties, to existential being; on each line some examples of specific activities are given. In each vertical column, the status of the basic triad representing the human system is pictured. Let us summarize the correspondence we suggest between each new cycle and its concrete manifestation in the history of mankind:

0) Entropic drift - "Soma" is the terrestrial evolving living medium out of which the human system has emerged.
1) Morphogenesis - "Percepts" corresponds to the hypertrophy of the brain, that is the emergence of a new structure (the brain) able to mirror the perceptive configurations of the whole organism.
2) Vortex - "Analogon" corresponds to the immaterial network built up within the brain and in the interactive processes between the brain and the body and materialized by the neuronal

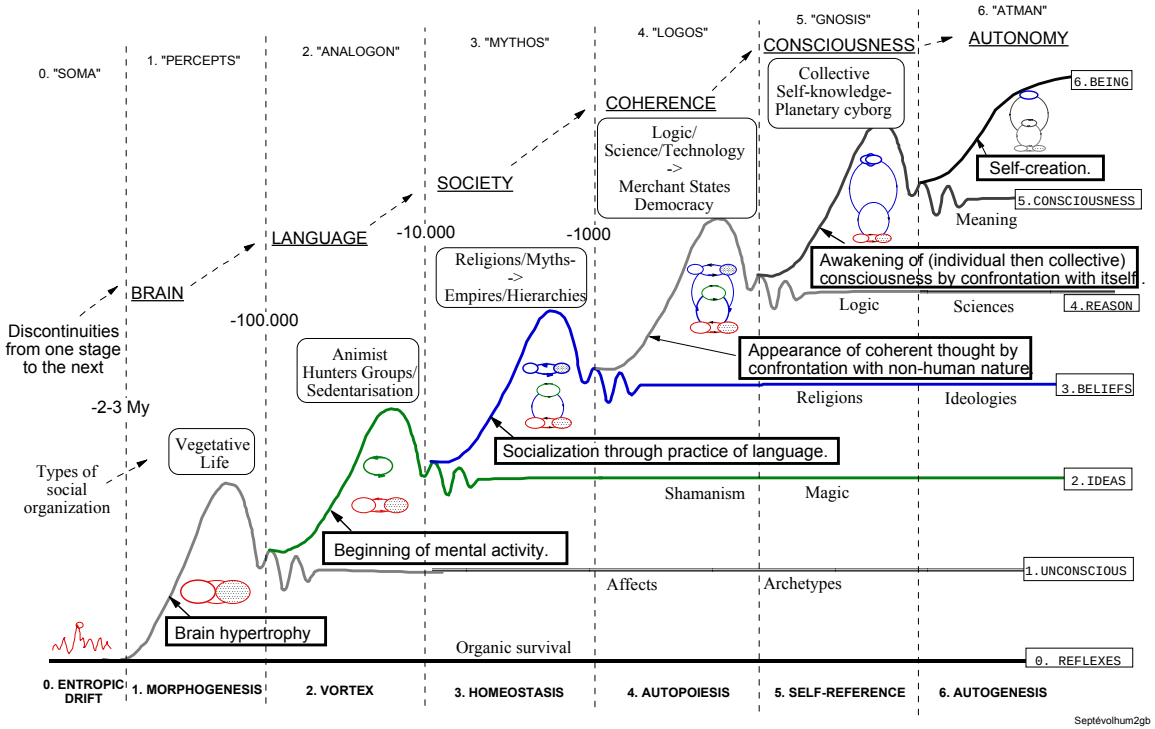

Fig.2. The seven stages and the seven layers of the "Human System", the collective entity produced by the transactions between the human individuals and the social medium.

organization. The development of this network made possible the mental activity, the production of more or less sharp images, then ideas and words. This step rendered language possible.
3) Homeostasis - "Mythos". The development of language created a link between the individuals, therefore the possibility to build a collective social system. The existence of a built social context is symbolized in the triad by the loop in the holistic plane. At this stage, language is more a tool to manipulate the other than to describe nature. Myths, religions, ideologies correspond to this level of social functioning.
4) Autopoïesis - "Logos". The closing of the autogenetic metaloop between the holistic plane (representing the produced social system and the natural environment) and the social production process, induces a pressure on the production of a new type of knowledge, which is not only a tool to take advantage of the other fellow humans but must be more compatible with the "laws of nature", i.e. the regularities in the natural phenomena. This stage marks the beginning of coherent thought. We think society has touched this level with the first developments of logic about three thousand years ago, and has fully exploited its potentialities only at the Renaissance with the scientific revolution.
5) Self-reference - "Gnosis". The increase of collective social self-reference (intersubjectivity) has produced some level of consciousness within individuals; according to our model it should go on by increasing the coherence of the global human system as a whole, which can be interpreted as a kind of collective consciousness. This stage has obviously not yet been reached. But it is interesting to note that our metamodel, whose roots are only topological (and not moral or ethical), shows that humanity's survival is related to its capacity to become more coherent (harmonious) and more holistic (integrated).
6) Autogenesis - "Atman". If it is ever reached, the ultimate step in the evolution of Gaia, the terrestrial living system of which the human system is a part, goes into the direction of increased autonomy, that is increased capacity to create its own laws, therefore to create itself. One feature of this existential state is a global meta-human consciousness.

This very crude summary can be completed by reading another paper on this subject [Schwarz, 2002a]. The six levels presented here have been successfully compared with a typology of systems of values proposed by the American psychologist C. W. Graves [Graves, (1974)].

3.2. Zoom on the Fourth Step: "Logos" or the Level of Reason (the Empirico-Rationalist Paradigm)

We continue our systemic study of the history of man and society, to better understand the important parameters that drive its functioning, interpret its present status, to eventually influence its dynamics in the direction of more coherence.

We now concentrate on the study of the present empirico-analytical paradigm that corresponds to the fourth of the six stages in the long run evolution of humanity according to our model (see fig.1.). As presented in the other paper in this proceedings [Schwarz, (2002b)] and reminded above, in the medium time scale, systems usually self-organize in four steps that can be represented on a spiral: initial tensions or crisis, morphogenesis (spontaneous build up of structure), stability and tropic drift or actualization of propensity, sooner or later followed by a new crisis. The spiral of the history of the rationalist scientific paradigm is shown in fig.3A between the years 1500 and 2000. Here the build up phase corresponds to the scientific discoveries made between 1500 and about 1800. The work of Kant has been chosen as the symbol of the apotheosis of reason. It also

corresponds to the take-off of technology and industrialization, interpreted in our model of systems dynamic as the actualization of the potentialities of mechanics and the other developing scientific theories. On fig. 3B the history of the main philosophical positions held by the scientists adepts of this paradigm, can be seen. On the left side, it is reminded that logic started already with the Pre-Socratic and Aristotle, among others. On the right side of the figure, the start of a possible next paradigm can be seen, with some non-reductionist non-objectivist sciences like the theory of relativity and quantum theory as well as the new non-materialist sciences of information and communication.

Fig.4. shows a deeper zoom into the empirico-analytical paradigm curve since only the second part (1800-2000) is considered. This part of the cycle corresponds to the tropic drift or actualization of the potentialities accumulated during the first part; this actualization is manifested

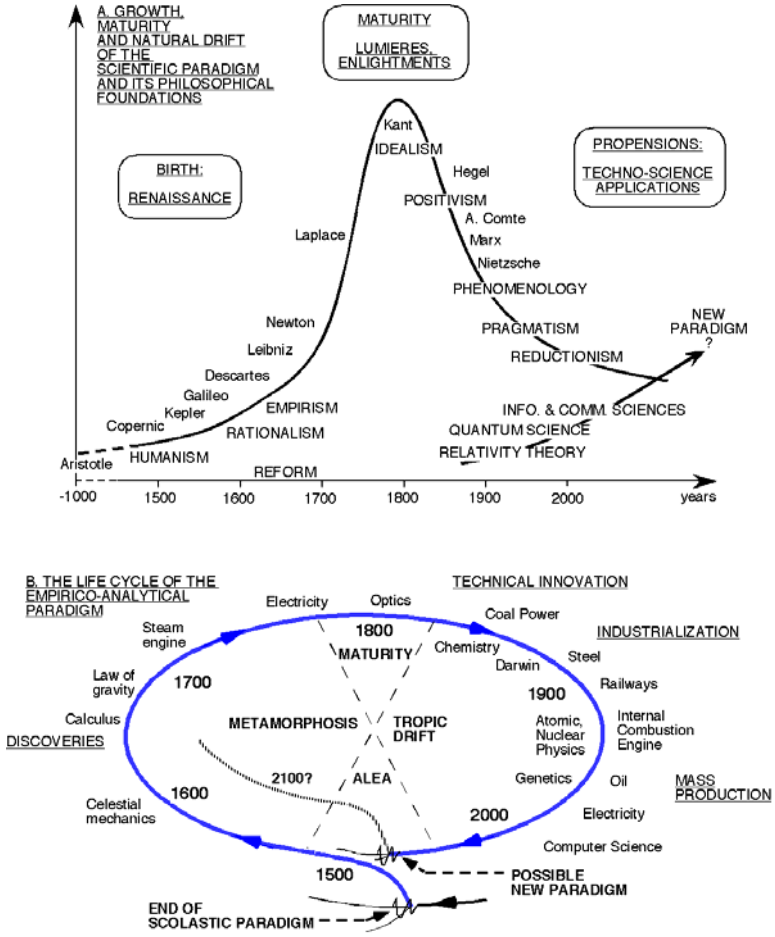

Fig. 3. A. Curve of the development, maturity and drift toward its propensions of the empirico-analytical paradigm and its philosophical presuppositions, from its birth at the Renaissance to its exhaustion and eventual replacement by another paradigm.
B. Spiral representation of the four stages of the rationalist (empirico-analytical) paradigm life cycle: morphogenesis (construction of its conceptual framework), maturity (symbolized by Kant's philosophical edifice), and entropic drift (actualization of its virtual potentialities) through the invention and prodution of technical devices.

by the developments of technology and industry, as a sort of materialization of the available scientific knowledge. Since the beginning of the 19th century, society has been dominated by the emergence of technology, industry and commerce. A Russian marginal economist, N. D. Kondratief (1892-1938), (who died under the reign of Stalin) proposed that the socio-economical system's metabolism does not grow at a regular monotonous pace but shows dynamical oscillations of about 50 years. These are triggered by

technological innovations, followed by an intense economical growth, saturation and recession until the next cycle; they can be decomposed by shorter cycles. The experts recognize four Kondratief cycles since the beginning of industrialization [de Greene, 1993]. In fig.4 the first four cycles have been superimposed to the second half of the empirico-analytical curve, with indication of the technological innovations that triggered each of them. It can be seen on the picture that, according to this analysis, the years around 2000 are characterized by the end of two families of cycles, the paradigmatic multisecular human evolution cycles (here the empirico-analytical paradigm) and the socio-economical K-cycles (here the fourth Kondratief cycle that started after the second world war). This sort of situation causes deep changes in the systems of belief (the "truth") and requires other kinds of measures than those usually proposed by contemporary politicians and other decision makers.

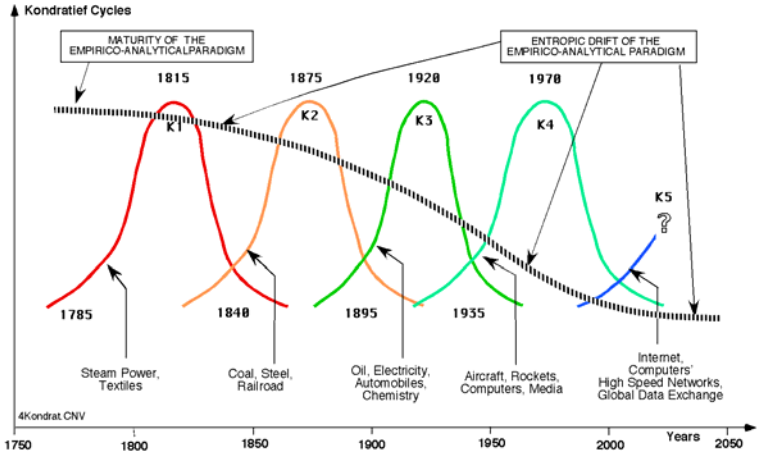

Fig.4. Detail of the second part of the evolution of the empirico-analytical paradigm, (tropic drift) from its conceptual maturity at the beginning of the 19th century to the present time. This period corresponds to the actualization of its potential capacities in the form of the technological developements and the subsequent industrialization and capitalization of Western society. To this wide curve, the four economical oscillations known under the name of Kondratief cycles have been superimposed.The technological innovations at the root of each cycle arealso indicated. The question about the emergence of a fifth cycle or of a radically new society (new paradigm) is still open.

4. Summary and Conclusions

The interpretation of human history proposed here with the help of a systemic metamodel should be seen more as an opportunity for a critical discussion on the state of our society and its possible and desirable futures, rather than a definitive model of "reality".

One should not forget the extreme simplification due to the fact that we have studied only the "human system" and not the other dynamical systems active on this planet. Because noise and fluctuations play an important role, our metamodel does not allow one to make predictions but only to point out to some trends and regularities. By singling out one system, society – the so called mesoscale -, we have not taken into account the fractal character of the natural systems and therefore neglected the dynamics of the micro- and macroscopic scales.

As we have seen, in its first stages, the human system manifested itself mainly inside the individual agents (brain growth and development of the mind), but after the emergence of language and the possibility to communicate, the subsequent evolution happened mainly on the social collective level, the individuals' behavior being more and more conditioned by "the system" (despite the well publicized individualism). Given enough time and the availability of material means to build complex structures, the spontaneous evolution of

systems scans a vast range of dimensions, from the most physical, like morphogenesis, through the densification of the cybernetical networks of interdependences – of which living organisms are typical examples - to the emergence of global holistic entities, like human consciousness. In our model, the consciousness of individuals is not the final word; of course individuals can further deepen their level of self-reference, but we interpret the indications of the model mainly in the sense of an increase of the collective coherence, which may later generate a kind of collective consciousness.

Improving our knowledge of the processes at work around us, means to increase our self-reference since our image of the world corresponds better to the way the world functions. In other words, the human beings may improve their own autonomy (= self-reference) within the autonomization of the global human system and in the wider Umwelt (the ecosphere and of the whole universe). Indeed, autonomy is not the ability to do anything, but to do things compatible with the rest of the world.

According to us (and other authors), humanity is now experiencing a historical transition, a mutation from the empirico-analytical paradigm based on binary (Aristotelian) reason and fragmented (scientific) knowledge, to a level of dialectical (or ternary) reason and of collective consciousness. The empirico-analytical paradigm of the last three centuries marks the apotheosis of reason; it also shows the limitations of a too narrow rationalism. On the concrete physical plane, the explosion of the new technologies of information and communication (NTIC) corresponds to the morphogenesis of a new stage in the evolution of planet Earth; it mirrors the brain hypertrophy of our primate ancestors that initiated the history of the "human system" more than 2 millions years ago. The emergence of this post-human phase does not mean that man has to disappear, but he has to adjust to this new context, in particular by adopting a more cooperative behavior and by improving his image of the world. According to our model (see fig.2), the next step in the evolution of the "human system", if it happens (which is not guaranteed by the model!), i.e. the step of self-reference, is interpreted as an increase of individual and collective consciousness. Self-reference means a better agreement between the physical processes and the network of relations that rule them, or in other words, a better agreement between reality and the image of reality.

As we have mentioned, the numerous unexpected and undesired events in the last decades, seem to indicate that our knowledge, our image of the world and our Weltanschauung do not fit with the way things work. We are convinced that systems science, the science of complex systems and critical reflections on our epistemological and ontological beliefs can help improve our integration in the world.

4. References

- Graves, C. W., 1974. Human Nature Prepares for a Momentum Leap. *The Futurist.* Journal of the World Future Society, Bethesda, April 1974.
- de Greene, K. B. 1993. Will there be a Fifth Kondratief Cycle/Structure ? *Systems Research* Vol. 10, No 4, 1993
- Schwarz, E., 2002a. Anticipating Systems. An Application to the Possible Futures of Contemporary Society. Invited Paper, 5th International Conference on Computing Anticipatory Systems, Liège, August 2001. Proceedings to be published.
- Schwarz, E., 2002b, Can Real Life Complex Systems Be Interpreted with the Usual Dualist Physicalist Epistemology – Or is a Holistic Approach Necessary *?* Paper in the present proceedings.