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Systemic Epistemology: A synthetic view for the systems Sciences Foundations

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ABSTRACT

This paper discusses a vision of the research that stems from the philosophical and empiric field. The concrete objective is to elaborate a strong systemic epistemology due to the conviction that in the field of cognition it might necessarily be evolutive. That is, change when the research demands it and the discipline formalization reaches maturity.

The great search is directed towards the study of foundations on Transdisciplinar Systemics. There is still an open debate on the characteristics and significant notes of Systemics as a theoretical-practical activity, domain and fields of conceptual support, methodologies and technologies as such in use. Enlightening comes to those who devote themselves to action research, to systemics instruction (especially at university) and to its diffusion. Systemics aspects as a discipline, interdiscipline are distinguished from those as a transdiscipline. The efforts made to widespread and increase Systemics have been culminated by an event, an International seminar on Transdisciplinar Systemics that will be held in the North of Argentina. It will be an opportunity for debate and exchange experience from Spanish-speaking systemicists.

This communication contains an initial layout regarding the research's focus of interest. The search in the methodological order, the epistemologies chosen as support, as well as the authors for conceptual references that lead to the assumption of a framework perspective. The final thesis includes conclusive comments that summarise the findings carried out. The proposal of this paper in this symposium hopes to receive comments or contributions which will be considered feedback to the research.

Keyboards: systemic epistemology, transdiciplinar systemic, systems research, systemic instruction, Praxiology

1. THE QUESTION

1.1. Difficulties in learning/research the "complexity"

It has become very important to revise the knowledge attained in the past and ennact it to facilitate learning because of the growing interest in system thinking that there has been in recent years. Imprecise definitions and unusual conceptual language have led to conceptual chaos among multi-inter disciplinary groups, causing long debates and misunderstandings.

This situation becomes serious when it refers to learning and research. Contributions regarding this were made in the 49th annual Conference of the International Society for Systems Sciences through the presentation of a project. The aim is to construct an interactive model of Information system to organize systemic concepts that facilitates dynamic thinking and knowledge through the processing of related terms. It serves as a bridge between practice and theory during the acquisition of systemic concepts by students and professionals [1].

It is important to highlight that learning/research for competence in the systemic performance demands a change in the thinking process. We are brought up under the paradigm of simplification which makes a global comprehension impossible and prevents the change of paradigm and innovative capacity. As Morin [2] claims in his work, our learning must consist of a necessary thought reform which allows us to understand the complexity of reality. We need to think under a new complexity paradigm, for which systemic thought is necessary. This reform is directly connected with the reform in university education, as an articulator of thought and education for the universe of science. One of the greatest obstacles is that universities are slow in their change, with a tendency toward ultra-speciality which pre-conditions the subject, limiting them and even blocking their perception. In general, in the initial levels few students get into contact with the ideas of the systems sciences. Given its philosophical and integrative nature, it is necessary to design programmes of systemic education, so that they facilitate richer and deeper information to

instruct students as conductors destined to guide the future, assuming the role of producers of ideas and not of passive consumers [3].

For the management of systemics concepts, there must be pedagogic resources and effective didactic means to create independent and further reaching curricula for the adequate use of systemics' own objects.

When the psychological conditions of the progress of science are studied, the conviction is reached that the problem of scientific knowledge must be laid out in terms of obstacles, taking into account the notion of epistemological obstacle as established by Bachelard [4]. It is necessary that the explicit can be openly debated to act synergistically together. This should be the acceptable minimum in a community of research and development.

1.2. Discussions About The "Disciplinarity Of Systemic"

There are diverse ideas about the meaning of the word "discipline" that calls for dialog. The epistemic attempts by authors like J. Piaget, M. Maruyama, M. Bunge, T. Khun make distinctions on this concept-word [5] from the most comprehensive (in its sense of norm of regulated and systematic behaviour) to the most controversial and polemic. During these last three years ours inquiries, studies and publications were intensified and dedicated to circumscribe these phenomena to make an inventory of the problematic.

The main question refers to the extent of systemics' domain and its composition. Through studies and research we maintain the thesis that systemics is essentially transdisciplinary. It can operationalize objects, rules and situations of another specificity as it claims the letter of transdisciplinarity[6] and the current studies, and that besides being a discipline it is also a supra-discipline. This concept includes the interdisciplinary, the transdisciplinary and maybe the meta-disciplinary (generalization of transdisciplinar approach, universal vision), still a systemic characteristic to be studied [7] [8] [9]. The transdisciplinary characteristics that systemic has through its methods, theory and philosophy constitute the field of interest of the head Institution of this project and the evaluative communications will be open for discussion at the event that will be held in the North of Argentina on August 2006.

Another old dispute refers to the methods and applications. There are numerous approaches to viewing systems essentially, they can be classified as "hard" systems approaches, "soft" systems approaches and "critical" systems approaches. It is about achieving improvement in situations of complexity, uncertainty, and conflict. We can better understand and increase the problem-solving capabilities with different "hard," "soft," and "critical" systems methodologies, as well as other problem-structuring methods looking at them in terms of the design of whole systems [10].

As Systemics is considered a scientific discipline, another problem appears: the one referring to the problematic between the scientific method and the ingenious solution. An approach to these discussions took place in the proposal on the philosophical foundation of Information Systems Engineering. The utility of models to philosophically sustain the procedures of engineering was manifested [11]. In that way it is possible to observe and debate over the epistemic width of systemics.

We know that the scientific method is not a group of rules learnt from some methodology to solve a problem, but that the selection of the technique depends on the problem, the conceptual and empiric means and the researcher's talent. The talented person creates new methods. As Bunge expresses: "there is no method for creativity" [12]. Quoting the same author: "The method is dominated while the original research is carried out" [13]. Consequently, nothing can be ultra-regulated, it grows and gets perfected through continuous practice and learning. The only recommendations are the ones that refer to original creativity, personal or group inventive abilities and finally the ingenuity and talents manifested [14].

Therefore, in the relationship learning/research in systemics, there usually is a two-way road, from theory to the active practice of research and back. But the problem of balance between theory and practice, between science and technique has lead to long discussions, sometimes in circles. For Mario Bunge [15] when the research is in the social sciences, ... "the problems, either conceptual or practical, cannot be isolated, but they appear in packages as have to be tackled as such in one intends to solve them..." In this way, by chaine the scientific method with methods in general and techniques in particular, it helps to improve the practice of the post-modern science.

1.3. Epistemological Research Of Systemic

We can still not be confident and secure of the concrete and effective "scientific practice" in research since the doxa and the praxis are evolving, if we consider the criteria of validity of Marion Bunge, or if we follow the

paradigmology of T. Khun. [16]. From a different perspective, Morin [17] directs us from both needs of validation, theoretical and practical. The question we are interested in is the systematic comprehension of the domain (in Bunge's terms) with which comes the necessity of counting with tools (technology) and instruments (methodology) to proceed towards learning, action and validation of the proceedings in terms of science and technology.

Systemics offers us a varied group of means, from the most theoretical to the ones that allow and facilitate the performance so as to ensure the validity given by consensus in gathering the references universally accepted, and allows room for creativity. Systemics has its disciplinary field in the group of objects, phenomena and problems of great complexity, its singular method is analogy and they are usable by model abstraction. Epistemic attributes that in a formal way can make it transdisciplinary – according to the thesis sustained – to almost every scientific discipline respecting the criteria of validity. The need to assume an epistemological position evidently appears. The ones that exist in the literature do not satisfy the criteria to include the field of objects, methods and other contexts. A way out consists of rehearsing the construction of a new epistemology, perhaps "singular" that permits to cover the complexity. It doesn't escape this double demand to approach systemics using at the same time epistemic systemic criteria. Perhaps it happens like in mathematics.

1.4.Systemic Social Organization Demand

The group of researchers and apprentices in this field of knowledge and action constitute a community. So it is proven by the international organizations and there is a "social" dimension. We find ourselves in a dimension of "organized complexity", with history, dynamics and on-going changes. The demand formulated by T. Khun [18] arises immediately, that this community or sub-group of it acting in institutions worldwide sustain certain forms of laying out and solving problems. The idea of "Kuhnian paradigm" imposes itself. Rosnay himself [19] expreses it when he claims that he systemic revolution is deriving in a new scientific paradigm which he calls "symbionomic". It is the human being in relation with machines, the bio-system with the techno-system, which will become part of a superior macro-organism, the cibionte. This change of paradigms is becoming more noticeable with the rapid incorporation of new technologies with which new mental capacities that evolve at the rhythm of the complexity, more dynamic and broad regarding their relations are being discovered. Therefore, systemics as systems science, as philosophy, doctrine, theory, epistemology, methodology and technology, requires innovative attitudes and aptitudes, attentive to the change of change and to evolutional features. It constitutes an epistemologically recognized and autonomous corpus.

2. OUR SEARCH

Every research starts with the identification of a group of questions. Methodologically, this basis is called "problematic" or group of problems which present questions to the researcher. Although some empiric contexts coincide, undoubtedly in our approach they refer to issues that range from philosophical questions (abstract and reflexive) to the verifications of the most concrete reality. The philosophical and methodological approach adopted is the one in favour of an objective search, relevant to facts, a rigorous theorization and empiric proof that support "Kuhnian" cases (examplaries) as comprehension tools in the learning/research process.

Systemics appears due to the dynamics of comprehension and the process of knowing an "object of study" in the classic denomination of the hypothetical-deductive methods. Such object-entity requires a frame and a description that responds to the canons adopted: the referential background.

We chose an hypothetical-deductive process to see the contexts both of discoveries and justification and application. We follow Bunge who claims that in order to explore the world we must observe facts and invent hypothesis to explain them or predict them. To construct this systems of hypothesis, that is, theories, imagining conceptual models of things. To verify the data and the conjectures to find out if the hypothesis are approximately true and invent techniques to collect or process data and argument about projects and discoveries. One of the characteristics of this new methodology is the construction of model objects and theoretical models [20] [21].

The problematic, the objectification of the entity to submit to study-research leads us to the necessity to delimit a "domain" that must be enunciated and at the same time be the foundation of the field. The rich and abundant literature [5] and the continuous contributions in the meetings of specialists in the world, generated related terms that were gradually constituted sematically organized concepts into theories. A good starting point indicates the necessity to establish some form ontological approach which conforms more systematic relations of search. This requires epistemic "forms" of organizing the logic of

academic discourse for the researcher and the apprentice.

3. REQUIREMENTS OF EPISTEMOLOGICAL SUPPORTS

To accomplish what was formulated the option was to focus on different available epistemologies to attempt a characterization of the knowledge field of what we here "named" straight-forwardly Systemic. And conjecturally delimited their different contexts of development, justification and application. We hold the opinion, that it is possible to argue from the disposal hypothesis about the evolutive systemic epistemology. This evolution is not only interesting to teach argumentably but also to keep ready for its diffusion, teaching and research. By means of the utilization of J. Piaget [22] [23], M. Maruyama [24], M. Bunge [25] [13], E. Morin [17] and T. Kuhn [18] epistemologies and the comment review of classical and modern authors like Bertalanffy, Banathy, Miller, Rosnay, Checkland, Jackson, François, Van Gich, Ackoff and others that still are in vogue [5].

3.1. Necessary epistemologies

Owing to the wide spectrum of epistemological concepts, a good first step would be to know first, what is knowledge? We are particularly interested in the view of *J. Piaget* for whom knowledge is not a state but a process. He supported the idea of understanding how we really know, approaching the relationships implicated in the process of cognitive development, that is to say, a theory that allows to know it. *Genetic epistemology* is opposed to considering the subject or object autonomous or isolated and emphasises that they can only be considered within the growing process of knowledge [22].

However, *Magorouh Mauyama* [24] questions the homogeneity in knowledge and reasoning from the works on *Communicational Epistemology*. Dedicated to the problem of communication, he claims that we cannot talk about communication without referring to the relationships between different reasoning structures and different types of logic. As the scientific theories can evolve in different levels named meta-types of causality to which an epistemological type corresponds, he proposes the term "mental landscapes". Each person, profession, discipline has a mental landscape. They are ways for each individual of generation of order of the information he receives. The mental landscapes are located in the communicative process that takes place between people.

In the characterization of epistemology that we propose, Mario Bunge's epistemology [13] [26] [27] serves as a strong foundation. He defines epistemology as one of the branches of philosophy that studies scientific research and its product, scientific knowledge. The problem he lays out is that in the fields of scientific research the treatment of problems should be adjusted to the criteria of utility. That is to say, the ways of laying out and solving the problems must be new. Therefore, an epistemological revolution is produced when its necessity is noticed and it is understood that there must be, and could be a useful epistemology. He proposes a *systematic* and, to some extent, *exact* and *scientific* epistemology. That is, formulated in certain exact (mathematical) languages and hoped to be consistent whit contemporary science. The author`s opinion is that the ultimate goal of theoretical research, be it in philosophy, science, or mathematics, is the construction of systems, i.e, theories. Moreover these theories should be articulated into systems rather than being disjoint. The variety of componentes of such system, the complexity violates the traditional borders among disciplines and call for a cross-disciplinary aprproach. The systemic world view (weltanschauung) [5] is a continuation of certain philosophical traditions and is in tune with contemporary science.

For Bunge, our future depends on our theories and the ways they are applied. We understand that research is not the accumulation of fact but its understanding, and that this is only obtained risking and developing precise hypothesis. The adoption of the scientific method is the experience illuminated by theories [20].

We must not confuse methodologies with methodolatries. Because of that *Edgar Morin* [2], doesnt't look for a unitary principle for all knowledge, nor a recipe. He defines that a method is a viaticum to think, to run the inevitable risks of all thought. From the epistemology of Edgar Morin we are particularly interested in the paradigm of complexity where the necessity arises of including the observer in the observation. From there emerge consequences that lead to make our own form of perception and understanding of the phenomenic world complex. That is why the necessity of an epistemological and paradigmatic reform is manifested, greater than the one existing today, that demands a reorganization of knowledge through another reflective degree: a knowledge of knowledge.

The idea of a systemic paradigm, which should be present in all theories, whatever their field of application on the phenomena, deepens the current

discussion of considering systemics as an independent scientific discipline or if it is only a methodology to approach complex situations. That is why it is necessary to enrich the foundations that consider systemics a scientific discipline composed of a group of universally valid knowledge, theories and models.

This direction is taken by the epistemology of Thomas Kuhn [16] who maintains that after a normal period in certain scientific discipline and faced with problems that cannot be treated by theories of the current paradigm, there is a crisis that leads to scientific revolutions. These give way to the change of paradigm (way of observing scientific reality) and once again to a normal period of scientific development composed of those new theories. From Kuhn´s epistemology, we argument that systemic has been considered a scientific discipline which has its own symbolic generalizations, models and examplaries. Considered the examplaries successful applications of the theories and methods of a discipline to one of its problems. We maintain a disciplinary approximation to Systemics could be made using as an epistemological tool Kuhn´s disciplinary matrix, which allows the characterization of Systemic´s nature [28]. Through this approximation are approached the disciplinary elements that allow the characterization of the nature of a discipline and distinguish it from others. For that, it is necessary to have examples in which the general models suggest new important hypothesis for the disciplines. With each change of paradigm, the structure of the disciplinary matrix is kept (symbolic generalizations, models and exemplaries) but its essential components for the cognitive and communicational functioning of the group that practices the discipline are renewed.

3.2. Thinkers Elected

As a complement to the epistemologies that we use as support, many modern thinkers were taken into account, whose choice responds to already published criteria [5]. In no way is this about presenting an exhaustive systematic of the discipline. Rather, it is oriented to set the firmer bases, perhaps not thoroughly discussed, that were the options of the extent of the work.

Having consulted the International Encyclopaedia of Systemics and Cybernetics and considering the position of the editor Charles Francois of categorizing the concepts, determining the frequency with which each of the mentioned authors are quoted in the different categories with their own concepts, it is observed in the category referring to Epistemology, Ontology and Semantics, that the authors more referenced are J. Van Gigch and R. Ackoff. The thinkers Miller, Troncale, Banathy, Checkland, Rosnay, Jackson, François and Bertalanffy are notably included in the other categories referring to General Information, Methodology or Model, Human Science and Discipline Oriented.

The hierarchization realized by Charles François directs from the beginning to attempt an informatic instrument of learning assisted by systemics. This project is currently being carried out [1].

The epistemological options encourage us to reflection, debate, to keep our critical faculties open, to the questioning of the paradigms that guide our daily duty and our professions. Although there are a priori limitations in communication and interpretation, it is necessary to be willing to do a paradigmatic cross-communication (Inter-trans). As Bachelard states [4] the epsitemological obstacles must be overcome with scientific spirit, attitude towards dialogue and permanent learning.

4. NECESARY “WELTANSCHAUUNG”

However, this collection of conceptual and theoretical material requires of a more unified perspective to answer the most essential questions of practice of practice. This leads us to “locate” a socio-dimensional context: a space and a time. The option is Latin-American reality, which is why the group devoted itself to revise their studies adopting a cosmogony that supposes a practical philosophy. The choice was the Jose Antonio Marina [29] philosophical thinking (a Spanish philosopher) for their ultra modern involvement. All his written work, 17 texts, have helped to focus globally the most dissimilar problems. Notwithstanding this philosopher not being systemic is useful as a reference in topics such as shared intelligence, ethic happiness, dignity search. The practical philosophy he proposes served for the necessary meditation between philosophy and praxiology starting from existential questions of current concern for young university students. To motivate and commit seems to be the necessity for young apprentices and researchers in this discipline and others.

The field of interest is oriented towards superior studies, university degrees and post-degrees. It is perhaps the field of greatest necessity to contribute to the problematic of their societies. The most notable cases of demand of tools and instruments in phenomenic like ecologies, anthropologies, communicational, etc, direct the attention towards

mono-disciplinary professionals in their crisis of understanding, their epistemological uncertainty and their cognitive limitations. A good post-degree formation seems to be the essential answer to this demand. But not from the theoretical debates but from the commitment of the executor who attends to processes which demand not only efficiency of knowledge but also the efficacy of reaching practical and tangible solutions successfully.

One of the contributions discussed at an international level [11] is having its internal feedback in the group of researchers. At the same time in this Congress of International Federation for Systems Research we communicate how systemic Modelization allows us to found the applications in the direct practice in the organizations concerning to information systems engineering. It is a contribution to the systemic praxiology of the plans nature/symbionomics/culture. It is a way of walking in an epistemic manner, this epistemic bridge between organizations of social/optimum management of the information/joint in worldwide net of aspects that contribute to the culture of each and every being. For Rosnay it is the "cibionte", which already has concrete existence [19].

5. REFLECTION AND SYNTHESIS

The basic idea consists of managing to avoid epistemologic obstacles that allow scientific advance intensifying Inter-disciplinary, multi-disciplinary dialogue adjusted to the criteria of utility. This must consequently motivate the interest and compromise of new young systemicists towards a cognitive transformation to achieve preparation for the production of ideas as conductors of the future. If the social problems of our time are to be efficiently approached, it must be done from the orientation of practice of practice. The communitarian extent of a social research should be accompanied by moral principles which combine personal interests with the common good. In the words of Mario Bunge, "Being a praxiologist, rationalist, realist and systemicist" [21].

To debate on the construction of a *strong systemic epistemology* is what the authors take to be the nucleus of this communication. The decision to cover this ground was to encompass to a major comprehension and hope it may help understand systemic. It is therefore necessary a conceptualisation regarding the expression that represents and synthesizes the thesis on the characteristics and "properties" of the epistemology we propose. We define and understand epistemology following the notions of Francois`Encyclopedia [5] "The set of viewpoints and instruments used by..researchers..to discover and organize coherence, derive consequences and connect ideas in order to construct their inner mappings and to orient themselves" (art 1136 pag, 204-205).

As we refer to Systemic epistemology, then in the Encyclopedia [5] it is defined related to the activity of observers, and observed observers, comparing their views. As it is based on multiple reciprocal relationships, it should also be evolutional (art 1136 pag, 204-205). This concepts help the group of researchers use their ideas in order to construct a systemic map taking into account their reflections and viewpoints. The reflection requests to organize coherence in this three different properties and characteristics that could define the proposed epistemology : *knowing, sense and significance*. Properties that should be submitted to constant validation through process.

This investigation is an attempt to bridge the gap between systems philosophy and systems praxiology. Of course this encompasses all intermediate terms in order of being, knowledge, ability and doing. Thus it is important a good definition of each term of the above synthetic expressions so we can share the same concepts to understand the thesis we support.

To make an effort to grasp the scientific concepts in effective psychological progressive synthesis, establishing to each notion a scale of concepts, showing how a concept produces another, how it is connected to another. And immediately the thought will present itself as an overcome difficulty, an overcome obstacle.

We refer to a strong epistemology that has these properties. When we talk about the first characteristic, we refer to *knowing*, in the following manner:

-The term *knowing* in Longman`s dictionary[30] as an adjetive means "showing that you know all about something, even if it has not been discussed directly" (pag 895).

If epistemology is the the field of research concerned with human knowledge in general and also interested in the application of knowledge, we realize that if we value knowledge we should continue to inquire because we shall never know enough. We are engaged in generating new knowledge, using it and diffusing it.

When one investigates an object , one engages in a cognitive process, and with some ability one will learn something about the object of inquiry. Wathever one has learned in this process, added to what one may have known , it`s one`s knowledge of the object. In that cognitive act or process, in which we transform or generate "bits of knowledge", is what we here name "*knowing*". Understanding that cognitive process has a "content" that can be communicated to other or externalized. This distinction is useful for the epistemoly characteristic, to undestand that aquiring knowledge is learning something. But there are different disputable views to define knowledge, which seems to confuse knowledge with information. And this happens not only betwen them but also in a symbolic scale of "entities" from a single "mark" to ultracomplex "memes".

We refer to *knowing*, because with that process then we can understand and obtain *"sense"* of reality.

-The term *sense*, in Longman's definition "as a good and practical understanding and judgment about the stated thing" [30].

This expression means to arrange the experiences according to an order that restitutes logic and allows to thinks both of its causality as the possibility of sustaining it or changing it. It is a complex intellectual practice, because connections are made that need of the thought to find the key of events whose meaning is not evident. This demands formulating adequate questions, well constructed to be able to find the answers.

With both concepts we can interpret the particular complex phenomena *significance*.

- The term *Significance* "as the quality of being significant, meaning" [30]. There are different entities with different degrees of significance, that is to say growing from a lower significance to a greater one.

As an original development we have constructed, and it is available, a graphic modelization of different "degrees" of significance. The scale goes form the simplest (mark) to the most complex known (memes). Each one of those range (11) are built upon the preceding grade plus a new or greater significance added. The resulting scale is a representation of the most simple thing to the most complex one.

The epistemology that is drafted will have to contain three essential features:
- Synthetic mode of knowing totalities (*knowing)*
- Synthetic mode of finding sense (*sense).*
- Synthetic mode of grasping degree of significance (*significance).*

The three modes are added and form and are composed in a synergetic way so that they constitute a complex (as a fishing net Popperiana) [31] that is thrown to catch (seize/ search) objects-fish from the biggest to the smallest ones according to its weaving. An epistemic system that is useful, efficient and motivating for its significance, its sense, its knowing of totality.

In a few words, it is about an epistemic vision of reality. From the most abstract to the most concrete it is a theoretical way of systemic observation of the reality, from philosphy to praxiology. In other words, is a constribution to the construction of an evolutional systemic epistemology that can be applied to the systemic domain, perhaps a systemic way of viewing systemics.

To have conceptual instruments available, capable of approaching a systematic comprehension could contribute with elements of judgement as criteria, so that they attend to the issues of learning (systematic or school or research), to clarify the domain as a scientific discipline (and so of its properties), to guide scientific research (hierarchising knowledge, actions) and to allow the academic community to generate diffusion and teaching.

The maturity of the systems of knowledge demand the assumption of meta-comprehensive positions and to have tools and instruments that allow their practitioners and faculty to reflect and have an ample, comprehensive and synthetic view.

6. CONCLUSION

We intended to establish a synthetic vision of the foundations of the system sciences. The thesis maintains the necessity of the formulation of a new systemic epistemology and the search consisted of accomplishing the systematisation of approximations that found the transdisciplinary features of systemics. The characteristics of this "strong" systemic epistemology were chained so that it is capable of knowing, possesses sense and contributes the significance of organized concepts as a scientific discipline. The approaches, discussions and elaboration allow us to conclude that :
a) The search, the findings and the contributions corroborate that the questions treated are crucial aspects for systemics nowadays. When revising

epistemic material, one verifies that it is necessary to propose a new way of studying systemics in a meta-comprehensive fashion. Especially due to its transdisciplinary characteristic for the benefit of meta-disciplinary relationships. b) Systemic Epistemology, elaborated with its especial characteristics that respond to enunciated capacities, permit the expansion and synthesis of the genetic-constructivist vision (Piaget), communicational (Maruyama), paradigmological (Kuhn), formal theoretical (Bunge) and methodological (Morin). c) The perception of objects in the field, the selection of methods, the hierarchization of contexts (discovery/justification/application), to have evaluative criteria to research, the availability of semantic nets regarding theoretical concepts and the orientation communicational/pedagogic/didactic set formulated horizons for new researches that systematize and facilitate the diffusion of systemics. d)There still is not enough argumentative evidence to maintain emphatically the statement that Systemics is essentially transdisciplinar. It is estimated, however, to have all the material for the next contact, always dependent on the results of interesting academic debates.

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