THE COGNITIVE AND ACTIVE STATUS OF PRINCIPLE IN SCIENCE AND PHILOSOPHY

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Abstract. A conceptual, both genetic and systemic study, of the principle as well as an analytical and integrative approach of its theoretical and metatheoretical status will be approached in the first part of our paper. A typology of principles is also proposed later and various fundamental, particular and specific principles are discussed. The system of principles that integrates knowledge in a theory is presented and the internal structure of the system of principles is analysed. A main purpose of the whole study is to explain and to illustrate the complex status – ontological, gnoseological, methodological, axiological and praxiological, as well as prospective of the principle.The final part of paper refers to the evolutive character of the principle as of the systems of principles and discusses the principle of evolution as well as certain specific expressions of this principle, used as a methodological instrument in the history and philosophy of information and information technology.

1. THE STATUS OF PRINCIPLES IN THE STRUCTURE OF A THEORY, IN A CONCEPTUAL SYSTEM AND IN A RESEARCH MODEL

The theoretical and metatheoretical status of principle is a complex one in the field of philosophy, where it has a double – ontic and ontologic –- position in the general theory of existence and an even more complicated (maybe a quadruple or even quintuple) position and role in the general theory of cognition, where it functions as explanation, systematization, evaluation and interpretation and, finally, as foundation of the whole construction of science and philosophy.

In his work on the explanation of prime principles, Aristotle identifies six main significations of the term "principle"[1], and discusses perhaps the greatest number of meanings that describe the intension of this notion, both in mainly historical and mainly conceptual parts of his main work.

The concept of principle is used with a lot of senses in sciences, in mathematics and physics, for instance, as well as in the philosophy of science. In his own book, *The Principles of Mathematics*, as in the book written together with A. N. Whitehead, *Principia Mathematica,* B. Russell uses as equivalents for the notion of principle terms like premise, axiom or simple idea, and in another intellectual space, the term of initial supposition (B. Russell, *Denomination)*.

However, seen from their content or formal side, as well as when analyzed from both these points of view, principles may be considered as neither elementary knowledge or truth, nor suppositions or postulates.

[1] Aristotle, *Metaphysics,* Romanian Academy Publishing House, "Greek and Latin writers" Series, VII, Translation by St. Bezdechi, Introductory study and notes by Dan Bădărău, Bucharest, 1965, p. 160–161.

From a content-related perspective, we can admit that a principle is not plain truth or elementary knowledge if we place it at the level of meta-cognition or even that of meta-meta cognition. We propose four further possible acceptations of this specification, involving aspects related to the historical approach, to the theoretical or meta-theoretical analysis, and to the systemic approach of the principle.

Firstly, principles are formulated at an already constituted level of knowledge in a field, in an epoch and within a model of knowledge, and express, in an implicit or explicit, but concise manner, these pre-conditions of their formulation.

Secondly, principles are not themselves descriptions of some fields of existence, not even explanations of existing knowledge about these fields of existence. It is theory that performs these functions, selects and evaluates knowledge and then idealizes and generalizes it, in order to free it from the concrete and fortuitous aspects and, finally, systematizes it in order to confer it a strong and unitary relevance and to propose a plausible explanation of the totality of available knowledge on a reality field.

Thirdly, we can notice that each principle is valid:

a) in its co-existence with other principes or even

b) within a hierarchy of knowledge

– constituted, in its turn, from data with different degrees of generality and validity and

– built from principles related according with a lot of crieteria.

We will later illustrate these aspects with a series of possible variants of building systems of principles.

Finally, as a rule, principles or systems of principles are elaborated through and on the basis of a theoretical or even meta-theoretical discussion on the whole knowledge regarding a research field.

Meta-theoretical activities such as these debates, take place within the framework of a scientific or philosophical school or between different heuristic (artistic or technical) schools, sometimes derived from one another.

The debate can even be carried between knowledge centers from simultaneously developed different cultures or can be continued or renewed over times, that can mean milleniums; in this way systems of categories or systems of principles were constituted, each of them being able to synthetize, not only knowledge with different degrees of thoroughness and elaboration about reality, but also various cognitive attitudes, heuristical matrices, theoretical and methodological options, prospective and general visions.

We can add, with regard to wider senses of these considerations, that ever since the times when the mythical models, scientific representations, philosophical metaphors and moral ideas co-evolved on the bole of an integrative vision about spirituality, the principle has been present and has functioned by bringing together

the virtues of all these ways to perceiving and imagining the world and of making it into a shelter for humans.

Such a wide and general status attributed to the principle may have as a major signification the idea that the principle can or even must be not only meta-theoretical, but also meta-cultural. This last affirmation has, in our opinion, even much more possible meanings, which cannot be here mentioned because of the projected dimensions of our present study.

Principles, especially those philosophical, can refer to any fields of the existence or to the whole of the existence. These kind of principles are, in fact, neither plain truths nor suppositions or postulates.

If they were suppositions, they should be based on previous theoretical or (at least) practical knowledge, even if these functioning as a knowledge environment or as a cultural context, because any theoretical construction is founded on the already reached level of knowledge.

To be postulates, they could be arbitrary, conventional or they should be strictly independent constructs of each scholar or philosopher.

At least two more types of situations can be considered, namely those in which

– the founding propositions are valuable because they are normative for the action and ensure the coherence of a kind of social organization or the consistency of an individual conduct by observing a set of imperatives, as in the case of morality, but also in cases from

– all practical fields of social life, because they ensure efficiency in action, in spite of a low degree morality or even of the lack of morality, as in the case of justifying the maximization of financial profits, of legitimating discretionary political influence or in the cases of unlimited growth of technical power's acceptance, even in its variant of information power.

We can ask then, what are principles if they are nor simple truths, nor suppositions, and not even postulates? There is an answer in three steps, an answer accompanied by arguments that can be discovered in the entire history of philosophy.

I. PRINCIPLES ARE COMPLEX IDEATIC CONSTRUCTIONS, CONSTITUTED BY DIVERSE, BOTH THEORETICAL AND PRACTICAL ACTIVITIES, CONSTRUCTIONS THAT ACCOMPLISH UNIVERSAL FUNCTIONS

Even if the ways in which principles are built are not described here, in the following paragraphs the system of principles will be presented and the internal structure of the system of principles will be analysed. The final part of paper refers to the evolving feature of the principle as well as of the systems of principles; the principle of evolution and its role in philosophy and science will be discussed, as a common denominator of these research filds.

II. PRINCIPLES ARE COGNITIVE, METHODOLOGICAL, EVALUATIVE, INTERPRETATIVE OR EVEN PROSPECTIVE SYNTHESES THAT MAY SHAPE AND GUIDE ANY TYPE OF ACTIVITIES, EITHER THEORETICAL OR PRACTICAL

Such complex syntheses were elaborated as far back as in the works of G. Bruno and Leibniz who outlined both the plurality and connectivity of worlds. Descartes and La Mattrie have formulated explications of the world system which can be named cybernetical in our days because they envisaged the organization of this system and the way it works by integrating the cosmic and human universe in the whole succession of organization and self-organization forms.

It may be of interest to remind here that the integration procedure, theorized not early than in the century that has just passed, was already used by the ancient philosophers: Platon, as an example, in his dialogue about the real and ideal city or state, integrated society in a triad of increasingly complex systems, from the human soul and its qualities, to the society with the various kind of governments, depicted by their specific features, and in the end, to the universe seen together with its organization, the cosmos.

Leibniz, in his turn, has shown and argued not only for the presence of a relation between the constitutive kingdoms of the world, but also for the nature of their correlation; moreover, he pointed out explicitely the continuity of human, animal, vegetal and mineral levels of existence.

Maybe, the main role of the continuity principle was, in his vision, to guarantee the necessary harmony between the above mentioned fields of existence, but this important principle has, itself, in our interpretation, another at least four more and more high levels of significations, namely, those which

i – guarantee the above specified harmony of different fields of reality;

ii – eliminate any appeal to other connections than those necessary (such as the hazardous or miraculous ones), in order to explain natural, social or psychic phenomena;

iii – **offer a real foundation for any possible explicaion of the available knowledge on the studied phenomena,** eventually, even for explanations formulated in our days;

iiii – conceptualize, at the highest level of generality a kind of relation or interaction (even if genetic, of law type, funcțional, accidental, necessary or of other nature), by formulating the universal principle of continuity.

Among the outlined aspects, the third can be counted as the most important, namely **the function of principle to found succesive but more and more adecvate explanations for the same reality field from the perspective of the corresponding, scientific or philosophical, theoretic disciplines.**

Another universal principles, that were already mentioned in our study or will appear later in the structure of the possibile systems of principles, would be analyzed with the same result.

III. THE PRINCIPLE HAS A COMPLEX STATUS, GIVEN FIRST BY ITS CAPACITY TO FOUND ALL TYPES OF HUMAN ACTIVITY AND THEN BY THE MULTIPLICITY OF ITS FUNCTIONS

As a first argument, we can highlight one of the previous considerations, made when discussing the various senses of the term, namely the ambivalence of principle. We can now add a thought of Aristotle: "The common trait of all these principles is that they are the first starting point because a thing exists, comes into being or is known"[2].

However the philosopher makes a difference between principles, when he finds that "some of principles are situated inside of things, other outside of them". But the thinker from Stagira illustrates this by their simple enumeration and leaves it with us to intuit how these principles can be grouped in the two categories. The mentioned examples are: nature, elements, meditation, intention, substance and goal.

The complex status and the multifunctionality of principles can be illustrated starting from Aristotle too, and obviously, from his work on prime principles. We find here cascades of principles related to any kind of important philosophical subjects, presented by specific means for various reflection fields. Consequently we learn that, in his vision, the principle is not only bi- or ambivalent, but has multiple valences, such as methodological or logical valences.

One of these filiations of principles we have identified in the work of the initiator of the peripatetic school illustrates both the complex status of principle and the depth of the aristotelic thinking. This kind of genealogies also offer the opportunity to introduce our argumentation concerning the hierarchical structure of the system of principles.

Aristotle then formulates the principle of syllogism, in *Metaphysics*[3]. In the same work, he appreciates that in this type of reasoning, the starting point is substance and therefore, substance may be considered as the principle of syllogism[4] (of course he refers here to one of the two complementary constituents of substance – matter and form –, namely to the formal aspect of the principle which ensures the necessary character of deduction).

The thinker from Stagira also emphasizes here the role of methods, procedures and techniques in the generation of knowledge when he attributes later to Socrates the use and theorization of two new procedures: induction and general definition. Because knowledge stems precisely from this kind of operations and procedures, Aristotles finds that what the master searches in this way is the essence of things itself, and for this purpose he already uses the syllogism, because "the principle of syllogism is the essence"[5].

[2] Aristotle, *op. cit.,* p.161.
[3] *Ibidem,* p. 409.
[4] *Ibidem,* p. 240.
[5] *Ibidem,* p. 409.

The following analyses of various kinds (historical, theoretical and meta-theoretical, systemic and functional) will gather other, new arguments in support of our idea that the principle has an even more complex status: ontological, gnoseological, methodological, axiological and praxiological, as well as a prospective one.

2. LAW, PRINCIPLE, AND THEORY

Our attempt to define the status and role of principle within the framework of theoretical (scientific and philosophical) knowledge may be preceded and facilitated by:

a) understanding science itself as a subsystem of the social system and by distinguishing its constitutive levels;
b) a comprehensive perspective on science as an integrated system of complementary disciplines;
c) the study of the explanatory power of theories, that generates even a *sui generis* hierarchy of scientific theories which indicates their specific (scientific) value;
d) emphasizing the systemic character of scientific theories, synchronically constituted and diachronically developed, without a permanently or necessarily evident intentional organizing effort;
e) a structural analysis of the internal organization of the theoretical level of science, taken in the restricted sense of the term and by envisaging the internal hierarchy of the scientific theory itself.

As constitutive levels of science seen as a social subsystem we distinguish the following five structural levels:

- Scientific activities (individual, team or even statal activities)
- The community of professionals in the scientific domain of activity, their competence and creativity, scientific consciousness and deontology as well as a research ethics connected with an innovation ethics and a technoethics, all these functioning within the framework of a scientific culture;
- Scientific relations, groups, nets and centers (institutional, national and international, or even global);
- Scientific institutions which accomplish research, education, omologation, communication, dissemination as well as cultural and practical activities;
- Politics of science at statal, regional or international level.

The systemic feature, the internal hierarchy as well as the possible intra- and inter-classification in science enable us to describe a large ondulatory or maybe even circular movement in science, a movement manifested first as a growth of the generality degree and as an increase of its systematizing and synthesizing capacity,

and followed by a second movement, namely a marked tendency towards specification, operationalization and practical application of theoretical rezults.

In both hemispheres of knowledge – the theoretical and the practical – viewed as horizontally superposed or as vertically composed (as in Brancusi's Gate or as in our own brain), science is sustained, guverned, and even moved, by principles which constitute the infractructure of the ensemble of knowledge. Let's see a more detailed internal structure and dynamics of science as a whole.

The various results of knowledge in specific fields of science, philosophy or technology may be generalized for the ensemble of existence by means of a system of principles with different degrees of elaboration, but all scientifically founded, through the mediation of an increasingly accurate description and analysis, modeling and simulation of the succesion of more and more complex systems that compose the world as a system of systems and by explaining the various kinds of knowledge also grouped in systems.

In order to make various results of theoretic knowledge functional we have to understand and represent them in their integrality and, in order to be operationally applied, we have to concentrate, to assemble and, eventually, to disseminate them through a unitary and persuasive new scientific vision, before their technical or social application. This is the more efficient way to finalize the theoretical knowledge, even if it is a longer and more laborious way, because the final effect may be remote but greater, more difficult but durable, more intangible but important.

The results of cognitive activity from distinct fields are also analyzed and interpreted in their specific significations, and included in cognitive constructions that allow an easier transposition of theoretical explanations into methodological principles and norms and, finally, in practical prescriptions. In this way the conversion of cognitive experience in efficient decision and action is in fact accomplishd and the finalization of research work by integration of knowledge in higher level cognitive processes and structures is achieved.

Knowledge systems are not necessarily identified with the already constituted fields of science; different knowledge systems may appear within the same science depending on specific cognitive aims. Today we can even see how the scientist himself does not know at the same level all the areas of his own discipline and how the new researchers can be considered experts, sometimes, only in a single scientific problem, the one selected by the manager of a research team engaged in a project with a limited and short-term oriented focus. Research workers may also have precise and restricted investigation objectives, explicitly attributed and distributed between the members of the team by a managerial plan of the project.

This feature of the present research system differeniate it not only from the past philosophical but also from the traditional scientific approach of theoretical knowledge according to which

a) it is knowledge – not facts, phenomena and events – that is explained and influenced by science;

b) both the object of scientific activity and its specific product is knowledge;

c) science produces science.

The traditional scientific approach to knowledge is also characterized by the conviction that theory is the very unit of science, and facts have scientific signification and are or are not true, only if they are parts of a theory.

On the contrary, we see now how knowledge processed and disseminated during the process of discovering, experimenting, explaining and testing is taken over, introduced and used in knowledge flows, nets and centers, that are in turn constituted, developed and financed in conformity with their efficacy in the global research and communication environment, where efficacy itself is estimated in terms of productivity, visibility and profitability.

In the above-mentioned, traditional sense, proper both to the history of philosophy and to that of science, theories are explanatory systems structured of the following types of elements:

– principles
– laws
– methods of discovery, construction, verification and interpretation
– cognitive models or scientific paradigms
– knowledge accredited as truth
– scientific problems
– unstructured, semi-structured, structured, tacit or explicit knowledge
– scientific beliefs, habits and customs, conventions, mentalities, prejudices and preconceived ideas; among other philosophers and scientists who refer to such kind of components at the theoretical level of scientific knowledge are B. Russell (*Analysis of Mind* and *Misticism and Logic*) or L. Blaga (*Religion and Spirit*).

If we put the accent of the analysis less on elements and more on larger and invariant structures, the following internal structure of scientific theory can be envisaged:

– Scientific instruments (conceptual and material), methods, procedures and techniques as well as devices, installations and pillot stations, experimental laboratories (terrestrial and even spatial or interstellar) and even mythical scientific and technological spaces such as Geneva, Baikonur or Silicon Valley. This scientific complex can be called **the technical infrastructure of science**[6].

– The **theoretical structure of science,** constituted of scientific concepts, scientific problems, scientific truths and errors, laws and theories;

[6] The technique itself is conceived here as the intellectual method that guides and makes efficient any kind of activities, if scientific, artistic, philosophical or economical and political.

– The **meta-theoretical superstructure of science** which includes inter-theoretical activities and relations, linguistic and logical inquiries of scientific problems, developments in multi- trans- and inter-disciplinary researches, advances in integrative science, etc.; at this level of science not only concepts, laws and principles are studied, but also inter-concepts, inter-laws and inter-principles;

– Science as a hierarchical succession of complex levels also includes the science about science, named *scientics*, which studies science as a social phenomenon and aims to guide the practical forms of organizing science; it has as a main objective the search or creation of new ways of optimizing the structure and dynamics of scientific research.

A systemic vision and a structural methodology could be the basis, respectively the suitable instrument to operate a general classification of sciences as another aspect of the systemic feature of this continent of knowledge, which is also a domain of culture. But today's classifications are elaborated and proposed not only for theoretical or metatheoretical reasons, but also from other perspectives too, like those of the politics of science[7], which has to take into account and to promote the specific interests of various social actors, of statal, inter-statal or international organisms, associations and organizations as well as countries, regions and groups or alliances of these very diverse national, international or even global agencies.

The principles formulated and used in various fields and at different levels of scientific research are more or less elaborated. Is the use of the term "principle" justified for some types of connections that are present or function at various levels of natural existence, in social life as well as in thinking processes, connections such as those of cybernetic kind? In many cases, these names cover types of relations which take place in diverse reality fields, describe the way in which different processes occur, so that this so called principles can be better considered expressions of laws.

But if we refer to cybernetics, these principle-like laws allow a systemic effort to formulate a more complete vision concerning cybernetics. By this larger perspective that integrates particular or specific connections it is possible to invent new forms of action or to optimize the known ways of practice in order to make them more efficient. This perspective also corroborate science, technique and even philosophy in research fields such as cybernetics and its branch – socio-cybernetics – where the **retro-action principle** is applied.

Socio-cybernetics itself may be understood as a complex activity, constituted of actions and activities of study and meditation, but also of social interaction and intervention.

[7] See, for this point of view, the classification of scientific disciplines, conceived, disseminated and recommended by UNESCO or the classification which guides the EU financed framework research programs.

Cybernetics, in turn, can be re-thought from this actional perspective, as the study of conditions which ensure a maximal growth of efficacy in action and as implementation of adequate instruments for the guidance, the coordination and control of development in social systems.

We can also complete the set of principles in cybernetics, by adding to the

– **Principle of feed-back** the
– **Principle of feed-before** and even the
– **Principle of feed-up.**

It is to be mentioned that if the retro-action principle is more frequently discussed, the second principle is very rarely studied, even if it may be considered able to exprime and explain a large cluster of evolutional processes and phenomena.

The third principle and its action was signaled and described in a study of cybernetics and systems[8] presented at the European Meeting on Cybernetics and Systems Research held at the University of Vienna in 2008, and it is manifested in systems with controlled evolution; this types of systems can be natural (biotic or social) and artificial.

3. ORGANIZATION AND EVOLUTION OF PRINCIPLES WITHIN A THEORY

The process by which the principle is built constists of such operations as generalization, essentialization, as by another, such as those of derivation, particularization or specification (concretization or even materialization), operations or procedures that are also used at other levels or for different knowledge purposes.

On the other hand, such operations are not always used systematically or methodically for the purpose of elaborate principles. They can arise in a way similar to the phenomenon of discovery, that can be, in its turn, a result of a lot of laborious experimental activity or of sudden and unexpected intuitions. The latter can be based either on the whole intellectual experience of the research worker or can appear as conclusion of some prolonged theoretical studies and directed reflections.

Certain complex processes can also be studied as telling examples for the genesis of principle. These processes illustrate the two, approximately symmetric branches of the

a) constitution, respectively of
b) application of principle.

[8] Laura Pană, *Sociomatic Systems, Studies and Reflections: A Challenge for Social and Intellectual Invention*, Robert Trapl (ed.), "CYBERNETICS AND SYSTEMS", volume 2, *Proceedings of the Nineteenth European Meeting on Cybernetics and Systems Research,* p. 325–330, University of Vienna, Austria, 25-28 March, 2008, Austrian Society for Cybernetic Studies and Austrian Research Institute for Artificial Intelligence (OFAI), ISBN: 3-85206-175-7.

The ascendent, respectively descendent lines of the principle's ways of manifestation, operation and evolution may be shown by the exemple of the causality principle. We will use, in this exemplification, in fact, multiple expressions of the same principle.

It is to be noted here that in Aristotle's work, as well as in the Greek ancient philosophers' thought in general, the word "principle" means, as we have mentioned from the beginning, perhaps above all, "cause". Once accepted, this statement may be interpreted, in our opinion, even in the sense that what for ontology is a cause, for gnoseology is a principle.

A complex but always incomplete picture of the descendent and ascendent branches of the manifestation and / or application of the causality principle may be conceived and represented even on multiple levels, each of them with many steps, going from higher to lower generality levels, such as in the following example:

III. a. – the principle of motion or dynamics
- the principle of action
- the principle of change
- the principle of stability or equilibrium;

II. a. the principle of causality
- general causes, characteristic both for the existence and its cognition
- universal causes and principles, which operate in all the fields of existence
- particular causes and principles, present and applicabile in a few domains;

I. a. manifestations or expressions of specific causes or principles, that are in action or are valid in a single domain or regarding a certain aspect of reality, as for instance in forms or at levels of cognition.

Our explanatory effort concerning the cognitive process initiates an other succession, this time ascendent, of founding and explanatory principles, allowed

I.b. – on the basis of connexion principle,

II.b. – particularized in the reflection principle, and

III.b. – specified in the principle of informativity.

A new beginning, with an ascendent evolution too, but at a different stage or level, in its turn with unprecedented steps in the evolution of the accessible part of nature, is marked by the

I.c. – principle of consciousness[9], followed by the phenomenon and

II.c. – principle of creativity, associated with that of constructivity and, in our days, with the

[9] We can use and study any principles that refers to specific, particular or general properties, processes or activities. Aristotles itself noted as principles those of nature, elements, meditation, intention, substance or goal (*Metaphysics,* p. 161). As more concrete and necessary specifications, we can say that here "nature" means matter, "substance" means form, and "goal" is for Good and Beautiful.

III.c. – principle of calculability.

The phenomenon of creativity itself can be conceived not only as an

I.d. – individual aptitude, but also as

II.d. – a characteristic of social organization and even in a larger sense, as being not only a specific human phenomenon, but also a

III.d. – property of the entire known nature and existence.

It is possible to understand, then, the way that two evolving principles can meet, through a general perspective upon reality, at the same level: the first, on a descendent path (because it is direcly derived from the universal principle of causality), namely the principle of generation, and the second, in progress from specific, particular, to general forms of manifestation, the principle of creativity.

Thus we can watch, in fact, the causality principle working in the whole of existence, through the agency of a lot of forms and ranges of existence or through action, cognition and creation, these existence or action forms being organized in decreasing, respectively in crescent ranges of generality.

If we apply the same scheme of analysis only to the sphere of knowledge, we find that the ascendent line in the evolution of a principle is usually more frequent and completely described, while the path from the general and abstract to specific and concrete, is less considered and less studied, like in the case of the transition from the principle of synthesis to that of analysis and then to that of (theoretical and practical) constructivity and finally, to the principle of action.

We can point out here that the principle of action can also be seen as a general principle, because it functions at all the levels and in each domain of existence. In the social field of existence even forms of meta-action can be distinguished, because various forms of action have distinct and important leading, motivating, projective or evaluative levels; they present then a lot of super-posed actions. In this field of existence then, a similar analyse shows that the principle of action extends into the principle of efficacy, finalized and valued, in its turn, in the principle of productivity, which is applied, in our days, not only in industry, economy or commerce, but even in science; a new knowledge or theory can be valuable even if it is not yet a certitude and it is not fully confirmed, because it expands the known universe and is fertile: it produces new hypotheses, proposes problems solvable only in a next paradigme and opens new cognitive perspectives.

The causality principle, which can be considered, in its turn, a meta-principle, in certain contexts, may be and is identified mainly as the principle of generation, but it is responsible equally for the maintenance of a system in a determined state or condition, usually, by a system of causes. This principle is present in the work of Aristotle[10] also as the priciple of birth or as the principle of creation but it is even called, still here, the principle of creative activity.

But the same principle of causality refers not only to the emergence or maintenance of systems in the same state and at the same level of complexity, but

[10] Aristotle, *op. cit.,* p. 207.

even to the change of systems within the same qualitative limits as well as to their evolution. This evolutionary phenomenon complicates the universal panel of causality, because evolution can be ascendent or descendent; therefore, a chain of causality may determine inclusively the destructuration, the destruction and even the disappearance of a system.

From the same perspective, that of the universal connectivity, the principle of causality is related, besides the principle of evolution, to the principle of development, which is a particular case of evolution. Manifestations of causality principle like these already described suppose and exprime also the presence and action of continuity principle (which means continuity of both change and stability), as of discontinuity principle (that also has multiple particularizations).

This description of diverse ways in which are intertwined and interconditioned the different principles and how they interact or are sometimes even generative each for others in certain horizonts of being, respectively how the diverse principles are reciprocally founded at the level of meta-theory, is inspired by the whole succession of philosophical systems and allows itself, in the same time, to outline some features of creation in this field[11]. It also offer a possibility of an alternative interpretation of the sources of huge magnitude, of unlimited and permanent valability as of the never diminished influence of the resulted philosophical systems, all belonging to the greek antiquity.

4. A TYPOLOGY OF PRINCIPLES

All the emphasized principles are active principles. They act at the mentioned levels and in the shown domains or even within the whole existence and have determined and continous effects over the way of being and evolving of these domains. The entire existence and the whole society, just like our mind, are structured and function in the way that they can be described, in their essence, by these principles.

Those principles that found knowledge and action are not only the results of generalization, but also of essentialization of knowledge and practice. The principle of constructivity also acts in the process of constitution of the system of principles, and even inside the system of principles. We can better say that the system of principles is the system that influences the state as the dinamics of existence as a whole.

The system of principles may be imagined and represented in various ways, once the idea of a necessary structuration of principles in systems is accepted, together with the idea of the validity of the constructivity principle inclusively in the world of principles.

[11] Laura Pană, *The Philosophical Culture*, Revista de filosofie, Tome V, No. 3-4, mai–august, 1999, p. 151–162, ISSN 0034 – 8260.

Various systems of principles centered on some of the mentioned principles or meta-principles can be built, systems that can have different internal structure and distinct hierarchies of the constituent principles. The systems of principles can be made up of different types of principles that are generally combined in accordance with specific rules for each system, but sometimes only around formal rules or even without rules, in an arbitrary or conventional way.

The constitutive principles of different cognitive constructions can be grouped in a few set of principles of various types.

□ Meta-principles, general principles, particular and specific principles

A reunion of all these categories of principles, in an explicit manner, in the framework of the same discipline is a characteristic feature of philosophy, where even theories are general theories and meta-theories. Philosophical theories are all general, from at least one point of view, that determined by the fact that they are elaborated on the basis of theories constituted in another areas of culture, most of them in those scientifical. Scientific meta-theories are not however of the same level of generalitaty and of the same value, then they are not equivalents of those philosophical; thus both the scientific and philosophical cognitive products have they specific value and importance.

□ Fundamental principles and derivate principles

All the philosophical principles are fundamental for another fields of knowledg; as a matter of fact, even the differentiation between fundamentale and derivate principles is made at the level of philosophical knowledge, where we fiind, as a rule, an explicitely outlined internal structure of the system of principles. The internal structure of the system of principles is also hierarchical, in most of cases, but the constituted hierarchy can be different, not only from system to system, but even in the process of application of principles by the same thinker in distinct issues and in diverse contexts.

□ Fundational principles and explanatory principles

The above made analyses have shown that principiile are not so much explicative as fundational. This evaluation is evident when referring to certain functions of the philosophical principles in their relation with the scientific hypotheses or theories, but induces problems in the study of existing relations between principles and between principles and other components of theoretical constructions, both in the case of scientific and philosophical systems. Such problems can be even more sticking with regard to ontological systems, in which principles that exprime genetic relations (causal, conditional or law-like) are, in this respect, automaticaly ”hierarchical” and take precedence over the systemic and

structural ones, while in other thematic areas and methodological approaches, that may describe relations of co-existence and co-ordination, is difficult to distinguish principles with different degrees of validity and the result of classification can be different.

□ **Theoretical principles and methodological principles**

□ **Evaluative principles and normative principles**

An analytic study of these categories of principles which all can be integrated in a more general dichotomy, namely the dichotomy of theoretical and practical principles, shows that they could be subjects of a separate paper. In what follows we attempt a short illustration of the multifarious relations manifested between different types of principles.

In a general panel of principles, as the above proposed, are implied much more principles that those effectively mentioned, principles studied in the scientific, technical and philosphical literature, such as the principle of structurality and the principle of evolution, the principle of continuity and that of differentiation or the principle of homogeneity and the principle of analogy, as the principle of action and the principle of constructivity.

The above emphasized principles can be considered fundamental, because they are underlying principles of the organization and evolution of existence, as well as of theoretical or practical activities. These principles have, in their turn, a lot of general manifestations. Thus general expressions of fundamental principles can be the principle of systemicity, the principle of connectivity, the principle of retroactivity and that of finality, the principle of efficacy as the principle of adaptation, the principle of learning and the principle of creativity.

Before continuing our discussion by outlining the next possible relations between the fundamental, general, particular and specific principles, we can remark that such a holistic approach of the status and functions of both ontological and gnoseological principles can reveal new filiations or cascades of principles such as those of the principles of causality, finality and retroactivity or of the principles of connectivity, structurality and systemicity.

This systemic and structural approach also allows us to integrate in a general classification and to put together a series of well studied but generaly omitted principles, that must however find their deserved place, discernible how we see, only by imaging a pretty much complete set of different types of principles. Much more, as we will constate, another succesions of principles will become evident in this integrative approach, also illustrated by the next examples.

A principle of adaptation may be detected in processes and activities of natural or social and even technical evolution and a learning principle and even a teachability principle may be considered as principles derived from the two above discussed principles, namely the evolution principle and the adaptation principle.

Both the adaptive and learning processes and activities may suppose or may also generate creative conducts.

These later are so important that they may impose the study of a corresponding principle. The creativity principle may be valuated as an equivalent of the constructivity principle, which was considered here as a fundamental principle, but it can also be valued as a fundamantal principle if it is conceived as a corresponding principle of the causality principle, if we consider the generative power of creativity, which can be viewed, as we argued, not only as a specific human aptitude, but as a larger, particular and even general property of existence.

Fundamental principles can also have particular forms of expressions and manifestation, that can be identified in complex areas of structuring or approaching of existence. Such particular principles are in the theory of knowledge, for instance, the holistic principle, the induction principle, the principle of deduction, that of idealization, of postdiction as that of prediction, the principle of verification, as the principle of interpretation, the principle of valuation and the principle of (practical) application.

For the same research field, that of cognition, specific principles can be emphasized, such as the principle of systemic analysis, the principle of structural analysis, the principle of functional analysis, as the principle of genetic analysis and the principle of modeling or the principle of integration etc.

In the philosophy of knowledge concretizations of some fundamental principles or even of some meta-principles are also available, such as the continuity principle, that can be ubiquitous, but which may not even appear explicitly in any ontological or gnoseological system, although it is present and active in both areas, through its multiple forms of manifestation.

As expression of the continuity principle in the area of knoweledge we can evoke the principle of transition from real to possible, the principle of transition from fenomenon to esssence, the principle of transition from concrete to abstract and the other way around, the principle of transition from analysis to synthesis, the principle of transition from comprehension to creation or the principle of learning valuation by innovation and invention.

A similar analysis of content and validity of principles can be made for another fields of being and knowledge. How we have shown above, in more detail, all of the emphasized principles are active principles, they act at the mentioned levels and in the indicated domains, and have determining and continuous effects upon their way of being and evolving.

The principle of action is therefore important from the perspective of our work, and in the discussion of the way in which this principle acts, a distinct place may be reserved for the study of a derived principle, that of efficacy; a lot of forms in which this principle acts at the social level of existence can also be highlighted.

In the context of present development of social scienes, we can outline the phenomenon of rise and differentiation of a lot of managerial principles, which are

formulated and applied in more new branches of management and that ensure the growth of efficiency in different social fields of action.

As the most important application of the proposed **typology of principles** we can present now a possible **internal structure of a system of principles.**

We will display, only for spatial reasons, no more than two or three illustrative principles at each possible structural level of a system, which has never a binar or triform, but a multifarious or even arborescent aspect.

- Fundamental principles, that can be established
  - with regard to the organization as the evoluton of the existence and
  - related to some aspects of both theoretical and practical activities;
- Principles of evolution and development
  - P. of homogeneity and P. of differentiation
  - P. of structurality and P. of dynamism
  - P. of action and P. of constructivity
- General expressions of fundamental principles:
  - P. of systemicity, P. of connectivity
  - P. of retroaction, P. of finality, P. of efficacy
  - P. of adaptability, P-les of learning, P. of creativity
- Particular forms and manifestations of fundamental principles (as reference system for this structural level we will take the field of cognition):
  - The holistic principle, P. of induction, P. of deduction
  - P. of idealization, P. of postdiction, P. of prediction
  - P. of verification, P. of interpretation
  - P. of practical applicability
- Specific principles (in cognitive activities):
  - P. of systemic analysis and P. of structural analysis
  - P. of functional analysis and P. of genetic analysis
  - P. of analogy, P. of modeling
  - Principle of integration.

The internal structure of a system of principles and, implicitely, a system of principles can be conceived and built in very different ways, and to discover these ways can constitute interesting applications also for philosophical or scientific, didactic seminars or heuristic group debates.

5. THE INTEGRATIVE FEATURE AND THE SYSTEMIC ORGANIZATION OF PRINCIPLES WITHIN A PHILOSOPHICAL OR SCIENTIFIC THEORY

The set of principles that founds the explanation of the structure and dynamics of existence has itself a systemic feature, which can be demonstrated by means of various theoretical perspectives, that can be concretized *inter alia* by the following succesion of arguments:

– at the ontic level, principles are reciprocally conditioned, and at the ontologic level they are reciprocally founded;

– the whole of principles that refers to the ensemle of reality or to a reality field has a systemic feature because reality is a system, or more precisely, a system of systems;

– each principle has its own explaining role, and then, its place in an explanatory system;

– among other relations betwen principles, those generative can be studied; as an example, we can admit a cognitive synthesis as an explanatory principle if it is already explained by an other principle, and in this case, the second principle is the foundation of the first, while the first can be considered as derived from the second and then, it can be seen as one of their manifestations or illustrations;

– another case is that in which an explanatory principle appears as a necessary conclusioon of the one early formulated, but the new cognitive synthesis functions as a foundation for building other theoretical constructs / new knowledge, as we have above shown;

– different principles that constitutes a coherent set of foundations for a comprehensive description of the whole of connections that function in a field of reality or for an explanation of the whole knowledge about such a field, are not sub-structures (elements or levels) of a hierarchy;

– in a system of principles all the component principles have the same importance, and a hierarchy can rise if we make up categories or types of principles, by fields of activity or areas of cognition such as:

- cultural (philosophical, scientific, moral, political, etc.)
- theoretical or practical
- methodological (structural, functional),

and then inside of these domains and not at the level of general or fundamental principles.

– all the principles that compose a system of principles have the same poower of determination and none of them cannot be eliminated without consequences for the whole system of scientific knowledge of respective domain of reality;

– in the framework of an explanatory system, as in a moral system, all principles has to be respected and exceptions or amendments cannot be admitted in the process of application of principles, because the theoretical system will be destructured, and the system of morality will be altered;

– the principles that are parts of a theoretical or meta-theoretical system must be respected in the same measure to ensure completitude, comprehensivity, independence and coherence for the system of principles, properties that found both the truth value and the practical value of the knowledge based on the system, if we consider

a) the sum of consequences generated and permitted, or if we refers to
b) the capacity to use the whole power of explanation as
c) the entire space of possibilities opened

by a new theory;

– that principles which refer to the completeness, coerence or the independence of principles în a system can be considered formal principles, that belong to the meta-theoretic and meta-lingvistic level of the study, guidance, interpretation, evaluation and practice of a scientific activity, and this body of principles can, at its turn, to not constitute a system. But becomes a must to be respected, in this situation, some requests of other principles, as that of simplicity or that of the minimal effort and, according, as an example, with the leibnizian system, the perfection principle.

However a set of natural or social, material or spiritual, entities or phenomena does not have to be perfect in order to be a system. It does not need, therefore, to be unchanging and unevolving, to be homogenous, finite and closed to make a system. The thought systems should not be total, complete and absolute (invariable) either to meet the same requirements of perfection. In the same system of ideas can be generated different theories, each of them with its own set of specific truths regarding the explained field, under a single condition: the achieved knowledge has to be subordinated to the same theoretical or meta-theoretical principles. These theories can be succesive or competing and a principle or a system of principles is precisely the unifying ground of different explanatory efforts and ways.

6. PRINCIPLES IN EVOLUTION AND THE EVOLUTION PRINCIPLE IN SCIENCE AND PHILOSOPHY

A discussion around the two announced themes necessitates a whole set of some early mentioned or prezented principles: the principle of continuity, the principle of evolution and, as we will argue, even a principle of co-evolution, as well as the principle of devlopment. Are also implied, in our vision, the principle of change, the principle of constructivity, the principle of action as the principle of efficacy.

But we start from the following question: may be principles associated with evolution, if we simultaneously put them at the foundation of theoretical constructions and if they are considered the core values of the main co-ordinates by

which we determine both the position and the dynamics of philosophical and scientific creations within the framework of a culture?

Our answer is affirmative, and we consider, in plus, that principles themselves have an evolution between the limits of a knowledge system, that may also be taken as a reference-system both for their generation and study.

We also emphasize that each principle can manifest itself in many and various forms, and its signification may evoluate in very diverse directions, according to its own degree of complexity as to the nature of the action domain, as well as to the ensemble of conditions in which the domain itself evolves.

An even more accelerated and evident form of evolution of principles takes place by intellectual invention[12], which is characteristic for any fields of cognition or action, but which is attributed mainly, if not exclusively, to the technical domain of culture and, in our days, particularily, to the most productive expression of technology[13].

Precisely because of such technological developments we do not exclude, as a manifestation of the constructivity principle inside of the system of principles itself, the possibility of technical or even automatic generation of new knowledge. It is worth noting that when we say "technical" here, we understand, first of all, techniques of intellectual activity[14] and, only in a second instance, computing techniques.

However, we foresee this possibility under the sign of interrogation, but we can also accept it, as far as we can actually speak about production and self-production of free information together with the coming into being of society and all the more as together with its present and foreseeable development[15].

Even if we use the current sense of the term "automatic" and not that of *automaton*, we can outline that a lot of activities such as axioms formulating and theorems demonstrating may be considered automatic operations, both if mentally (humanly or naturally) and technically (instrumentally or artificially) performed, as far as the intended logical constructs follow necessarily and explicitly one from another and step by step.

[12] Laura Pană*, Intellectics and Inventics,* Kybernetes, The International Journal of Systems and Cybernetics*,* Volume 35, Issue 7/8, 2006, p. 1147-1164, Cod ISI, IDS Number, 094 SY, DOI: 10.1108/03684920610675148, ISSN 0368-492X.

[13] Laura Pană, *Crucial Intellectual Events in the History of Information Science and Technology,* Noesis, Travaux du Comité Roumain d'Histoire et de Philosophie des Sciences, Volume XXXV, 2010, Editura Academiei Române, Bucureşti, p. 171-195, ISSN 1223-4249.

[14] Laura Pană, *Knowledge Management and Intellectual Techniques - Intellectual Invention and Its Forms,* Robert Trapl (ed.), CYBERNETICS AND SYSTEMS", Volume 2, *Proceedings of the Eighteenth European Meeting on Cybernetics and Systems Research,* University of Vienna, Austria, 18-21 April 2006, p. 422-427, Austrian Society for Cybernetic Studies, ISBN: 3 85206 172 5.

[15] Laura Pană, *Levels and characteristics of social information*, "Noema", Volume II, No. 1, 2003, p 74–89, ISBN: 973-85554-4-X.

The above mentioned human and technical activities can also be associated with specific activities of social information structuring, processing and using[16] and with studies regarding structural information[17], but even with a general presentation and interpretation of the categorial system recently arised in the philosophy of science and technology[18].

The principle of evolution itself can be studied as a theoretical principle, all the more as this principle is used both in philosophy and in science, and not only in biology, but in many other scientific fields and disciplines.

As a first guide mark in philosophy we can remind the metaphors of evolution proposed by Heraclitus which mark probably the beginning of dialectics as a complex philosophical and scientific system constituted of research activities, meta-theoretical studies and of a universal *organon,* even an entire methodology. In his vision the law is active both in reality and in the cognition of reality. The law which governs the whole of reality regards both nature and society. Evolution itself is produced by law: we have then here the first intuition of the laws of dialectics.

The group of eleatic philosophers, which discovered the identity principle and energically imposed the non-contradiction principle – both these primciples being elaborated with the aim to counter the heraclitean attitude – also revealed the contradictory character of movement, the diversity of existance and the role of qualitative changes, and thus developed dialectics, logics and science as a whole.

The sophists, concerned with not only philosophical but even with rhetorical, literary and political issues, can also be made responsible for the invention of dialogics and for the development of dialectics, applied in social activities as argumentation, persuasion and motivation for action. They conceived language as the more efficient technique of determine humans to take action.

Socrates and Plato have their own chapters in the history of dialectics, but we can note here an important contribution made in the theory of evolution by Schelling, who demonstrated that nature itself evoluates towards spirit and spirit, in turn, evoluates toward nature, within the framework of a great dialectical movement which is finalized into a necessary unity of nature and spirit, namely in action.

Comparable to Plato and Aristotle in terms of the extension and of the profoundness of his philosophical work, Hegel can also be recognized as the creator of the general theory of evolution; his philosophical system was also a complete and fertile encyclopedy of sciences for the culture of his times and for the universal culture. By using philosophical and scientific methods such as

[16] Laura Pană, Information and information society, chapter in *Philosophy of technical culture,* Technical Publishing House, Bucharest, 2000, especially pages 421-423.

[17] Laura Pană, *An integrative model of mind, cognition, consciousness and creation*, Noema, Volume VII, 2008, p. 120–137, University Book Publishing House, ISSN: 1841– 9852.

[18] Laura Pană, *From studies in the Science of consciousness to the concept of the Society of consciousness,* to be published.

extrapolation and intrapolation Hegel completes a huge synoptic table of knowledge in which any natural, social or logical entity and process has its own place and role on the universal scale of evolution.

In the field of biology we discover a history of the long and difficult creative process through which was coined the specific idea, principle and theory of evolution. This process is meticulously described by Charles Darwin himself, who intends to gather by this historical introduction a lot of authority arguments in order to accreditate his own contribution in the field, contribution presented as a continuation of numerous and various efforts made in natural sciences starting with Aristotle who is, as a matter of fact, the first quoted author in his book, *On the Origin of Species.*

Buffon and Lamark (with his *Philosophie Zoologique* – 1809) are the next personalities invoked by Darwin, who altso refers to another important work of Lamark, that on *Histoire Naturale des Animaux sans Vertebres* (1815). G. Saint-Hilaire (*Life* – 1828) and W. C. Wells, with his relevant and important work on *The principe of Natural Selection* (1818) are also presented. Another reminded authors are W. Herbert (*Horticultural Transactions* – 1822), Grant, Mathew as well as N. J. d'Omalius d'Halloy (a geologist) and the resounding dispute for priority between Wallas and Owen is described, in scientific terms, of course. Are not forgotten another well known scientists with contributions in the field, such as Naudin, Keyserling (geology), Schaafhauusen and Lecoq; Goethe is mentioned as a contributor.

Evolution is a universal phenomenon. All domains of existence are characterized by evolution; they evolve according to some laws of evolution and are explained by particular theories of evolution, developed for each region of existence.

But can we explain the evolution of existence as a whole, only on the basis of specific knowledge, provided by these domains and updated by using the current scientific findings, therefore without using speculative principles?

A next more specific and trifold question can be raised:

1) is possible a universal theory of evolution and then
2) how can such a theory be formulated;
3) may also be accepted a principle of universal evolution?

A few preliminary arguments can be furnished here. Evolutive phenomena are present in all domains and at every levels of existence, from that physical (micro- macro- and mega-cosmic) to those biotic, social and psychical ones. A universal theory of evolution may be based on a philosophical vision (general, abstract and complete) about the whole existence, such as those invoked in the above tried historical sketch. A universal principle of evolution will be coherent and co-operative with other fundamental principles in a system of principles and can be useful in such an integrated system.

From the class of systems with sense, especially the evolutive systems which can be described as developing sistems are studied. Social evolution itself can be natural, artificial and mixed, in its each component dimensions: biotic, mental, cognitive and spiritual. The natural and artificial co-existent, co-generative and co-functional forms of being are presented and their co-evolution is described[19]. Socio-technical aspects of natural and artificial evolution are studied and instruments of social interaction and intervention, offered by the information technology, are considered.

At the biotic, social and technical levels of evolution, finality as self-organization and self-development appears not as a ring-shaped connection between different aspects of a system or between the evolution stages of a system, but it is an open evolution that can be modeled by specific methods. At the social and technological levels, these forms of asymmetric evolution, even if open, can be both anti-entropic and entropic.

Social evolution has some specific forms, levels and means, because it is a self-determined evolution and because the society as a system of activities and human activity itself, all belong simultaneously to much more spheres of existence, the material, intellectual or spiritual ones.

At the social level of existence, natural and artificial forms of being now coexist and evolve. These kind of existence forms also are co-generative and co-functional. Some authors are even convinced that the so far experienced generations of artificial cognitive systems, techniques and agents are also steps in human evolution. We conclude[20] therefore that social evolution itself can be now natural, artificial and mixed, in its every component dimension: biotic, mental, cognitive and spiritual (moral, artistic, philosophical and technical).

The accelerated rhythm and the crescent social importance of artificial agent's development can be explained by the start point of their evolution, that of the upper level of human evolution, the intellectual one.

Humans evolve *with* and *by* their artificial creations, like the growing set of artificial (cognitive agents), and then we have, rather a common evolution or a co-evolution of human and artificial agents.

If we center our attention on some cognitive aspects of human-artificial co-evolution, we can remark that nowadays a triple cognitive evolution is occurring:

α. Human cognition is continued in its already sketched theoretical and methodological frameworks but with outstanding new results (new forms and levels of knowledge), generated by new cognitive models and integrated in unprecedented conceptual structures.

β. In the same time, artificial cognitive techniques, means and processes are conceived and used in a growing rhythm and with high efficiency.

[19] Laura Pană, *The Source and the Sense of Natural and Artificial Evolution Forms*, Noema, Volumul VIII, p.141-163, Editura MEGA, 2009, ISSN: 1841-9852.

[20] *Idem.*

γ. The previous two processes are not independent and a third, more and more powerful tendency is now developing, by their intertwined development, that of a human-artificial cognition, characterized by human initiative and aims, but by artificial methods, techniques and processes, that are used in an artificial intellectual environment, which is a technical and often virtual environment.

Human-artificial cognitive agent's co-evolution is differently understood and anticipated by diverse kind of specialists, from technical or social branches of knowledge. This evolution is nowadays viewed in various ways, such as:

A – technically directed evolution;

B – evolution by simulation of the natural evolution of populations, that needs the generation and management of complex processes which involve ecosystems, mutations, viruses and selection;

C – self-structuring processes in ordered context: engineers will create just suitable conditions for a self-determined development of artificial activity and even life forms;

D – learning activity, realized by cultural processes, like in the case of children education.

Co-evolution of human and artificial cognitive agents also needs, in these last conditions, culture learning, values understanding, sharing and practicing.

Permanent changes are also to be emphasized mainly in AI research orientation. Probably the most significant movement in the field, from the perspective of a social and cultural approach, is the comprehensive and reflexive inclusion of social goals among the aims of technical development.

This new orientation has, in our vision, two main directions:

a) a more concrete and immediate component, with another four distinct objectives, that of

a. a. developing artificial social agents to offer accurate, specialized, efficient and interesting public services as to

a. b. provide a permanent and close help for disadvantaged persons, and to

a. c. improve man-machine interaction; to

a. d. develop a society of intelligent agents which can assist humans in various types of work, such as knowledge work and creation work but also in designing, "healthing", life conditions preserving, entertaining etc. These types of agents can be knowbots, softbots but also medical or industrial robots.

b) a long-term oriented and visionary direction, with scientific and cultural aims, but each of them, creation-oriented.

CONCLUSIONS

I. Principles are complex ideatic constructions, constituted by various, both theoretical and practical activities, constructions that have universal functions.

II. Principles are cognitive syntheses that may found and guide any type of activities, either theoretical or practical.
III. The principle has a complex status, given by its capacity to found all types of human activities and then by the multiplicity of its functions.
IV. The analyses of various kinds (historical, theoretical and meta-theoretical, systemic and functional) support our idea that the principle has an active status and that it permanently and ubiquitously acts within the entire hierarchy of structural levels of a theory. For this reason the principle of constructivity was so frequently and carefully discussed in our paper.
V. Science is sustained, governed, and even moved, by principles which constitute the infractructure of the ensemble of knowledge and the basis of action in various fields of culture.
VI. Principles are *reciprocally conditioned* at the ontical and ontological level, they are *reciprocally founded* in the gnoseological field and they are *reciprocally realized* in the realm or practical action.
VII. Principles are organized in systems which are integrative systems and then in their cognitive or practical application we have to observe a lot of theoretical exigencies and practical requirements such as those identified in our paper.
VIII. Principles are evolutive scientific and philosophical constructs.
IX. The complex – ontological, gnoseological, methodological, axiological and praxiological, as well as prospective – status of principle was demonstrated and illustrated.
X. In a heuristic approach the last conclusion may be added by the reader, who is also considered a contributor and critic and then a partner in the intellectual work.