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*Arnold Tsofnas*

# UNIVERSALISM AND PARAMETRIC SYSTEMS THEORY

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***ABSTRACT***

The parametric general systems theory is an adequate method of research in universalism. The article focuses on this theory and its formal apparatus—ternary description language. It shows the advantages of researching universalistic problems through the use of the systems method. Parametric systems theory can be helpful to universalism in acquiring the characteristics of a relatively rigorous scientific conception.

**Key words**: universalism, adequacy, system, system parameter, system regularity, general systems theory, ternary description language.

## I. UNIVERSALISM, PHILOSOPHY AND INTERDISCIPLINARY METHODS

There is no doubt that by its very nature "universalism" has at least an interdisciplinary and intercultural character, and the term "philosophical" is appropriate here as well. Certainly, the principles of universalism, which require an organization of a social behavior based on a holistic view of public life and nature and on tolerance, are not an invention of its theorists. Suffice it to recall the words of Spinoza: "not to cry, not to laugh, but to understand". Precisely these requirements were achieved by philosophy during the twentieth century.[1]

In the presence of two competitive social trends—globalization, on one hand, and regionalization and federalism coupled with a preservation of unique cultural diversity, on the othe—the universalistic approach has become the only possible way to promote both survival and the formation of a noospheric worldview. In order to achieve a balance of the universal human system of life,

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[1] Janusz Kuczyński, *Dialogue and Universalism as a New Way of Thinking* (Warsaw University Press, 1989); *O uniwersalności i jedności nauki.* Zbiór rozpraw (Warszawa: Centrum Uniwersalizmu, Uniwersytet Warszawski, 1993); A. Góralski, "O słowniku uniwersalizmu", *Wspólnotowść i postawa uniwersalistyczna*, no. 1 (1999): 129–157.

we must learn to avoid selecting a single alternative standpoint, a kind of a "suitable" ideology to be blindly professed and fought for. Rather, we should be open-minded and try to comprehend and consider all alternatives from the meta-territory. And above all we must learn not only to understand, but also to act practically–a task, which (contrary to K. Marx's "The Theses on Feuerbach") can be set before universalism, rather than before philosophy in its traditional sense.

Universalism, of course, needs philosophy, which is indispensable for many reasons. One of these is that knowledge always includes a reflection: it becomes knowledge when it is self-reflective and presumes a knowledge of itself and, therefore, of its own philosophical bases. The main thing is that any realization of the pragmatic goals of universalism is impossible without being based on an appropriate method. The subject of universalism being researched is so broad that we have to focus on the most general ways of cognition and decision-making, which have a general scientific character in the area of their application.

The use of existing general scientific methods, which have been offered by semiotics, cybernetics or synergetics, is limited in universalism since all these methods have the same essential drawback: they have been created for the solution of a rather wide, but specific class of problems. In these interdisciplinary conceptions, there is no adequate apparatus (notions, methods and regularities) that could be used for the analysis of many problems that are of great interest for universalism. Among such problems are, for example, the evaluation and preservation of unique languages and cultures; an inquiry into the comparative power of social groups and eco-systems; a choice between the principles of unitarianism and federalism in a social organization; a determination of the significance of individualism and collectivism in the structures of social life; the correlations of good and evil in ethics' systems; the description of the parameters of immanence, stability, regeneration and others in finding the quality of life; an estimation of the role of religious doctrines from the point of view of their ability to ensure a dynamic equilibrium of social systems and public mental health; the construction of socially significant typologies of a person, etc.

Let us turn, for instance, to synergetics. It is possible to make use of the synergetic paradigm for explaining the emergence of totalitarian regimes under conditions of social disorder ("chaos"). Another possible application is the emergence of social groupings oriented towards deviant behavior. Nevertheless, it would be an obvious stretch to apply the ideas of synergetics (that have been formulated on the basis of researching of natural, mainly physical, processes, to which the quantitative analysis is potentially applicable) to such areas, as the research of universal preconditions for human life, the revealing of invariants in the spiritual life, and the searching of archetypes of collective unconscious or primary structures of thinking and language. It does not make much sense to describe in terms of synergetics, for instance, a philosophical Absolute or universal religion. All these things, being a matter of great interest for the theorists

of universalism, are hard to be interpreted as "systems, arising in non-equilibrium conditions".

Universalism requires not just a method having general scientific applications, but an *adequate* method.[2] Such a method must be *relevant* to the "universalistic" approach to problems, i.e., it should coincide with their meaning and should be extensionally identical with them (universal in application). Moreover, such a method should offer the structures which are isomorphic to the described relations in society and nature.

The Parametric General Systems Theory (PST), developed by the school of Avenir Uyemov, meets these requirements due to certain features of this theory.[3] First, it has a rather distinct construction "from top to bottom", and its philosophical and ontological premises are clearly specified. PST, in the sense of structural description, is based on the ternary structural model of the world, which presumably refers only to functional differentiation of things, relations and properties (one of the seven logically possible models). Due to these bases, the subject range of PST is so wide extensionally that it is akin to universalism, thus is able to approach any system-structural problem addressed by universalism.

Second, there is an obvious commonality of many fundamental concepts in PST and universalism. A number of categories used by the theorists of universalism have been given definitions and formal representations in PST: "system", "stability", "autonomy" (compare with the notions of "regionalism" and "federalism"), "power" of systems, "totalitarianism", "uniqueness", "immanence", "self-preservation", "an openness of system", "regeneration", "completeness" and others.

Third, the subject of the universalist's interests in general, as well as the researching of global economical, cultural and psychological problems of mankind in particular, is very difficult for quantitative analysis because of its extreme complexity and basic uncertainty. Reasoning and discourse on these things is usually carried out at a qualitative level, in a natural language, rather than quantitative. The polysemy of a natural language always hides a danger of sliding into mere verbal discourse. In PST there have precisely been developed ways and procedures of non-quantitative measurements, related to the definition of values of system parameters.



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[2] See Арнольд Ю. Цофнас, *Теория систем и теория познания* (Одесса, 1999), 26–51, 80–90.

[3] See *Проблемы формального анализа систем* (Москва, 1968); *Логика и методология системных исследований* (Киев–Одесса, 1977); Авенир И. Уёмов, *Системный подход и общая теория систем* (Москва, 1978); Авенир И. Уёмов, "Основы формального аппарата параметрической общей теории систем", *Системные исследования. Методологические проблемы*. Ежегодник. 1984 (Москва, 1984): 152-180; Avenir I. Uyemov, "The ternary description language as a formalism for the parametric general systems theory," *International Journal of General Systems*. Part 1, vol. 28 (4–5) (1999): 351–366; Part 2. vol. 31 (2) (2002): 131–151; Part 3, vol. 32 (6) (2003): 583–623; Арнольд Ю. Цофнас, *Теория систем и теория познания* (Одесса, 1999); Авенир И. Уёмов, *Системные аспекты философского знания* (Одесса, 2000); Leonid Leonenko, "The language of ternary description and its founder", *Modern Logic,* vol. 8, no. 3–4. (2001): 31–52.

Fourth, since PST uses a special formal calculus—the Ternary Description Language (TDL)—it is possible to carry out a rigorous analysis of universalistic problems, without any unjustified simplification of humanitarian phenomena. Such simplification occurs when these phenomena are represented in languages that are intended for the description of quantities and magnitudes (traditional mathematics). In this way, universalism gets the means for a formal presentation of its own tenets, for an analysis of the correctness of reasoning, and in some cases for the derivation of deductive conclusions. The application of PST promises to provide universalism with a tool for the theoretical description and the forecast of outcomes of system synthesis when dealing with systems of different natures. In other words, PST can be helpful to universalism in acquiring the characteristics of a relatively rigorous scientific conception, thus opening the possibility of obtaining a heuristic function.

And lastly, universalism by applying PTS, would be able to get some of its own regularities ready-made as some specifications of the corresponding PTS regularities. This point will be discussed below.

Thus, the "implantation" of parametric general systems theory in the tree of universalism promises to give interesting scientific and practically significant fruits. We shall review the basic ideas of this theory below.

## II. PARAMETRIC SYSTEMS THEORY

### The Notion of a System

Any conception that pretends to be some "general theory of systems" cannot ignore the established language pragmatics—language games, in which the word "system" is filled up with sense anyhow. Eventually, a system is a thing that satisfies one of the available definitions or explications of the term "system", at least the definition that the "current" author had proposed.

However, General Systems Theory, in which this word is used as a term, should define it so widely that different system notions assumed in scientific practice as well as in the ordinary usage could be considered as particular cases of the definition. At the same time it is necessary to avoid impoverishing of the content of a notion, which occurs in the ordinary procedure of abstracting. The definition should be informative enough not only to allow distinguishing a system from "non-systems", "conglomerates", "non-systemic complexes", "chaotic formations" etc., but also to give the possibility of eliciting consequences from system view.

As a result of relational generalization (the invariant structure of different definitions was revealed), Avenir Uyemov formulated[4] the two following definitions:



[4] Авенир И. Уёмов, *Системный подход и общая теория систем,* 120–121.

*Definition 1*. A system is an arbitrary thing in which a relation having a definite property is realized. (This definition is called *attributive*).

*Definition 2*. A system is an arbitrary thing in which properties having a definite relation between them are realized. (This definition is called *relational*).

What are the basic features of these definitions?

1. Both definitions explicitly use the triple of philosophical categories: *thing, relation and property* (specified by Aristotle). Herewith these categories are understood very widely. It is supposed that they cover objects of any nature. These categories are defined one through another and are distinguished only on the basis of *functions* they play regarding each other in a given context. The functional character of these differences is perceived naturally enough for natural languages.

2. Both definitions also refer, while not so obviously, to one more triple of categories: *definite* (natural language synonyms are "fixed", "presetting", "predetermined", "supposed"), *indefinite* ("any", "some") and *arbitrary* ("anyone", "everyone", "whatever", etc.). These categories are not understood in the plural set-theoretical sense. For instance, "some" does not necessary mean "there is such object in the given plural set, which . . .", as well as "any" is not a synonym of "any thing of the given plural set". Just as the categories of things, relations and properties do not express the nature of things, the notions of definite, indefinite and arbitrary do not make it either. A thing of any nature can be definite, indefinite, or arbitrary.

3. Both definitions fix a certain order for presentation of a thing as a system: a) "definite property" (or "definite relation") indicates the sense in which the given object is considered as a system, and so must be chosen firstly; b) secondly, we must point out the relations (or properties of the second definition) that correspond to the indicated definiteness; c) finally, we come to a thing that is a bearer of the chosen relations (or properties).

4. According to above definitions, any object can be presented as a system. The world is not initially divided into the things that are systems and those that are not systems in any sense and under any circumstances. In other words, the division of reality into systems and non-systems is accepted only on the intentional principle: any thing can be understood either as a system or as not a system. Any thing that is initially perceived as something unsystematic can immediately become a system if some relations, satisfying a certain property, or some properties, satisfying a certain relation, are realized.

5. These definitions are structurally similar. They will even remain unchanged, if we simultaneously replace the word "relation" with the word "property" and vice versa. It means that these definitions submit to a so-called *principle of duality*. The idea of duality is widely used not only in science (in geometry: "two straight lines determine a point" and "two points determine a straight line"), but also beyond it. For example, from Ludwig Feuerbach's judgment "For love, two is necessary", by dual transformation we can get another

judgment: “Love is necessary for two”. The meaning of these judgments, irrespective to their validity, is different. Analogously, the presentation of a thing as a system in two dual ways gives two different systems.

6. Both definitions include the common point that is present in the structure of those definitions, which were generalized. Any object that is presented as a system according to the one from two given definitions, which are generalized, will certainly turn out to be a system according to the one of these definitions, formulated by Avenir Uyemov.

## Systems Descriptors

As it was mentioned above, both definitions of system are constructed under the same three-step scheme. The generalization of these steps results in the notion of *descriptors*; namely, in the notions of *concept*, *structure* and *substratum* of system**.**

*Concept* is the definiteness (definite property or definite relation) that system’s presentation starts with. Most frequently it is not formulated explicitly, but “keeping in mind” as something self-evident and known before system presentation. In the process of reasoning that deals with the system of points on a plane, even a schoolboy understands that he refers to the “geometrical” concept, so there is no sense to expect from points that they would possess the properties of weight, velocity, color, size, etc. The question is about the spatial correlations of these points. A. Bogdanov in his *Tectology: Universal Organization Science*[5] was interested in the “organizational” concept, and all tectological objects were selected only from this point of view. Another founder of a general systems theory, M. Petrovitch, usually perceived the relational mode of concept, namely, as the relations of isomorphism.[6] L. fon Bertalanffy used an “organismic” concept. Those who determine a system as something that corresponds to a certain class of mathematical equations base this on the definite “mathematical” concept (and thus understand “system” in accordance to the second above-mentioned definition), etc.

Only some abstract systems are presented unequivocally, i.e., they can have only one relation, determined by the concept. (Here we speak about the first definition, but *mutatis mutandis*, this concerns the second definition as well). As a rule, it happens to deal with the concepts that define the system-forming relations equivocally. This ambiguity is removed only by the subject (a person) who is carrying out a choice of these relations, from the range of the allowed, to choose by the accepted concept. For example, the human being as a system, even in an anatomical sense taken as a concept, is not a single, but a great number



[5] А. Богданов, *Тектология: Всеобщая организационная наука*. В 2-х книгах (Москва 1989).

[6] Ibid., I, 278–291.

of different systems. It is known that Tibetan medicine has a quite different system of human body organs than European medicine.

Analogously to the concept, the *structure* of a system is defined in two variants in conformity with two ways of system presentation. The structure can be *relational* (case of the first definition) and *attributive* (second definition). This is perhaps the most important descriptor of a system. The attention of an explorer is mainly focused on a structure. However, the system approach is not identical to the structural one (as for example in algebra or in structuralism in general) because, in the system approach, the structures are considered not separately from things, but namely together with the things, i.e., as the interpreted structures. Yet this does not mean that the structure cannot be abstracted from the system that possesses it.

The *substratum* of a system is the thing upon which the structure is realized. The choice of this thing, as has been mentioned above, is arbitrary. It may have any nature and may relate to the inorganic or organic world, to a social area or to a sphere of knowledge—which seems to be quite suitable for the theorists of universalism. Various cultures, ecological complexes, archetypes of collective unconscious, poetic images, etc., are as systematic as the system of telephone communication, constellations or the natural series of numbers.

In the literature on system research, the notion "elements" is frequently used instead of the "substratum". However "elements", even if we do not link it with the concept of a set, assumes the view of object as divided into parts, dismembered. At the same time, the dismemberment is essential not for all systems. The system of "self-analysis" does not consist of elements, nor any other system which structure is a reflexive relation. However, it is pertinent to use the concept "element" for characterizing the dismembered systems.

Though the presentation of any object as a system can be carried out in two ways—attributive and relational—it requires the same algorithm respectively to the sequence of the use of descriptors. This serves as the basis for the unified scheme of definition: *The procedure* (and the result) *of transformation of an arbitrary object to a substratum being constrained by some structure that satisfies a certain definite concept is called system presentation.*

The system presentation is not an ultimate goal, but only the initial stage of application of a system method. In the next stage, some specific "system properties" should be specified.

## System Parameters and Their Values

If we assume that any thing can be presented as a system, then "general system properties" must be only those that can be attributed to any thing without *nonsense* (though *falsity* is allowed). At the first sight, it seems that the domain is restricted to the properties that are fixed by philosophical categories. Really, what basis can make it possible to divide into classes such a set of heterogeneous

objects as: a snowflake, a surd number, a hare, Butsefal, a dream, the relation of identity, 2 x 2 = 25 , the genitive case, parental meeting, universalism? Probably, we could manage dividing this set into classes on the basis of philosophical categories, so to say, to receive the classes of material and ideal subjects. Nevertheless, we cannot obviously separate these things based on such attributes as clever, white, lucky, bearded and old. The attributing of these properties to some of the subjects from our set is senseless and cannot form the basis of its division.

However, let us assume that the above list of objects has already been somehow represented as a system. Some philosophical categories can be attributed to any thing. But this still does not mean that some properties (not only philosophical categories) can not be meaningfully attributed to any thing represented as a system. In fact there are some properties that can be indeed attributed to any system. The system perception of a thing requires, at least, the preliminary extraction of concept, structure and substratum. In its turn some relations of the second order can be established between these descriptors, and these relations always possess some properties. These properties are applicable to any system (so they can characterize any thing in its system representation). Some examples of such properties are: stability, dismemberment, variability, complexity, completeness, wholeness, reliability etc. So, if we represent the above list of (dream, parental meeting, snowflake, …) as a system, the division of this list on groups based on the above properties becomes possible.

Thus, a *general-system parameter* is such an attribute that can form the basis for the division of the whole notion of "system" into classes according to the ordinary logic rules: commensurability, common foundation, mutual exclusiveness of classes and a continuity of division. Then such characteristics as, for example, "unreliability", "completeness", "certain degree of complexity", "stability" etc., act as *values* of these parameters. That is to say, the value of a system parameter has always indicated the class that a thing can be referred to, if it is considered as a system.

There exist two kinds of system parameters: those that characterize a system itself (they are called *attributive*); and those that characterize a system in its relation to another system (*relational* parameters).

## Attributive System Parameters

We shall present several examples of dichotomic division of systems by attributive general-system parameters. Almost all of these system characteristics have been missed in the majority of system conceptions, just for the indicated reason: their authors were interested only in the systems of definite kind.

One of the two values—*dismembered* or *non-dismembered*—of the two-valued property *dismemberment* can be attributed to any system. According to the given property, a system can either be consisted of elements or not. The

frame of reference in physics or any system of reference in humanitarian sciences (for instance, for definition of good and evil) is an example of a non-dismembered system. When something correlates to the system of reference, its elements are not interesting—what is important is the whole system itself. "The subject of knowledge" in classic epistemology is also non-dismembered system.

The next general-system parameter is determined on the basis of mutual autonomy—or absence of autonomy—of elements respective to the system as a whole. These systems are called *automodel* or, on the contrary, *non-automodel* systems. According to Leibniz, for instance, an animal is "a garden, each part of which is a garden also". The parameter of automodelity is of great importance in discussions about federalism and unitarianism.

Let us pay attention to the parameter of *elementarity*. A system is considered to be elementary when each of its elements is not a system respective to the concept of the whole system. The requirements of completeness, consistence, independence, which each separate axiom cannot correspond to, apply to the whole formal axiomatic system; this system is elementary. However, the confederation of the states is constructed as a non-elementary system. If all elements of a system are systems with the same concept as well as the system as a whole, such a system is called *autonomous*.

Bogdanov and Bertalanffy as well as many others were interested in systems, which were dynamically changeable. Changeability is a property that essentially characterizes many systems. This attribute is one of the two values of the parameter of *variability*. *Variable* system supposes changes both of structure and of a substratum, and passing through a number of variations it can even transform itself into another system. Meanwhile most systems are far from being like this. The abstract concepts, which have their definition, are not variable. Defining a square as an equilateral rectangle, we do not expect any changes in this characteristic. Therefore, non-variable systems are not characterized by the notion of changeability. *Non-variable* systems are not changeable. They have no "states" in the strict sense of the word.

The statement of the existence of non-variable systems does not contradict the belief in generality of motion: the object can change, for example, its spacial position or even change qualitatively, but not in the sense that determines it as a system. A geographical map of Poland, for example, wears out or changes, some corrections are made while it is republishing. However, the given map, as a certain system of symbols, has no states and then is a non-variable system. The domain of non-variable systems includes the series of natural numbers, a crystal lattice, an anatomical atlas, and Kantian system of categories. The concept of "absolute spiritual values", as well as other abstractions, is a non-variety system, but a set of hypothetical imperatives of Kant, for example, is a variety system.

The parameter of *immanence* is undoubtedly of interest for universalism (e.g. in the analysis of eco-systems, determination of the nature of political

independence or cultural identity, etc.). In non-immanent systems, a system-formative relation embraces not only a substratum of the given system, but also other things. To realize the structure of an immanent system there is no need in any other objects, as its substratum and a set of correlates of a system-formative relation coincide. As an example of non-immanent system, any systems of communications can serve: the character of speech of a politician is determined not only by contents of speech, but also by the audience, as well as by a political program of his party. An opposite example is the idea of autarchy, a North-Korean ideal of "chych-hea", i.e. of the reliance on one's own forces only: it is an appeal to self-sufficiency, immanence.

The search for the optimal political frames for humanity involves the discussions of the nature of totalitarianism. However, the political "engagement" of this term prevents the universalistic statement of the question. Meanwhile the definition of *totalitarianism* as a value of an attributive general-system parameter (a system is called *totalitarian* if its concept is realized on an arbitrary relation between elements; i.e., so to say "penetrates into the system from top to bottom") allows reference to this class of systems, not only Plato's model of state or Stalinist type of socialism, but also the series of natural numbers.[7]

The discussions about overlapping tendencies of globalization and regionalization frequently raise the question of preservation of the unique cultures, tongues, ethnos, ecological complexes. But this problem is not always addressed clearly and accurately. Within the framework of the system's methodology, there is a possibility, at least, to distinguish different kinds of *uniqueness*. If the structure selected under the given concept can be realized only on the given substratum, and not on any other, the system is unique in its substratum. Analogously, we can distinguish the uniqueness of system by its structure or by its concept.

There exist many other attributive system parameters that are somehow used in universalism, but without attempts to apply a system method of research. It is impossible to describe them in detail in this paper. We shall only name (without detailed comments) some parameters, whose values appear especially frequently.

*Reliability*. According to this property, it is possible to divide systems into fully reliable and not fully reliable systems. Fully reliable systems are those that realize their concept on each of their elements. Examples of this are guerrilla detachments and terrorist groups, thus it is so difficult to counteract them. Ironically, it seems to be easier to defeat a regular army than multiple al-Qaeda cells.

*Completeness (closeness)*. The structure of system which is completed (closed) in a substratum, does not allow inclusion of new elements without



[7] Авенир И. Уёмов, "Общая теория систем и логика в анализе перспектив социального развития", *Materiały Międznarodowej Konferencji WspółczesneProblemyUniwersalizmu w Europie Środkowej i Wschodniej.– Wspólnotowość, regionalizm, globalizm* (Warszawa 1996), 30.

destruction of this system. Human knowledge and culture as a whole can be presented as the uncompleted systems. At the same time, some scientific theories, especially formal, are complete or strive for completeness. Analogously, it is possible to consider the structural openness or closeness.

*Minimalism* (*minimal and non-minimal systems*). In contrast to completeness, this property indicates the possibility of removing the elements. If the structure of a system will be destroyed by removal of any element, the system is minimal. Otherwise, it is non-minimal. Analogously it is possible to define the *structure*. Political dictatorship is minimal in its structure (but not in its substratum): it collapses with elimination of certain parts of its structure, e.g. the relations "dictator-executor".

*Stationary character and stability.* The system that preserves itself, despite the replacements of its elements, is stationary. Poland is kept, despite the continuous alternation of generations or changes of social institutes. Analogously, if the system is steady regardless of the changes in its structure, it is stable.

*Regeneration*. The system can be restored completely or partially, spontaneously or externally, respective to its substratum or to its structure. These major characteristics are frequently discussed during decisions made on political problems. Religious belief is auto-regenerative, at least in structure. The hope for external regeneration allows the teacher to be engaged in the re-education of a child.

The *power* of a system means that a thing, becoming an element of the given system, loses the former system characteristic—its concept (Hegelian dialectic in dialectical materialism is not anymore Hegelian dialectic).

To conclude, it must be noted that several dozens of general-system attributive parameters, which divide systems into classes in a binary way, have been described and investigated. It was also formally demonstrated that the totality of attributive system parameters is a denumerable set.[8]

If necessary, intermediate values of parameters can be introduced, thus making it possible a transition from a dichotomizing principle to more detailed classifications. On the other hand, some attributive parameters, being linear, do not presume dichotomizing division of concept "the system". An example of these are the parameters of *complexity* and *wholeness*. The latter indicates a degree of cohesion (coherence) of elements in a substratum, parts of structure or aspects of concept. The parametric systems theory allows describing these degrees by non-quantitative mode.

Let us notice that system parameters require precise definitions; otherwise there can be misunderstandings. Therefore, the solar system is habitually determined as a centered system on the ground that it has the largest allocated



[8] Л. Л. Леоненко, И. Н. Сараева, "О применении языка тернарного описания к моделированию значений системных параметров и установлению общесистемных закономерностей", *Системные исследования. Методологические проблемы*. Ежегодник ( Москва, 1984): 181–193.

element – the Sun. However, in PST the centrality is understood as a presence of a medium link through which the relations between separate elements are determined. In this sense, the solar system is not centered, as far as gravitational relation between planets does not presume relation to the Sun.

## Relational System Parameters

These parameters characterize relations of any systems to each other that involve concepts, structures, substrata as well as their combinations. We frequently use some of these characteristics without thinking of their system nature. One can speak, for example, about identity of systems in concepts (*relevance, isoconceptuality*), in structures (*isomorphism, isostructuredness*) or in substrata (*isosubstratumness*). Then the incongruity or partial coincidence can also be examined as value of the given parameter.[9] We speak about *adequacy* if systems are identical in their concept, but differ in substrata.[10]

It is possible, by analogy, to raise the question about general-system relational parameters, for instance, such relations, as *determination*, *functional conformity* or *complementarity*. Actually, universalists are frequently engaged in clarification of these kinds of relations between systems: in the discussions about dialogue of cultures, about a parity of ecological complexes, or about ways of establishing of mutual understanding.

## General-System Regularities

The system-parametric description of objects does not solve any problems itself, except the problems of classification. Without discussing the question of reducibility of any theoretical problem to a classification problem, we shall note that classification has operative significance only when it is possible to establish any steady correlations of classes. Such correlations carry out the role of laws and allow predictions (analogous to what can be done, for instance, using Mendeleyev's periodic law).

The correlations of system parameters are established in two ways: (1) by statistical analysis of the empirically obtained functional dependencies or (2) analytically, by deductive reasoning. The second way is realized even when there is no empirical basis for the formulation of the theorems that are to be proved. The statistical processing of many systems (with maximal diversity) is focused on the reception of a generalized judgment like this (in a simple case):



[9] In the book of: Avenir I. Uyemov (Авенир И. Уёмов, *Системный подход и общая теория систем,* 148) is indicated the summary scheme of definition of those possible two-place binary values of relational parameters, which are defined under relation of identification.

[10] See Арнольд Ю. Цофнас, *Теория систем и теория познания*, 65–66, 80–90.

if a system has a certain set of binary attributive parameters' values, then, with a certain probability, it possesses certain values of other parameters.

As a result of computer data processing of about two thousand systems (25 series with 400 systems in everyone), more than three dozen general-system regularities reflecting connections between twenty attributive parameters in PST have been obtained.[11] To give a brief explanation of their character, we shall present here examples of several regularities connected with the parameter of regeneration. Let us note that all these regularities, due to their generality, are not indifferent to universalistic reasoning.

— *If a system is auto-regenerative respective to its substratum, it is also auto-regenerative respective to its structure.* The social system that is capable of restoring its institutions automatically reproduces the former social relations as well. (So, in the framework of Marxist thought, its thesis about the necessity of demolishing the old state machine was not senseless.) After the collapse of communism, in many post-Soviet countries, while the declared goal of transition toward democratic government and market economy has being pursued, nevertheless the former state system was able to restore its traditional institutions. The restoration of the previous substratum was followed by the restoration of the previous structure, which contradicted the declared concept. This led inevitably to the crises. This regularity is also apparent in ecological systems and in the phenomena of culture capable of auto-regeneration.

— The systems that are not capable to external regeneration, as a rule, are not fully reliable (probability of exceptions $q \cong 0{,}019$).

— *If the system has property of auto-regeneration respective to its structure, then its structure is not externally regenerative*, and vice versa ($q \cong 0,\ 07$). The fact that these two characteristics practically never converge has great importance for all self-developing systems—from organisms and eco-systems up to a society and the development of human knowledge. According to this regularity, the experiments in artificial reformation of norms of grammar (language reforms because of their apparent ease are often attractive for governors of the emerging states) should result in that language losing its capacity of self-restoration: the language would cease to be "alive".

— Usually ($q \cong 0,\ 07$) *the system, auto-regenerative respective to its structure, has the property of autonomy.* It explains a well-known fact: the market economy presumes, at least, economical federalism and independence of the subjects of economical relations. In accordance to this regularity, both science and art are capable of reproducing itself as long as the autonomy of separate theories and of various trends and movements is preserved. Simplified understanding



[11] See В. И. Богданович, Б. В. Плесский, А. И. Уёмов, "Автоматический учет корреляций между системными параметрами", *Проблемы формального анализа систем*, 75–90; Г. Я. Портнов, А. И. Уёмов, "Установление общесистемных закономерностей с помощью ЭВМ", *Системные исследования*. Ежегодник. 1971 (Москва, 1972): 103–127; Авенир И. Уёмов, *Системный подход и общая теория систем,* 180–187.

of reductionisms' programs on reduction of all or the majority of sciences to psychology (D. Hume), physics (in physicalism), logic (in logicism), sociology (E. Durkheim) etc., has been apparently doomed to failure. For the same reason any school or movement in the arts should not pretend to exclusivity for the sake of its own preservation. (Here the term "autonomy" is interpreted in the fixed sense determined above: each element should be a system in the same sense as the whole system).

Certainly, empirically obtained regularities of PST are not free from deficiencies typical for all empirical generalizations. Therefore, in PST the efforts on verifying these regularities by analytical method were undertaken. It is clear enough that the construction of formal language, in which the general-system reasoning could be expressed and in which the deductive parametrical system theory could be built, is a matter of great importance. The desired language has been elaborated and applied to solve the last problem for many attributive system parameters.

## Key Notions of Ternary Description Language

The parametric systems theory accepts a specific logical calculus as its formal language. It is called "ternary description language" (TDL). In total, there were created four variants of this language.[12] All variants have the same initial categorical basis and, respectively, the same philosophical premises. However, the last version TDL-4 possesses the greatest expressive capabilities. Since the philosophical categories used in this language exist before and irrespective of the theories of systems, the expressive capabilities of TDL are not restricted to express the judgments of systems only. The TDL is applicable to express and analyze different kinds and structures of reasoning.

Some characteristics of TDL construction, distinguishing it from other formal languages, are the following.

The well-formed formula of TDL directly specifies a thing, its property or relation, a relation of properties, the properties of relations etc. A subject of



[12] See Авенир И. Уёмов, "Об одном варианте логико-математического аппарата системного исследования (Часть 1)", *Проблемы формального анализа систем* (Москва, 1968), 42-69; Авенир И. Уёмов, "Формальные аспекты систематизации научного знания и процедур его развития", *Системный анализ и научное знание* (Москва, 1978), 95–141; Авенир И. Уёмов, *Системный подход и общая теория систем* (Москва, 1978); Авенир И. Уёмов, "Основы формального аппарата параметрической общей теории систем", *Системные исследования. Методологические проблемы*. Ежегодник. 1984. (Москва, 1984): 152–180; (see also: Avenir I. Uyemov, "The ternary description language as formalism for the parametric general systems theory", Part I, II, III, *International Journal of General Systems*, vol. 28 (4–5) (1999): 351–366; vol. 31 (2) (2002): 131–151; vol. 32 (6) (2003): 583–623); and a text-book Авенир И. Уёмов, *Основы практической логики с задачами и упражнениями* (Одесса, 1997), 212–235.

analysis can be TDL formula itself, so TDL has the function of a meta-language. Like natural languages, the TDL is *self-applicable*.

The categories of *definite*, *indefinite* and *arbitrary* are expressed semantically, by interpretation of the well-formed formulae of TDL. The following senses are associated with elementary well-formed formulae: $t$ — definite thing; $a$ — indefinite thing; $A$ — arbitrary thing. In the last versions of TDL the list of $t$, $a$ and $A$ is the full list of elementary well-formed formulae (WFF). While different occurrences of $t$ within the framework of one formula specify the same subject (in fact it is already fixed), for $a$ and $A$ it is not obligatory. If it is necessary to express that two occurrences denote the "same" indefinite or arbitrary thing, then the operator of identification ($\iota$— "iota operator") is used. If iota-operator is repeated before notations of indefinite things (for example, $\iota a \ \ldots \ \iota a$), it indicates bilateral identification. Different groups of mutually identified things in the same formulae are marked by different $\iota$-operators; e.g. indexed — $\iota_1$, or duplicated — $\iota\iota$.

Since categories of *thing*, *property* and *relation*, as was pointed out above, differ only functionally, the special symbols for their expression are not used. These distinctions are expressed in TDL syntactically—with the help of "positional principle", i.e. indication of the place that they occupy relative to other symbols. Separately standing symbol indicates a thing. If it is included in brackets, the symbol at the right of a round bracket indicates property, and at the left—relation. Examples of reading of such well-formed formulae: $a$ — "some indefinite thing"; $(t)a$ — "the definite thing possesses some property"; $a(A)$ — "an arbitrary thing possesses some relation".

TDL enables both judgments and notions to operate. It also distinguishes judgments from notions. The judgments are expressed with the help of the opened ("propositional") formulas, and notions—with help of the closed ("conceptual") ones. In both cases, *valence estimation* (which is not applied to notions in usual logical calculations) is supposed. It is not the same to think, "Any thing has the definite property" (this judgment is expressed by $(A)t$, and it is obviously false), or to think about "any thing possessing definite property"— $[(A)t]$; that is quite acceptable. For conceptual closure (only for this purpose), the square brackets are used in formulas. The closed formula itself is an analog of a notion but, strictly speaking, it does not express "notion" in a traditional sense because it reflects certain content of a notion but tells nothing about its extension. The identification of objects closed by square brackets is also made with the help of iota-operators.

The distinction of two directions of predication is expressed in TDL with the help of *direct* and *inverse* formulas. It is false that "Some thing possesses an arbitrary relation"—$A(a)$, but it is true that "An arbitrary relation is realized on some thing"—$A(*a)$. The subjects of judgments are different here. The asterisk in the formula indicates the change of direction of predication. Analogously the following notions have different meanings: $[(a)t]$—"some thing

possessing the given property”, $[(a*)t]$—“the definite property attributed to some thing”.

Let us emphasize that the conceptual closing allows considering *properties and relation as things*. It corresponds to their interpretation stated above, according to which the given philosophical categories differ by a functional principle. For instance, $t$ is a thing in the last formula (“the definite property attributed to some thing”) that certain properties can be attributed to and some relations can be established on. And the thing itself can be attributed as a property or be accepted as a relation of some things, for example, in such a way: $(a)[t(*a)]$—“some thing possesses the definite property which is the relation of some thing”. (Since iota-operator is not used here, the second occurrence of the symbol $a$ can denote either another thing or the same thing as the first $a$).

Like usual logical calculations, the fundamental relation of *implication* is used in TDL, but this logical operator has some other meaning in it. First, the notions of truth and falsehood are not initially assumed in TDL (their analogues are determined as derivative), and implication is not determined through them.

Second, the implication of TDL, opposite to the implication of propositional calculus and predicate logic, equally correlates with opened (propositional) formulae and closed (conceptual) as well; both of them can be its antecedent or its consequent.

Third, not a single, but several kinds of implications are used in TDL. So-called *neutral implication* has the most frequent application. It is marked by a pointer “$\rightarrow$” and is read so: “*if ... is given, then ... is present also*”. For example, $A \rightarrow a$ is read: "if an arbitrary thing is given, then some thing is present also". But neutral implication serves as a generalization for its other kinds: for *concrete implication* “$\Rightarrow$”, that can be considered as a model for the copula (“to be”) of categorical judgment; for example, “A bee is an insect”, “All bankers are rich”, etc. (This implication is also called an *attributive,* since its consequent expresses some characteristic inherent in the antecedent.) If the consequent specifies the relation that we identify an antecedent with (for instance, a citizen is sometimes identified with social relations, a city for the tourists – with the scheme of motion of a municipal transport, etc.), then it concerns the *relational implication*, signed by “$\succ$”. One more kind—*mereological implication* “$\supset$—that covers such relations as “contains”, “includes” (the question is about the correlation of a whole and a part, a set and an element, etc). Both an antecedent and consequent here are things.

Let us turn to an example of more complex WFF, in which the other, already explained symbols, occur: $[(\iota A)t] \rightarrow (\iota A*)a$. We should read, “If there is any thing possessing the definite property, then some property is attributed to the same thing”.

In TDL, other symbols are used also, in particular, the comma, permitting an enumerating of something, without assuming any relation, except relation in the list. It is possible, for example to make the *free list* (from a nail and a requiem)

just through listing of these subjects. However in the phrase of Chekhov "it is similar, like a nail to requiem" these subjects have already been connected by some relation. Ignoring the nature of this connection, we can make the *connected list* of them. In such a case, the dot between symbols is used. For example, the formula $(t \bullet \iota a) \rightarrow (t, \iota a)$ means that, having the connected list of a definite thing and any thing, we thereby have their free list.

The *figured brackets* are used to avoid an ambiguity in the well-formed formulae. For example, it is obvious that the formula $t, a(A)$ can be read in two ways. If it is necessary to exclude this ambiguity (while it is not always required, since sometimes ambiguities should also find formal implementation), one of two possibilities can be presented like this: $\{t, a\}(A)$. Figured brackets do not have any other functions.

The above are the most often used (applicative) symbols. They are quite enough to give formal representation of two definitions of a "system" formulated above. For this purpose we use designations which are not the symbols of TDL, — meta-symbols: "$=_{df}$" — "*by definition*" and the word of natural language "*System*". Then attributive definition (*definition 1*) will have the following form:

$$(\iota A)System_1 =_{df} ([a(*\iota A)])t$$

Literally, it is read as: according to definition, *any thing has a property to be a system*$_1$*, if some relation of this thing has definite* (previously fixed) *property*. Thus, in a verbal definition there were no nuances, which could not be expressed by formalism.

Accordingly, *definition 2* (relational) is expressible as following:

$$(\iota A)System_2 =_{df} t([(\iota A*)a])$$

It says: *any thing is a system*$_2$*, if some of its properties possess the definite relation*.

The values of system parameters and other statements of the parametric systems theory are expressed in analogous way.

## III. THE APPLICATION OF A SYSTEM METHOD TO THE ANALYSIS OF SOME UNIVERSALISTIC PROBLEMS

Let us examine more closely the application of PST to the analysis of problems in which universalists are interested.

The first example is from the area of economic-social relations. One of the problems faced by the world community is that the support of international financial organizations to developing and other countries with transitional economies is inefficient. This problem has been analyzed mainly at an intuitive level. This inefficiency, however, is better explained by one of the principles or

regularities of the parametric general system, according to which *a system, being subjected to external regeneration, loses the ability of auto-regeneration* and becomes dependent upon external influence. Conversely, the other parametrical regularities indicate that precisely those systems which are capable of auto-regeneration and self-restoration are structurally stable as well.[13] The instability of the countries with transitional economies is a serious concern that discourages investors.

Another example, related to the first, is that according to one of the principles of PST (the idea of so-called "relational collapse") an *external* relation of a system with the outside influence has a tendency toward being internalized and becoming an *internal* relation of this system.[14] In other words, a system gets "accustomed" to this kind of structure and, as result, the system's condition is changed.

In some cases it leads to undesirable consequences, such as the above-mentioned example of the negative outcome of policies relying solely on foreign "financial injections" from international organizations. On the other hand, according to the same principle, there are possibilities of a positive outcome of an external relation of a system, in the cases in which the system retains its auto-regenerating capability and structural stability and improves its condition. This principle provides a theoretical insight for current debates regarding whether or not democratic and free-market structures can be successful in the non-Western countries which historically did not have these traditions. Some argue that an open society is impossible in the Eurasian region and in Eastern countries due to their different socio-cultural traditions. From this perspective, Rudyard Kipling' observation that "East is East, and West is West, and never the twain shall meet…" would be interpreted not as the recognition of cultural differences of two great worlds, but rather in the absolute terms of their alleged Manichaean incompatibility as an insurmountable barrier in the path of their economic and political cooperation. But this argument does not hold up in light of the above-mentioned systemic principle. The possibility of successful democratic development can be realized since the relations that are introduced from outside and that function during a long period of time eventually can become internalized and assimilated as "natural" for the system in many ways: economically, politically, culturally, psychologically, etc. Historical traditions have their impact, of course, but only at the level of specificity of emerging systems. The key issue is whether or not the set of democratic values will be adopted by a system-recipient. Any attempt of "forcible restructuring" is doomed to failure: systems are incompatible if their concepts are radically different. In other words, ideas have to pave the way to and lead the economy and politics: otherwise, the efforts in other areas have no chance for success.



[13] See Авенир И. Уёмов, *Системный подход и общая теория систем*, 182–183.

[14] Ibid., 228–231.

The third example is related to the attempts to explain the sometimes inexplicably strong influence of some charismatic leaders using certain ideologies to get complete control over the minds and behavior of masses of people. The system approach can be helpful to the better understanding of some of the "universalistic" features of this phenomenon. Apparently, there is a whole class of similar systems, not only in the area of social psychology. The charismatic type of leader and ideology was explored, for example, by Max Weber particularly in his studies on the phenomenon of "the Protestant ethics". We can call such systems "magnetic" and give the following formulation of this meaning of the attributive system's parameter:

$$(\iota A)\textbf{\textit{Magnetic}}\ \textit{system} =_{df}$$
$$=_{df} (\iota A)\{\{\{([\iota\, \iota\, a(*\iota A)])t\} \bullet \overset{\times}{\iota} a\} \rightarrow ([\iota\, \iota\, a(*\overset{\times}{\iota} a)])t\}$$

An interpretation of this formula is as follows: an arbitrary thing ($\iota A$) is magnetic if it is represented in a systemic form and its connection (the connected list is designated by a dot) with a certain thing ($\overset{\times}{\iota}$ a) thereby indicates that the later acquires the same concept and structure as the arbitrary thing. In other words, as result of their synthesis, a new system emerges that is isomorphic (isostructural) to the first system in relation to the same concept. For example in physics, a natural magnet is able to magnetize even a nail, thus transforming it into a magnet. In the field of cultures, such magnetic systems are represented by Christianity as well as other world religions that attract many people to become believers. Ideologies also belong to such systems (for instance, the influence of communist ideology exploiting the idea of social equality, which remains attractive for some sectors of the population in economically less developed countries). The European Commonwealth can also be considered a magnetic system which attracts many countries, which are interested in joining it—even sometimes at the cost of their vital needs—hoping to acquire the basic characteristics of the system.

It is possible to further study the relation of this value of the attributive parameter with the values of other parameters in order to ascertain their correlations and to discover the corresponding relevant regularities.

The systems theory approach can shed new light on the debates regarding globalization. Currently, in these debates there is a growing split between "globalism" and "antiglobalism". Roughly speaking, the positions are polarized between two incompatible visions. The theorists of globalism assert that the tendency toward integration and globalization—technological, economic, political, and cultural—is an inevitable "law of history". They believe that this tendency will help solve the world's problems, from climate change to terrorism. They propose the establishment of a centralized world government as the only thing able to deal with anarchism in international relations.[15]



[15] H. Milner, "The Assumption of Anarchy in International Relations Theory: A Critique", *Review of International Studies* , no. 17 (1991): 67–83.

Their opponents from the antiglobalist camp point out the negative consequences of globalization, such as the decreasing of diversity and the spread of standardization and homogenization of culture. They view globalization as a symptom of the crisis of contemporary civilization and of the degradation of humankind. They argue that, since Herbert Spencer's nineteenth century theory, it has been known that nature is characterized by an escalating entropy, while humanity continues its evolution due to the increasing diversity, heterogeneity and complexity of its organization. But if people continue a strong attachment to habitual national customs and traditions, this can result in the inertia of conservatism and stagnation. In general, everything homogeneous is incapable of development. Homogeneous systems lack vitality.

Both sides pretend to speak on behalf of the interests of humanity, but nonetheless none of them appears to present a decisive argument. However, from the system theory point of view, *both* models appear to be correct. The concept of globalism is correct in the sense that the search for an "order" in world affairs is always a search for structure within the framework of *one* system, and this structure is selected so as to fit a certain concept.[16] The antiglobalists also have their legitimate concerns. A decrease of the level of the diversity in a culture, including political culture, threatens its own future and can lead to its destruction: an autogenerative system, i.e. system capable of self-recreation and self-reproduction, can not be homogeneous.

Apparently this conflict of conceptions has precisely the character of *complementarity*—in the sense of the term used by Niels Bohr: each of them is just, but each is incompatible with the other. In this case, the globalist remains uncertain of an answer to the question: How can culture exist in a totally regulated homogeneous world? Similarly, the antiglobalist is uncertain of an answer to the question: How can humanity resolve global problems? Therefore, one could assume that contemporary civilization has to *forever* preserve this conflict of the two conceptions (in nonviolent form) in the name of self-preservation and harmonization of the civilization itself. This can be plausibly achieved by finding a new conception of the dynamics of world development, a new system with a completely new concept, whose structure would be based on the relationship of complementarity and tolerance, and whose substratum would be the conceptions of globalism and antiglobalism.[17]

What could such a concept be? The answer to this question lies beyond the borders of the goals of the systems theory approach: the possibilities of systems theory are not limitless. Perhaps, it could be an idea of a shift from a predominant tendency of extensive and extensional behavior of humanity toward an intensive and intensional model. Perhaps something else. Coming back to the



[16] Regarding the concept of "order" see А. И. Уёмов, И. Н. Сараева, А. Ю. Цофнас, *Общая теория систем для гуманитариев*, 139–152.

[17] See Арнольд Ю. Цофнас, *Теория систем и теория познания*, 132–133, 255.

main theme of this article, we can conclude that the parametric systems theory can be helpful to universalism in acquiring the characteristics of a relatively rigorous scientific conception. This would stimulate a dialogue with the scholarly and cultural communities, while avoiding oversimplification of the problems of universalism, thus making this dialogue heuristically more fruitful.

Translated by Edward Demenchonok

ABOUT THE AUTOR – Professor and Head of the Department of Philosophy and Methodology of Science at the National Polytechnical University of Odessa, Ukraine. He was a disciple of Prof. Avenir Uyemov, and under his tutelage he defended his Doctoral dissertation on Philosophy of Science. He is the author of *Systems Theory and Theory of Knowledge* (1999) and *Gnoseology* (2005). He also coauthored, with Avenir Uyemov and Irina Sarayeva, of *The General Systems Theory for the Humanities* (Warsawa, 2001).