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Philosophy International Journal
ISSN: 2641-9130

Developmental Systems Theory and Systemic Approach: A Weak Relationship

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Research article

Volume 5 Issue 1

Received Date: January 05, 2022

Published Date: February 04, 2022

DOI: 10.23880/phij-16000226

Abstract

Developmental Systems Theory (DST) has the merit of revitalizing the concept of system and applying it in a phenomenal field that can only be explained with precision by means of this paradigm. However, DST is a systems theory without systems, since it does not use the concept of system beyond the simple mention of the conceptual framework (that is, GST) to which it is ascribed and through the use of the principle of unity of system and environment. One of the most glaring contradictions of DST is that it does not use the powerful conceptual baggage of the systems approach that it claims, or, when it does, it makes the same mistakes as structuralism. On the contrary, conceptions are born within it that, pretending to introduce new things, what they actually do is draw attention to the obvious as if it were something new (for example, to the ostensible fact that "there are processes"). In this sense, around GST and DST new acronyms arise that do not contribute anything that is not already contained in the old but in force systemic approach.

Keywords: Development; System; Structure; Organism; Biopsychosocial; DST; GST

Introduction

When Ludvig von Bertalanffy expounded his General Systems Theory in the homonymous book at the same time that he vindicated his authorship of the concept, he referred to the fact that it was replicated under other names, although he proudly proclaimed that this was a sample of its success (Bertalanffy, 1968).

Bertalanffy was right: today, variations on the same theme are still proliferating, such as the prevalent DST (Developmental Systems Theory) or the brand new DDST (Developmental Dynamic Systems Theory). One of the key authors in this area is Susan Oyama, who can take credit for having contributed, to a greater extent than anyone else, to the rise of DST through her controversy with the deterministic approach of the genotype-phenotype relationship and its implications, as well as for the "discovery" that science uses metaphors instead of full concepts [1]. It must be clarified that, both in the case of Oyama and Bertalanffy, as in all the other variants of the General Systems Theory (GST), these are not theories in the scientific sense of the concept, but rather a conceptual framework applicable to any entity or process qualifying as a "system" or "developing system". In fact, even though the merit of calling attention to the systemic nature of reality must be recognized, Bertalanffy's elegant prose book is, to a large extent, a scholarly account of the areas in which this "theory" is applicable (with an accurate description of these), plus some thoughtful opinions about certain philosophers that the author links with GST.

Regarding the supposed use of metaphors by science, if the way in which Oyama uses the concepts is studied, it seems that said author confuses (or perhaps tries to make the reader confuse) philosophy with science and metaphor with model; the fact that this confusion is somewhat widespread in DST field suggests that, in a certain way, Oyama lays down doctrine, thus contradicting her own deontological desideratum. Concerning Oyama's confusion, it is widely known that, although philosophy (at least since Plato, some of whose metaphors were mistakenly called "myths") operates with metaphors, science, on the other hand, operates with models of the reality that studies (for example, the Bohr atom model), which can be static (in which the time variable is not relevant) or dynamic (in which it is). What must never be forgotten is that it is about models, not reality itself [2]; otherwise, we would be confusing the territory through which we travel with the map that guides us.

On the other hand, if a branch of scientific research (or its epistemology) embraces a conceptual framework, it cannot only use such framework as a "denomination of origin", but rather has to apply its methodological system. This is a problem that DST, according to the appreciation of the writer of these lines, has not yet resolved with respect to the systemic approach to which, supposedly, it ascribes.

The Systemic Paradigm

The systemic approach in the study of reality, even without the explicit use of this formula, is not new, and could go back to Hippocrates (who studied the organism as a systemic whole) but before. Aristotle's complex worldview constituted a great system containing a complex of subsystems, such as the physical, the biological, the logical, etc. No one can deny, on the other hand, that both Leonardo da Vinci and Galileo Galilei were, in their own way, systemists in the application of their scientific and philosophical concepts to reality. But it was not until the arrival of the Enlightenment that a German supporter of it, Paul Henri Thiry, Baron of Holbach, contributed to the encyclopedic enterprise, among other things, with the synthesis of the materialist and systemic paradigms [2], contributing to the emergence of the philosophy of science. In another vein, Norbert Wiener, with his Cybernetics, emphasized the fact that in complex systems there is at least one control subsystem that "ensures" the optimal functioning of the system as a whole and of each of the subsystems that contribute to that operation. In the case of animals (including humans), this controlling system is the NCS [3]. Bertalanffy explicitly recognizes the significant contribution of cybernetics to General Systems Theory.

The concept of structure is very seductive, as it can be applied to everything. Perhaps it is due to this phenomenon that one of the mistakes that is usually incurred is to take the structure by the system (i.e. Giddens, 1984 and structuralism in general) [4]; this substitution means that either the fact that the structure is nothing other than the set of relationships of the components of a system and that, therefore, it cannot exist without them or without the system that they constitute: there are no structures without relationships, there are no relationships without the components that maintain them, and these are components of systems. Another error is the simplification of the system concept by reducing it to a kind of black box endowed with inputs and outputs [5]; This reductionism only achieves the self-destruction of the concept itself, since it is not possible to describe a system without examining what is inside the supposed "black box", where the components, mechanisms and structure are hidden (part of which would be constituted by such "inputs and outputs"). Therefore, it can be said that structuralism and reductionism are alien to the systemic approach.

The simplest model of a material system is the inventory of its components, its environment, its structure and its mechanism/s [2]. Both the environment and the components depend on the type of system, however, the structure and mechanism are common to all types of systems. The structure is the set of links that hold together the components of the system, as well as those that relate it to its environment, so that the structure of each system is part of the structures of the other systems. Mechanisms are processes that determine the "identity" of the system and intervene in its development. As was already shown in the introduction, it must always be borne in mind that a model of a system is not the system itself (economists tend to incur this confusion when believing that their mathematical models, behind which there are sometimes ideological presuppositions, are the very reality that they claim to represent).

Bertalanffy noted long ago that there were (and still there are) almost as many systems theories as systems theorists (Bertalanffy, L., 1968). Furthermore, systems theory as it appeared in the 1970s, for example, in the systems philosophy of Ervin Laszlo (who had the "go-ahead" from Bertalanffy), lost all credit in claiming that it was possible to solve any serious problem without resorting to either empirical research or accurate theorizing [6], so that this philosophy ended up becoming a new franchise for the old holism. The systemic approach goes beyond the holistic intuitionist epistemology by analyzing the "wholes" in terms of their components and the set of variables related to them [2].

The systemic approach is not, then, a new theory that replaces other theories, but is a methodology to understand the reality that manifests itself systemically and to be able to design, for example, research projects to discover characteristics of real systems and conceive models of these that help us to understand them (as long as we know how to distinguish one thing from the other). It is not enough to affirm that something is a system: it must be demonstrated, and for this, it is necessary to discover its components and study its structure (which includes their relationships with the environment, which must also be studied as an integral part of the system), as well as presume and explain the mechanisms that underlie its operation.

Complex systems have various interrelated mechanisms that operate simultaneously at different "levels." The brain, for example, carries out biochemical, vascular, emotional, locomotor, cognitive and rational processes in parallel (to name a few mechanisms). The processes of development and evolution of organisms depend on a multiplicity of interdependent mechanisms, such as genetic change (which obeys interrelated processes that take place at different "levels"), the so-called "natural selection" (which is a special case of the above) and ergonomic modification of the environment (not only do environments influence organisms, but they also transform their environments, thus creating a "virtuous" cycle).

Another aspect of the systems approach (which, by default, is dynamic) is its difference from the classical approach when it comes to development processes. In the classical conception, development has a fixed and unalterable genetic calendar; in the systemic-dynamic conception, the environment of the system can modify the genetic calendar. The first approach is based on milestones, while the second is based on the dynamic sharing of structures; for example, in the study of the development of the human individual, it applies this milestonian cliché, while the systemic approach contemplates this development in the dynamic bio-psycho-social framework (See Table 1, Figure 2).

Milestonian approach						
Event	**Time**	**Event**	**Time**	**Event**	**Time**	**Event**
Birth	8 a→	Stage 1	10 a→	Stage 2	12 a→	Stage 3

Table 1: This type of approach assigns specific dates to each event based on purely biological criteria (own elaboration).

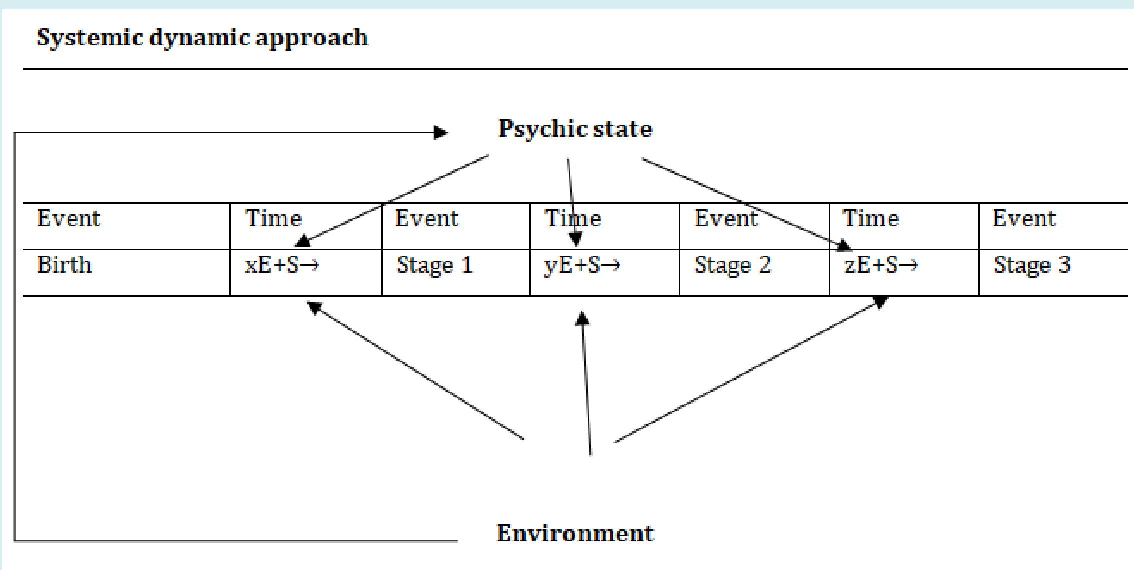

Figure 1: The systemic-dynamic approach takes into account the influences of the environment on the psyche, and of the latter on the phenotype, as well as the direct influences that the environment exerts on it. (E = environment; S = mental state [own elaboration]).

Walter Schönwandt drew attention to the fact that it is convenient to distinguish the mechanisms that are essential from those that are not [7]. The former are those peculiar and *sine qua non* for systems of a certain type. On the other hand, there are mechanisms that interfere with each other: for example, in the case of personal development within the framework of society, its own mechanisms can favour or hinder said development. For example, in the development of sexuality (and sexual identity), there are two essential biological mechanisms in the pre-adult stage:

adrenache and *gonadarche* [8,9]. The birth of "sexuality" is linked to the development or "awakening" of the adrenal gland that takes place around the age of 8 and is related to the increased production of adrenal androgens such as dehydroepiandrosterone, dehydroepiandrosterone sulphate, and androstenedione, processes involved, also, in the growth of pubic hair. A couple of years later, the gonadal glands begin to mature, promoting the production of gonadal hormones such as testosterone and oestradiol [8], which promote the growth of the ovaries and testes, as well as the breasts and genitals; this is the empirically most plausible and scientifically well-founded option, without prejudice to the participation, in the process, of the hippocampus, with which they constitute a system in which this would be a "reinforcing" component. Both are biological mechanisms programmed in the genetic calendar and that should be accompanied by a free and open reception by the environment for the sake of its reinforcement, since they contribute to the full realization of the personality; however, social mechanisms such as moral and religious prejudices and the taboo nature of sexuality in general and pre-adult sexuality in particular strongly condition and repress the healthy development of said processes subject to the aforementioned mechanisms; consequently, society alters biological processes and, to legitimize the disastrous result, constructs imaginary stages of personal development such as adolescence, which does not exist in cultures that do not repress said [10], thus demonstrating that we impose, above their natural reality, our dubious stereotypes about how things should be.

A new approach to the interrelationships between body, mind and environment is required in the field of psychiatry, , that is, one that demands for a systemic integration of the bio-psycho-social whole, which uses a concept of organizational causality instead of typical linear; this would help to understand the causality involved in the biopsychosocial processes that can stimulate the emergence of psychiatric disorders [11]. This system of systems would be something like a hierarchically ordered continuum that would span from molecules and cells to nervous systems, people, families, communities, nations, and finally the entire biosphere. Each of these levels is a system in its own right, so that the lower-level systems are the components of the higher-level systems [12]. Strictly speaking, it is not exactly as this author describes it, since, as we have seen above, systems share structures (or, if you will, the scope within which their structures intersect), which is more much more complex than a simple composition of hierarchically ordered subsets. In any case, the approach that unites biological, psychic and social factors (biopsychosocial approach or BPS) points in the right direction, so that it could explain what influences (both positive and negative) of the environment on the individual could condition or favour the development of the personality of the latter, and this explanation could be obtained by focusing on the area in which the structures of the systems involved intersect. It is precisely in the space in which the intersection of the biological, mental and social structures takes place where the phenomenon that has been exposed above takes place, namely, the development of sexuality (and sexual identity) that is driven by the timed genetic program (biological field), the repression that society (social field) exerts on it, the type of psychic effect that this repression reaches (mental field) and the effect that, in turn, the derived behaviour from the effect of social repression on personal development may have on the genetic calendar (psycho-biological field).

For social systems, a mechanism is essential when it consists of a process that causes the desired changes or slows down those that are not [2]. In the sociological field, some authors conceive essential social mechanisms as the social processes that have the intended consequences for certain subsystems of the social system [13]. However, there may be essential social mechanisms supervening, such as revolutions, that do not necessarily meet the requirements alleged above.

Social processes, in addition to assuming mechanisms and natural laws like any other systemic process, obey norms based on obsolete idiosyncrasies, selfish interests, retrograde morals, absurd prejudices, etc. not reducible to natural laws. Some authors argue that every norm is levelled by a counter-norm [13], although it does not seem at all obvious in today's society, in which the prevalent norm seems to be that for certain classes there is no norm at all and, in front of this phenomenon, there is, for now, no counter-norm, in the same way as there is no counter-norm to the norm that is the fundamental law of our system: the accumulation of capital. A systemic process can be explained either by a simple phenomenal description or by exposing its underlying mechanisms. Even mental processes, such as thinking, are linked to neurological mechanisms and, therefore, where they take place is in the brain. *Cogito ergo sum* means, then, that if there is one thing that thinks, it is that there is at least one brain within which someone is thinking.

It must be borne in mind, however, that the mechanisms are supported by natural laws, which means that any systemic-mechanistic explanation must ultimately be based on these (unless it implies the discovery of new laws).

Unobservable mechanisms are inferred in the manner of hypotheses, and hypothesis formulation, as characterized by the *father of Pragmatism*, is an art [14]. Not only can mechanisms be inferred from existing processes, such as pollution and social inconsistency, but mechanisms that contribute to their solution can be predicted (for example, in the first case, energy rationalization and in the second, economic democracy and free participation). Scientists have always explained the behaviour of a system by exposing its mechanisms [2]. The curvature of space caused by bodies of great mass is the mechanism Einstein uses to explain the curvature of light rays when they are close to them. The transition of atoms from excited energy levels to lower energy levels is the mechanism Bohr uses to explain the emission of light. The formation of new assemblages of neurons is the mechanism underlying Hebb's explanation of learning. Etc.

So we are in a universe full of systems. But is the universe itself a system? The scientific community takes it for granted, since reality is made up of systems, the universe must be the system that includes all other systems and systems within other systems (subsystems). To verify this, let's review the requirements that a system must meet to be considered as such.

A system is made up of:

1. ***Components***: Elements or subsystems.
2. ***Structure***: Set of relationships between the components of the system, between them and the environment, and between the system as a whole and the environment.
3. ***Environment***: Context in which the system with which it shares structure is "located".
4. ***Mechanisms***: Processes that make the system "work" as such.
5. ***Functions***: Results of the "activity" of the system as such.

Now, let's see if this entity that we call the universe meets the requirements. At first glance, such an entity does not meet one of the "requirements" to be a system: to be somewhere and have relationships with its environment. It is overwhelmingly obvious that neither the whole can be "somewhere" nor can there be any environment with which it can maintain structural relationships. Consequently, on the one hand, the universe has no environment and is nowhere to be found, and on the other hand, the universe only fulfils the structural property endogenously, so that only the systems within the universe have relationships between them.

We know some of the components of the universe (although not all). We know some of the mechanisms of these systems that populate the universe, but we do not know any mechanism of the universe as such, nor do we have any concept of how the universe "works". And, of course, we have not the remotest idea of the "result" of the "activity" of the universe (that is, its functions).

At least two inferences can be drawn from all this, namely, that 1. The universe is not a system and 2. It is necessary to review the *a priori* way in which we use the concept of *universe*, since we use this word to express the inexpressible, since the whole, by definition, cannot be contained in a concept and, despite this, we assume that it has a signification (do not forget that the *signification* is what is expressed by the *sign* that *signifies* it). The same concept of *space*, separated from the concept of *time*, is imprecise, and can be used both to refer to the "between" (that is, the space between different objects) and the "where" (that is, the space that occupy and in which the objects are, so that the space would be something like a container of objects). On the other hand, when we refer to space in terms of the science of astronomy, we tend to project the idea of a distant space, populated by planets, stars and galaxies, as if we were not in it and as if space were not, furthermore, within us; this old prejudice is contained in prevalent expressions such as "the conquest of space". Also, the concept of time, separated from space, has problems: for example, it is impossible to determine the *right now*. In reality, it is impossible to determine any moment, because outside of our imagination there are no moments or instants; seconds, minutes and hours are a human invention with which, contrary to what we believe, we do not measure time, but rather our imaginary relationship with it. The only option we have left is to accept that *spacetime* is an infinite *continuum*, which we mentally separate into segments in order to understand reality and have some control over it. A necessary corollary of this is that the universe is infinite, and that alternative hypotheses (such as the "parallel universes" or those that assume the periodicity of the universe in cycles of extinction and resurgence) are only resources to try to get out of the way the unbearable feeling of having to admit that we cannot know everything about everything; in other words, it is ultimately an exercise in anthropocentric pride. However, and although it may seem paradoxical, even though the universe is not a strict census system, it could fit into the concept (which will be discussed below) of a developing system, for the simple fact that this is a sort of *processes and systems factory* and, *a fortiori*, because of the indisputable fact that every system necessarily develops within the universe.

A New Systems Theory?

DST (or Developmental Systems Theory) is the latest version of the systemic approach, and focuses on self-developing systems. Although, strictly speaking, every dynamic system is self-developing, the importance of DST is due to its adoption by a significant sector of biology, specifically evolutionary biology, which includes evolutionary psychobiology (or evolutionary cognitive neuroscience) and epigenetics, among other; it is also noteworthy that DST is gaining new additions, such as some branches of psychiatry [11]. Although some authors circumscribe DST within the field of biological sciences, and specifically focus its application to the unitary explanation of ontogenetic development and evolution [15], there is no doubt that DST is spreading to other fields, sometimes with other names, but always keeping the principle of the unity of the environment and the system. In this sense (namely, its application to the biological realm), DST would study development, inheritance, and evolution in a way that would avoid dichotomies such as nature versus nurture, genes versus environment, and biology versus culture [16]. In any case, in DST applied to biology it is not clear if the environment is part of the self-developing system or if it is a conjunctural factor (in a purely systemic approach, the environment would be an integral part of the developing system, since they share structures). One of the most notable shortcomings of DST is that, paradoxically, it does not use the powerful conceptual baggage of the systems approach, which would greatly simplify things for its improvement. For example, the concept of structure applied to the dynamic relationship of a system with itself and with its environment would be an excellent conceptual framework for the description of ontogenetic and evolutionary systemic processes. It would also be conceptually productive to establish the hierarchy of mechanisms, to show how certain genetically programmed biological processes are modified, either in an evolutionary sense or in an involutionary sense, by the environment: another example of the sharing of structures.

However, even in DST, "crutch" concepts such as "process" are introduced, placing them in a *sui generis* status [16]. For example, pretending that DST is a "theory of processes", apart from not contributing anything new (since the concept of process comes "from the factory" in the systemic approach) distorts the conceptual framework. The fact that DST emphasizes processes involving organisms does not mean that DST can be reduced to a theory of processes. The concept of process, in this context, is used to expose topics such as development, which is predicated to be a dynamic process and that, as such, must be studied through a procedure that accounts for this dynamism. The concept of epigenesis, whose fundamental role in the development of DST is unquestionable, takes into account the processes that explain it, but is not limited to them, but there are also structures and mechanisms behind it; therefore, reducing epigenesis to a "processual" concept is simplifying it. Nor is anything new contributed by adding the adjective "processual" to the dynamics of development, since it goes without saying that it is a process in which systems composed of organisms, components, structures, mechanisms and environments intervene. In the end, a process is nothing more than an event over time [2]. And there are no processes *per se*, but things, organisms and environments (that is, systems) that are involved in processes, such as, for example, ontogeny (which, incidentally, does not exist without organisms).

Although, in the field of DST, Susan Oyama managed to draw attention to the problem of what she calls "ontogeny of information" [1], it was actually Conrad Hal Waddington who launched the conceptual framework of DST in the specific field of evolutionary biology (note that Bertalanffy had already done it in biological science with GST), with his epigenetic hypotheses, and his investigations on the non-deterministic nature of development, which assume that the developing organism can vary due to changes both genetic and environmental, so that the phenotype would escape such determinism (a hypothesis that becomes overwhelmingly obvious as soon as society is studied from the biopsychosocial point of view). Therefore, the phenotypes would be epigenetic pathways, which would depend on both the genome and the environment [17]. However, the one who held a more radical struggle against the prevailing biological orthodoxy was Richard Lewontin (from whom Oyama "borrows" much of her argument), for whom "academic biology" was prey to ideology (and let's not forget that ideology of a society is the ideology of the class that controls it). According to this, each organism is the result of reading its DNA in some temporal and contextual sequence and is subject to fortuitous cellular events that arise due to the very small number of molecules of each type in each cell. The average differences between carriers of different genotypes, according to Lewontin, are abstract constructions: there are no genes isolated from the environment in which they are "read". Each unique combination of genes and environment produces a unique and unpredictable developmental outcome in advance. The usual interactionist viewpoint (which Lewontin does not share) is that there are separable genetic and environmental causes, yet there are no genetic processes outside of environments and there are no evolutionary influences from the gene-free environment. The necessary condition for an environment to be such is that it be of a developing organism, that is, there are no abstract organisms outside an environment, although DNA molecules can be found "unclothed" anywhere. Organisms are the nexus of external circumstances and DNA molecules that turn these physical circumstances into causes of development only in this dynamic link, and they cannot exist as causes outside of their simultaneous action [18]. Well, what does Lewontin do, through the refined conceptualization of it, but describe the mechanisms that underlie evolution and development and reveal the structure of the systems that participate in them? All this may seem obvious, however, the dispute between orthodoxy and the new paradigm continues today (partly because of the erroneous interpretation, on the part of the scholars with whom Lewontin disagrees, of the biological meaning of the sequencing of the genome). In any case, it is not necessary to "demonize" the genotype to deny determinism (as Oyama does), because without it we would not exist, nor (for the same reason) it is necessary to sacralise the inexorability of the "genetic program", as the academics that for Lewontin they would be ideologically entrenched do. The systemic approach is useful for the new bioevolutionary paradigm because one of the requirements for something to be a system is that it be in an environment with which its components are related, thus completing its structure. This is, as we have seen, Lewontin's approach and it already existed, as noted above, long before the invention of GST and DST.

On the other hand, it seems that DST does not take much into account that the role between the levels of interaction is, basically, an empirical problem, to which *a priori* conceptualizations cannot contribute much more than opinions (despite the more respectable and brainy that they are). For instance, although the development of lung cancer is a very complicated process that involves the combined action of many factors and interactions, it is not scientifically unreasonable to consider that the fact of tobacco use has a potentiating effect on the development of lung cancer. This is a case that shows that, although development processes, as we already know, are highly interactive, dependent on the environment and very complex, it would not be correct to conclude that it is unlikely that the main effects of heredity and the environment can be find in chance, nor is the idea that changing the effect of one factor always depends on what is happening in other factors, since it is possible, in some cases, to modify the causal link only through genetic manipulation, as happens when the gene for the protein (toxic to caterpillars) produced by the bacterium *Bacillus thuringiensis*, which causes the death of caterpillars when biting the plant, is inserted into certain plants. So, as Lewontin argued, development approaches must be evaluated on a case-by-case basis. However, if the concept of structure is properly applied, DST can argue that the plant and the worm share structure and that by modifying that of the plant, the worm itself has also been modified. Furthermore, DST, perhaps due to its misuse of systemic concepts, has not been able to explain well the relationship between heredity and the environment (although Lewontin does, but without resorting to GST or DST). This weak point leads DST to being accused of certain inconsistence in accounting for facts such as the relative importance of the environment in the role that genes have in the human predisposition for speech in general and not of a language in particular [19].

Another weak point of DST is the so-called interactionism, a concept that is accused of being too vague and used loosely, when referring to the gene/environment interaction. [20]. Although this, while it could apply to Oyama and her "constructivist interactionism," it would not apply to Lewontin, who relies on empirical data to formulate his hypothesis. However, DST has at its disposal a whole battery of arguments in the correct concepts of the systemic approach.

Conclusions

As has been observed, DST is a theory of systems without systems, since, despite subscribing and advocating the principle of unity of system and environment, it does not use the concept of system beyond the simple mention of the conceptual framework (namely, that of GST) to which it is attached. One of the most notorious contradictions of DST is that it does not use the powerful conceptual baggage of the systemic approach that it claims, allowing conceptions to be born within it that, under the pretence of introducing new features, what they do is call attention to obviousness as if they were something new (for example, about the fact that "there are processes"). In this sense, around GST and DST new acronyms arise that do not contribute anything that is not already contained in the systemic approach.

It is very likely that, if instead of beating around the bush in its "forest of structures", DST applied the methodology and conceptual framework of the systemic approach, it would give coherence and precision to its discourse. This could be carried out, for example, making use of the systemic concept of structure, applying it to the dynamic relationship of a system with itself and with its environment, which would configure an excellent conceptual framework for the description of ontogenetic and evolutionary systemic processes (i.e. development systems). However, it falls into the error, mentioned above, in which structuralism incurs: when it resorts to the concept of structure, structuralism (and DST) use it as if it were the system, in such a way that they consider that each of these structures is, ultimately, irreducible at any lower or higher level of structure, and which can only be described and explained in its own terms (which contradicts the systemic approach and Lewontin himself). It would also be useful for DST to establish the hierarchy of the mechanisms that underlie evolution and development, to show how certain genetically programmed biological processes are modified, either in an evolutionary sense or in an involutive sense, in relation to the environment (which can be an active agent in it), instead of just putting the label of "developmental system" to everything that lends itself to it.

Regarding the sources, it cannot be objected that DST is right to vindicate the epigenetics of Waddington and the epistemological critique of Oyama, but it is undoubtedly that it would do even better to vindicate the evolutionary biology of Lewontin, who contributes much more than what which seems to be the foundation of this conceptual framework (although he is not using the brand new acronym all the time), as well as the Bertalanffy GST and the optimization of the systemic approach carried out by Bunge. And he would do even better if, in addition to praising the sources, he carried out some constructive criticism to demonstrate his methodological solvency.

DST is still being built and, as is often the case with new paradigms, it suffers from a barrage of contributions of all kinds, some “developmental” and others harmful (or harmless but sterile). This is the contradiction that DST will have to overcome: either adhere consistently to the systemic approach and develop a solid conceptual framework that allows it to define exactly what it consists of or, simply, remain something diffuse and incoherent, whose only merit is to draw attention to the comprehensive and dynamic approach to certain biological and bio-psycho-social facts.

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