

# A PARALLEL BETWEEN THE STRUCTURAL-PHENOMENOLOGICAL PERSPECTIVE AND THE PARADIGM OF TRANSDISCIPLINARITY

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This paper aims to explore from the point of view of the concept of *information* two philosophies under both their similarities and differences: the structural-phenomenological outlook of the *orthophysics* developed in Romania by Prof. Mihai Drăgănescu, member of the Romanian Academy, and the paradigm of *transdisciplinarity* founded, among others, by Prof. Basarab Nicolescu in France. Finally, it will appear that, in spite of some reciprocal contradictions, both of them share the desire of overpassing the frame of nowadays *structural science* (as seen by M. Drăgănescu) in search of a more comprehensive paradigm of knowledge, practice and spirituality.

Several decades ago, information has become a major issue in the *corpus* of the contemporary philosophy of science. It is no longer possible to underestimate it, especially when one has to cope with such difficult phenomena as *qualia* or, for instance, *non-separability* as a consequence of the theory of quantum mechanics. Inside the literature of this subject-matter one can easily grasp among an enormous amount of contributions and comments two points of view well known and highly opposite to each another:

1) The first kind of approach considers information from the side of cybernetics and semantics – *i.e.* the theory of *actualization of the potential information through the process of communication*; this is the situation of so-called by orthophysics *the structural science* (= the theories of information starting with Shannon and Wiener) for which the information is not a fundamental concept. Shannon's information is nothing else but the measure of regularity of a signal source pointed out through the formula of entropy:

$$H = - \sum_{i=1}^k p_i \log_2 p_i$$

Here  $p_i$  is the probability of a signal emergence in an ensemble of  $k$  signals. However, this kind of information is fit for the technical process of communication and, therefore, not inherent to the human mind. Structural science admits information only as *structural information* derived from physical structures. And here occurs the biggest paradox: in spite of the fact that artificial intelligence allows the presence of semantical information (qualitative), analogous to the human brain, the science of structural information cannot explain the mind and even considers brain phenomena as unaccountable for.<sup>1</sup>

<sup>1</sup> See M. Drăgănescu, *L'universalité ontologique de l'information*, Editura Academiei, București, 1996, p. 54–55: “Avec l'apparition de l'intelligence artificielle, un changement radical est

2) The second kind of approach sees information as an *autonomous and potential universe*, irreducible to the aspects of digital and actualized information. Orthophysics asserts that it is exactly inside the human brain that one has to search for the essence of the concept of information. Into this second category are to find structural-phenomenological orthophysics and transdisciplinarity. They both make an attempt to overtake the essential of the phenomenon of information in the above-mentioned sense (as *an autonomous and potential universe*). Thus, the *quantitative* limitation of the classical theory of information to the detriment of the study of the *qualitative* dimensions of information is strongly criticized.

From the perspective of structural-phenomenological orthophysics, M. Drăgănescu wrote: “In the ring...of the existence, which consists of profundities – the quantum world – the macroscopic world and the subject – and profundities again – the profundities may be outside the space-time relation and have their seat in Orthoexistence, as results from the exertion of quantum physics and from the philosophical experiment of the subject. However, the subject, the human being and its possible informaterial relation to the orthoexistence are not that clear...there is no abstract mathematical *idea* in orthoexistence to be the fundamental of the world. Basic information is however inscribed into the informatter in orthoexistence. So the fundamental of the world is in a way an informational structure...If the profundities are the seat of the informational bases of the world, then we first have to understand better the informational aspects available. Let us examine information that is beyond technique that is beyond information treated on statistical bases, as is, for instance, information in the statistical theory of communications, or information in the automated data processing systems. Otherwise stated, let us examine genetic information in biology and information developed with respect of the human being. *The notion of information is not yet well defined in science. We actually have now several notions of information with no unifying concept* (underlined by us). In order to understand information, we

intervenu: l’information des ordinateurs peut être aussi messagère de signification, elle peut être donc sémantique. L’information structurale est passée d’une sémantique quantitative à une sémantique qualitative. Mais cette nouvelle sémantique provient de celle du cerveau humain et c’est ici qu’en premier lieu il convient de chercher l’essence de la notion d’information. Envisagé comme un dispositif strictement structural, le cerveau ne saurait être distingué d’un ordinateur, l’information n’étant en pareil cas, tout comme auparavant, qu’une structure physique...A l’intérieur de la science structurale, où la notion d’information est considérée comme dérivée des notions fondamentales de la physique, s’est développée avec le temps *une science de l’information* (c’est nous qui soulignons)... C’est l’apparition de cette science, l’informatique, qui a fait changer les choses, notamment à partir du moment où, à l’intérieur même de l’informatique, commença à se développer l’intelligence artificielle structurale. Comme on le sait, celle-ci se rapporte à l’esprit humain. Cependant, l’esprit humain n’a pu et ne peut être expliqué par la science structurale qui considère comme inexplicable l’apparition des phénomènes de compréhension dans le cerveau. En effet, si la compréhension ne correspondait qu’à des structures physiques, comment expliquer les phénomènes de conscience qui, pour n’importe quel humain, sont tellement réels et évidents? Le fait est que la conscience ne saurait être niée, ni expliquée par la science structurale.”

shall have most likely to consider the whole material world, beginning with the physical world and ending with the psychological activity of the human mind. From all we know, information appears to be principally a certain structure. It may be objective if it inscribes into the profundities of the matter, wherefrom it penetrates, under a certain form, into the quantum world down to the genetic elements of the living cell and to the structure of man's nervous system."<sup>2</sup>

Therefore, physics has to plunge its roots deeper into the *phenomenological information* and only then to deal with structural information. By all means, it would be wrong to claim further that quantum physics (in particular quantum mechanics) should limit its research to the field of *structural information*, even if the importance of the research carried out in this respect cannot be denied. Physics has to seek out thoroughly and much deeper, in the way of sub-quantum level and *profound matter (orthoexistence)*. It seems that in this only way the '*physics of living*' (including human mind and social processes), can be understood as a *structural-phenomenological process*. In the deep matter, primordial information is *phenomenological*; it makes possible and "give birth to" *structural information* and, in time, a *structural universe* like the one known at present.

Now, two important principles of a future structural-phenomenological science may be asserted:

- 1) *Any structural information with meaning is based upon a phenomenological sense or aims at a phenomenological sense.*
- 2) *Any structural information comes directly or indirectly from the phenomenological information.*<sup>3</sup>

<sup>2</sup> M. Drăgănescu, *The Depths of Existence*, English edition, Bucharest, 1991, p. 39, 41–42.

<sup>3</sup> Idem, *Informația materiei* (Information in Matter), Editura Academiei, București, 1990, p. 77, 78; see also, *L'universalité ontologique de l'information*, p. 34–36: "...la vie fait apparaître un phénomène physique fondamental nouveau. Mais la vie n'est pas possible en dehors de l'existence de significations phénoménologiques qui sont une forme naturelle de l'information et se produisent dans l'informatière. Cela étant, la physique doit plonger ses racines dans l'information phénoménologique et ensuite seulement s'occuper de l'information structurale. Limiter la physique quantique à l'étude de la seule information structurale et, de plus, réduire cette dernière au bit de la théorie shannonienne nous semble, par conséquent, totalement insuffisant. Il va de soi qu'il n'est pas question de nier l'importance de tous les travaux recherchant les limites physiques des opérations de structuration d'une information, mais la physique ne peut s'arrêter à ce niveau dans la création d'une physique basée sur l'information. Il faut qu'elle s'attaque au substrat sub-quantique, qu'elle atteigne la matière profonde. La seule voie pour y accéder est la physique de la vie comprise comme un processus structural-phénoménologique. La physique ne saurait plus ignorer la vie en tant que réalité complète, incluant l'esprit et les processus sociaux, le fait de les considérer simplement comme observateur n'étant pas suffisant. Dans la matière profonde, l'information primordiale est l'information phénoménologique. C'est par elle que, dans la matière, naît le phénomène physique structural de l'univers aussi bien que l'information structurale qui s'y associe. En d'autres termes, l'information structurale n'est même pas possible sans information phénoménologique (c'est nous qui soulignons)." (p. 35)

In some of his essays, M. Drăgănescu draws and develops the principles of a future *structural-phenomenological science*, as follows:

- *the principle of insufficiency of structural knowledge* (I);
- *the principle of self-consistency of matter* (II);
- *the principle of profound matter* (III);
- *the principle of ontological universality of information* (IV);
- *the principle of ontological universality of energy* (V);
- *the principle of tendencies of becoming* (VI);
- *the principle of structural-phenomenological modeling* (VII).<sup>4</sup>

Inside the orthophysical model of the material world (*i.e. the Ring of Existence* or *RE*) the profound matter (*informatter*) is a source which participates in the organization of a ring. It contains the whole existence-universe as we know it today. The key-elements of this ring are *the profound matter*, *the human being* and *the society*, especially *the conscience* of the last two ones. The profound matter intervenes ceaselessly in the process of life through phenomenological senses (*i.e. orthosenses*), as well as for the mind and conscience. Mind and conscience can observe and act over life, macroscopic world and even over quantum world. Furthermore, they could act over the profound matter, but this will be due to some future adequate technological devices and life forms especially created for. In our interpretation, *the principle of the ontological universality of information* receives the highest rank among all the other principles of a structural-phenomenological science.



The paradigm of *transdisciplinarity* has been particularly developed in recent years by Basarab Nicolescu, a French physicist, philosopher and poet of Romanian origin, researcher at the CNRS, Paris, France. He is the author of a famous essay (*Transdisciplinarity. Manifesto*), published in French in 1996 and translated into many languages (Romanian edition, 1999). During the International Congress “Science and Religion – Antagonism or Complementarity” held in Bucharest (November 8–11, 2001) he gave the lecture *Les niveaux de Réalité et le Sacré* (The Levels of Reality and the Sacred).

For the purpose of a better understanding of the concept of *transdisciplinarity* as seen by B. Nicolescu, first it would be useful to underline some preliminary distinctions he makes between *multi-disciplinarity*, *interdisciplinarity* and *transdisciplinarity*, as follows:

- *multidisciplinarity* studies simultaneously an object/item of one and the same discipline/field through many disciplines – *i.e.* more than one (ex. a painting of

<sup>4</sup> Idem, *Informația materiei* (Information in Matter), p. 81–125.

- Giotto could be studied in the perspective of history of arts, history of religion, history of Europe, physics, chemistry, geometry, etc.);
- *interdisciplinarity* has another aim, *i.e.* the transfer of methods from one discipline to another (ex. the transfer of methods of mathematics to physics or methods of informatics to fine arts);
  - as the Latin prefix “trans” denotes, *transdisciplinarity* refers to what is at the same time *between* disciplines, *inside* a certain discipline and *beyond* any particular discipline; the supreme goal of transdisciplinarity is *the understanding of the present world in the perspective of the unity of knowledge*.

However, both multi- and interdisciplinarity remain in the same universe of disciplinarity. Because of its capacity of generating new disciplines, interdisciplinarity could even contribute to the “disciplinary big Bang”. While disciplinary knowledge and research are concerned with *one and the same level of Reality* (sometimes even less, they could be interested in only a “fragment” or a “piece” of Reality), *transdisciplinarity deals with the dynamics caused by the simultaneous action of many levels of Reality*. But, in order to discover and realize the dynamics of those levels of Reality, one has to get through disciplinary knowledge.<sup>5</sup>

The next step is grasping the difference between what is the *Reality* and what is the *Real*. “Reality is *what offers resistance* against our experiences, representations, descriptions, images or mathematical formalisms”.<sup>6</sup> Reality is not just a “social construction”, the outcome of a social agreement; it has a *transsubjective dimension (i.e. objective or intersubjective)*, too. But, if Reality is characterized by the attribute of *resistance* against our human experience and, therefore, accessible to the human understanding, the *Real* means *what there is (ce qui est)* and remains forever impenetrable, veiled or “hidden”.

Being always ruled by the logic principle of the excluded third, modern science remained anchored in a single level of Reality (at least until the XXth century, when 3 levels of Reality emerged: *macrophysical, microphysical, cyber space-time* and, for

<sup>5</sup> See B. Nicolescu, *Les niveaux de Réalité et le Sacré*, “Academica”, XIIth year, nos. 1–2 (122–134), November–December 2001, p. 11: “*La transdisciplinarité* concerne, comme le préfixe latin “trans” l’indique, ce qui *est* à la fois *entre* les disciplines, *à travers* les différentes disciplines et *au-delà* de toute discipline. Sa finalité est *la compréhension du monde présent*, dont un des impératifs est l’unité de la connaissance...La recherche transdisciplinaire est radicalement distincte de la recherche disciplinaire, tout en lui étant complémentaire. *La recherche disciplinaire concerne, tout au plus, un seul et même niveau de Réalité*; d’ailleurs, dans la plupart des cas, elle ne concerne que des fragments d’un seul et même niveau de Réalité. En revanche, *la transdisciplinarité s’intéresse à la dynamique engendrée par l’action de plusieurs niveaux de Réalité à la fois*. La découverte de cette dynamique passe nécessairement par la connaissance disciplinaire...Il est important de réaliser que la connaissance disciplinaire et la connaissance transdisciplinaire ne sont pas antagonistes mais complémentaires. *Leur deux méthodologies sont fondées sur l’esprit scientifique.*”

<sup>6</sup> *Ibidem*.

the time being, a theoretical one – the *superstrings*). If considered at a single level of Reality a physical phenomenon/event appears as an undecidable struggle between 2 contradictory and mutual exclusive elements: continuity and discontinuity, separability and non-separability, global causality and local causality, etc. This no-escape contradiction of modern science cannot be suppressed unless the notion of “level of Reality” is admitted and the existence of an infinite/indefinite number of levels of Reality at the entire scale of existence is accepted.

The transdisciplinary approach of the Nature and knowledge asserts that the world (the Universe) is composed of three basic entities: the Transdisciplinarity Object (TO), the Transdisciplinarity Subject (TS) and the Term of the Interaction (*X*). The different *levels of Reality* (LOR) are accessible to the human knowledge owing to the existence of different *levels of Perception* (LOP). There is a biunivocal relationship of correspondence between LOR and LOP. On the one hand, there is a flux of *information* which crosses all the levels of Reality (*i.e.* the TO); corresponding, on the other hand, there is a flux of *conscience* which crosses all the levels of Perception (*i.e.* the TS). Both of them are *coherent* and *orientated* and thus one can draw a conclusion for the property of *auto-consistence* at the universal ontological scale. The opened structure of the ensemble of levels of Reality finds itself in harmony with the well known theorem of Gödel: it would be impossible to build up a theory strong enough to describe the whole of levels of Reality.

Thus, knowledge is neither *exterior* nor *interior*; it is at the same time both exterior and interior. The study of the universe and the study of the human being are reciprocally supporting each other.

The Term of the Interaction (TI) or (*X*) is somehow *the source* of the Reality and Perception. *X* and the locks of information and conscience describe the third term of transdisciplinarity knowledge: TI between S and O, which is not reducible either to the O or to the S.<sup>7</sup>

Discussing some problems of the philosophy of nature, B. Nicolescu focuses his attention upon the relationship between matter, energy and information. He points out that contemporary science does not (any longer) identify *matter* with *substance*. At the quantum level, there is a perpetual transformation of energy into substance and information, and *vice-versa*. The concept of *energy* appears then to unify the whole picture: while *information* could be considered as an encoded

<sup>7</sup> *Ibidem*, p. 12: “Au flux d’information traversant d’une manière cohérente les différents niveaux de Réalité correspond un flux de conscience traversant d’une manière cohérente les différents niveaux de perception. Les deux flux sont dans une relation d’isomorphisme... La connaissance n’est ni extérieure, ni intérieure: elle est à la fois extérieure et intérieure. L’étude de l’Univers et l’étude de l’être humain se soutiennent l’une l’autre ... Dans un certain sens, le point *X* est la source de la Réalité et de la perception. Le point *X* et les boucles associées d’information et de conscience décrivent le troisième terme de la connaissance transdisciplinaire: le terme d’Interaction entre le Sujet et l’Objet, qui ne peut être réduit ni à l’Objet ni au Sujet”.

energy, *substance* looks like a materialized energy. Matter is associated to a complex *substance – energy – information – space – time*.

In order to make the point after displaying some essential ideas of these two conceptions concerning information, we may say that:

- Both structural-phenomenological orthophysics and transdisciplinarity emphasize the idea that *information* is one of the most important entities of the world or Universe; M. Drăgănescu makes the choice for a *phenomenological information* coming from a deep matter (*informatter*) – source of the *structural information* wrapping up the existence-universe –, all ending in the *RE*, while B. Nicolescu gives the best chance to a model of infinite corresponding levels of Reality and perception, information being only a “branch” (*i.e.* TO) of it; for B. Nicolescu, energy would be the keyword of the transdisciplinarity outlook.
- As soon as someone examines closer these two perspectives, it seems likely that, consonant to the image of the “ring” it would be at hand: 1) to assimilate the other “branch” of B. Nicolescu’s model of transdisciplinarity (flux of conscience which flows through TS) with the phenomenological information crossing human brain or mind and thus matching the circuit/flux of information through levels of Reality – TO; 2) to conjecture that, if the famous *X* – the term of Interaction between TS and TO – could be considered the source of Reality and perception, then this *X* is nothing else than the *mind*, in which phenomenological information opens human being to the microscopic/quantum world or to the macroscopic world.

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