

The Implications of Interdisciplinarity to the Development of Romanian Experimental Psychology

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Abstract

The purpose of this article is to emphasize the importance of multi, inter and transdisciplinarity, in the emergence and evolution of various sciences, especially in the field of experimental psychology. Some of the contributions of two great Romanian scientists to the development of psychology as a science are brought to the forefront, namely: the “structural system of temperaments” put forth by Gheorghe Zapan and the “consonantist psychology”, introduced by Ștefan Odobleja, in which he used, for the first time, the concept of “reverse connection”, later known as *feed-back*.

Keywords: Pluridisciplinarity; Interdisciplinarity; Transdisciplinarity; Gheorghe Zapan; Ștefan Odobleja

Introduction

We live in the era of a multidisciplinary “big-bang” and of excessive specialization... Undoubtedly, there are now hundreds, thousands fields of specialization... Extreme specialization may lead, for example, to the situation where a specialist in a particular field has difficulties in understanding the speech of another specialist in the same field. And, then the justified question arises: if two specialists from the same field “cannot understand one another”, how can two experts from different hold a genuine and meaningful discussion, which doesn’t just border on general topics, more or less banal?, say a physicist specializing in quantum physics and a neurologist, a mathematician and a poet, a politician and an IT scientist, a biologist and an economist? The multi, inter and transdisciplinary language runs the risk of becoming an obstacle, an apparently unsurpassable one for a novice. And we all, for that matter, run the risk of becoming permanent neophytes in search of “the right way”, always attempting not to stray in a tower of Babel... This “babelization” process cannot continue without endangering knowledge itself. The major challenges of our time require increasingly more “competences”. Yet the amount of the best specialists in different fields does not necessarily lead to generalized competence, because the sum of competences does not mean competence, but on the contrary, the intercrossing of different fields of knowledge can sometimes result in an empty set. The need to create “bridges” between different disciplines led to the emergence, halfway through the 20th century, of multidisciplinary and interdisciplinarity.

Multidisciplinary lies at the intersection of themes common to several researchers from different fields, in which everyone “preserves” their specific concepts and methods. It deals especially with parallel approaches having a common purpose, benefiting from the addition of specific contributions from different fields. Multidisciplinary is a combination of disciplines with a common goal or project; it refers therefore, to studying an object from a discipline, through several disciplines simultaneously. The resulting object will be enriched by the intercrossing of several disciplines. Multidisciplinary research accrues the discipline in question; this “accrued benefit” serves exclusively that discipline. In other words, the pluridisciplinary approach transgresses the limits of disciplines, but its finality still remains within the initial research framework.

Interdisciplinarity is different from multidisciplinary. It refers to the transfer of methods from one discipline to another. Interdisciplinarity

implies a dialogue and an exchange of knowledge, analyses and methods between two or more disciplines. It involves mutual interaction and exchange between several specialists from different fields, with the purpose of enriching the knowledge of each. Consequently, it is noted that, while interdisciplinarity establishes connections between different sciences and disciplines [1-6], pluridisciplinarity refers *simultaneously* to several disciplines.

Basarab Nicolescu [2] distinguishes three degrees of interdisciplinarity: a) *an applicative degree* (for example, some methods from nuclear physics can be transferred to medicine, leading to new treatments for cancer); b) *an epistemological degree* (the transfer of the methods of formal logic to the field of law, generates interesting analyses in the epistemology of law); c) *a degree generative of new disciplines* (the transfer of mathematical methods to the field of physics resulted in a new discipline: physical mathematics or by that of informatics science to art in generative art). Same as with pluridisciplinarity, interdisciplinarity exceeds the limits of one discipline, but its finality remains within the interdisciplinarity research.

As far as *transdisciplinarity* is concerned, it frequently involves cognitive schemata that can cross disciplines, with an unusual “virulence” (often engendering a state similar to the trance). Transdisciplinarity designates a certain kind of knowledge that intersperses various sciences, transgressing every limit [7]. Transdisciplinarity is concerned with – as is indicated by the prefix “trans” – what is simultaneously at the limit *between* disciplines, *within* the various disciplines and *beyond* any discipline, its purpose being the unity of knowledge. Transdisciplinary research is not antagonistic, but complementary to multi and interdisciplinarity research. The fact that transdisciplinarity is so often mistaken for interdisciplinarity and multidisciplinary (as, moreover, interdisciplinarity is often mistaken for multidisciplinary),

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is largely due to the fact that all three of them transgress the limits of disciplines. Inasmuch as it “obscures” the different finalities of the three types of approach, this confusion proves to be extremely damaging. In fact, these “compounds” of inter, pluri and transdisciplinarity played a huge role in the history of science; it should be recalled that the key-concepts involved herein are: the *cooperation* and the *articulation*, the common *objective* and the common *project*.

We can conclude that terms like multidisciplinary, interdisciplinarity and transdisciplinarity are difficult to define, due to their polysemantic and elusive nature. One thing is certain, though: pluridisciplinarity, interdisciplinarity and transdisciplinarity are as many “arrows” of one and the same bow: that of knowledge.

The Experimental Psychology at the Junction Between Sciences

Koch S [8] shows that psychology is not a coherent and integrated science, but it is fundamentally non-cohesive, unable to be homogenized into a unified discipline. In the evolution of psychology there is an equal occurrence of both the tendency towards a diversification of concepts, theories, psychological orientations, and the unification and integration of concepts. Situated at the junction of human sciences, social sciences and natural sciences, the branches of psychology are the result of pluri, inter and transdisciplinarity. At the junction of all these sciences, general psychology defined its own applicative fields, among other things, experimental psychology.

Perhaps more than any other discipline, experimental psychology proves its pluri, inter and transdisciplinary character. It is well known fact that psychic phenomena are preceded and accompanied by material, physical, mechanical, chemical, biological, neurological processes. Consequently, the researcher also needs knowledge from other fields than psychology alone in order to “successfully” work in the field of psychology.

Under these circumstances, there is no wonder that, more than any other field of knowledge, the development of Romanian experimental psychology as a science needed a fundamental, extremely valuable contribution from professional whose fundamental scientific education had no direct rapports with psychology. Suffice it to recall names like: George Zapan, Ștefan Odobleja, Mihai Ralea, Victor Săhleanu to realize to what extent, original ideas or paradigms from other disciplines were “generating principles” in the field of psychology.

Throughout this article, I will confine myself to the presentation of some of the studies and research of two Romanian scientists: Gheorghe Zapan and Ștefan Odobleja, who essentially contributed to the “consolidation” of psychology *as a science per se*.

The mathematical model of system of temperaments - Gheorghe Zapan's contribution in the area of experimental psychology

A scientist of pluri and interdisciplinary formation (psychologist, mathematician, cyberneticist, educationalist, philosopher, jurist, gunner), Gheorghe Zapan is one of the most important representatives of experimental psychology and cybernetics in Romania.

George Zapan attends courses in mathematics and philosophy and in 1923 becomes a graduate from the University of Iasi. In 1934, he is appointed lecturer at the Department of Psychology at the University of Bucharest. Since 1930, he starts studying in Germany, experimental psychology with W. Köler, work psychology with H. Rupp, mathematics with R. von Weizsäcker, physics with A. Einstein and E. Schrödinger. In

order to complement his psychological studies on human nature, he graduates from the Institute of Theatrical Art, where he takes the classes of professors like Herman and Petersen. A Herder Prize laureate, doctor of science and philosophy at the University of Berlin and member of the Academy of Sciences in New York, Zapan was the founder of many scientific disciplines, such as taxiology or the science of the organization of human activities according to progress factors and structural pedagogy. A less known fact is that Zapan was the founder of qualitative cybernetics at the world level, developing cybernetics of human activities and of qualitative evolutionary systems with preferential events (biological, psychological, educational, economic, social), pedagogical cybernetics, a type of cybernetics with applicability, especially in the natural systems.

George Zapan is the creator of some original scientific theories, highly influential and important for fundamental and applied research: the theory of professional orientation and selection, a new theory of the exercise and of learning, the theory of the relativity of psychophysical systems, the theory of psychological space and time, put forth within the hypothesis of non-homogeneous somatic fields (a sort of theory of the relativity of the psychic universe similar to that developed by A. Einstein for the physical universe), the theory of mathematical and psychological modeling of professionals and human activities, the theory of taxiological and structural negentropy, the theory of the psychological process of mathematical invention. His interdisciplinary scientific thinking progressed from German structuralism (gestaltism) to a complex approach, systemic-evolving and cybernetic of psychological phenomena and human activities.

In the field of psychology, Zapan developed and tested methods of knowledge and education of mental activity, such as: the method of objective assessment and the method of taxiological programming, he built a *system of temperaments*, using his own methodology of diagnosis, he discovered the fundamental laws of psychical functioning (the law of intensity in biophysics, a new law of memorization, the law of negentropy, the law of the organization of stereotypical dynamic). He also proved to be a promoter of the use of statistical-mathematical calculus in the human sciences, establishing numerous formulas and biometric anthropometric and statistical coefficients, (the structural formula, the social formula, the formula of the degree of mental development etc.).

I will present, in what follows, one of Gheorghe Zapan's most interesting contributions, “*The systematization in the theory of temperaments*”. The paper was published in the *Journal of Pedagogy*, in 1940. The study concerning “the system of temperaments” proposes a new mathematical formula for the approach of temperament. Zapan postulates a three-dimensional model whose factors are: *motricity* or activity, *affectivity* or emotivity and *representation* or imagination, intuition. Every individual can display either one dominant dimension, or two-three different dominant ones or even none of them [5]. We can distinguish some basic types of temperaments in the multitude of temperament formulas. Assigning each of these three dimensions of temperament a positive (+) or negative (-) evaluation, Zapan distinguishes 8 basic temperamental types (corresponding to those identified in the typology of Heymans and Wiersma), as in next Table 1.

Systematic theory of temperaments might be liable to both a mathematical interpretation and to a geometric representation. Taking into account the table of basic temperamental types, the 8 types of temperaments can be graphically represented, placing them in the 8 corners of a cube, as in the Figure 1.

From Figure 1, we might infer that the three coordinates are:

Type of temperament	Motricity	Affectivity	Representations
Sentimental	-	+	+
Nervous	-	+	-
Choleric	+	+	-
Sanguineous	+	-	-
Phlegmatic	+	-	+
Apathetic	-	-	+
Passionate	+	+	+
Amorphous	-	-	-

Table 1: The table of basic temperament types.

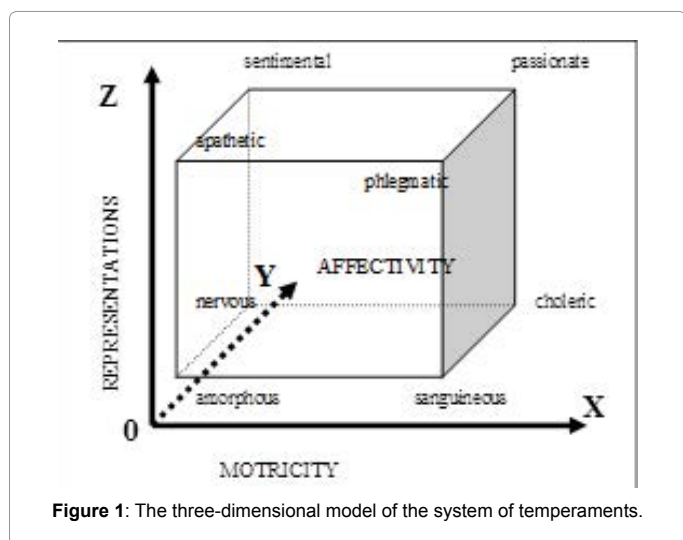


Figure 1: The three-dimensional model of the system of temperaments.

X=motricity, Y=affectivity and Z=representations. The “amorphous” temperament, with the formula (- - -) is located near the origin of the axis. The “passionate” temperament, with the formula (+ + +) is placed in the corner opposite to “amorphous.” Each of the other temperamental basic ranks is defined by those coordinates. The cube of temperaments is constructed based on the assumption that each of the three determinants: motricity, affectivity and representations, are equally important in the structure of the temperament (Figure 2). The types represented in the cube corners are ideal types. The intermediate temperament lies at a certain point inside the cube. The extreme cases, generally abnormal, defined by the signs (+) and (-) may lie outside the cube. The mathematical formula of temperament will be expressed in terms of the 8 temperamental determinants: x; x²; x³; y; y²; y³; z and z³, where: 1. x = motricity; x² = rapidity of the motric reaction; and x³ = latency of the motric reaction; 2. y=affectivity; y²=direction of affectivity (external world or internal world of the subject); and y³ = attitude toward self and attitude to others (optimism-pessimism); 3. z=representation and z³=communicative or reserved. We notice that, if one of these determinants becomes nil, then the temperament tends towards nil as well.

The structural formula of temperament is given according to the 8 temperamental determinants: $T = x^a \cdot x^{2b} \cdot x^{3c} \cdot y^d \cdot y^{2e} \cdot y^{3f} \cdot z^g \cdot z^{3h}$, where the numerical value of the determinants is calculated in deciles, depending on the signs of determinant¹³. The exponents: a, b, c, d, e, f, g, h of the mathematical formula of temperament are exponents of the

¹Between the sign of determinant and the numerical value is the next correspondence: + → 10; + → 7,5; (+ -) → 5; (- +) → 5; - → 2,5; - → 0,5.

structure and the importance of each, as well as the degree of mutual connection between determinants is determined in the structure of temperament. The numerical value of the structural exponents is determined by a numerical method of approximation.

The systematization proposed by Zapan includes temperaments in all their possible nuances and leads to a practical and reliable method of diagnosis of temperament. Furthermore, this systematization, as a simple, fast and accurate means of diagnosis of temperament, proves to be extremely useful in research carried out in the fields of psychology, pedagogy and sociology, which studies: a) the temperament at different ages; b) the temperament by sex; c) temperament and aptitudes; d) temperament and areas of professional specialization; e) temperament in different peoples.

Gheorghe Zapan has a fundamental contribution to the development of cybernetics and psychology, and his visionary and interdisciplinary spirit helped initiate new directions of research in the human sciences.

The “Consonantist Psychology” – the role of Stefan Odoobleja’s Cybernetics theories in the field of experimental psychology

A major contribution to the establishment of psychology as a science based on laws and able to conceptualize discoveries was that of a Romanian scientist, physician, psychologist and logician, called Ștefan Odoobleja. Science, philosophy and poetry are the three dimensions of Odoobleja’s scientific and cultural activity.

Ștefan Odoobleja studied in Bucharest, as a student of the Faculty of Medicine and scholar of the Military Medical Institute. He defends his PhD thesis in 1928. In 1929 he publishes the study “The thoracic transonance method”, where he mentions for the first time the law of reversibility. He receives the “Doctor Papiu General Alexander” award for a paper entitled “The phonoscopy”, published in Paris in 1935. The principles of compliance and reversibility which lie at the basis of cybernetics are both summarized in this work.

While attending the International Congress of Military Medicine in Bucharest, he announces the publication of his capital work *The Consonantist Psychology*, where he popularizes the first version of the concept of generalized cybernetics and demonstrates its interdisciplinary and multidisciplinary character. Given the fact that the concepts of “reversibility” and “consonantist psychology” were introduced in the paper *The Consonantist Psychology*, ten years before the publication of Norbert Wiener’s *Cybernetics*, we can say that Odoobleja may be considered the “precursor of cybernetics”. The cybernetic model, which he proposes in 1938-1939, from observation, intuition and rationality will circulate 10 years later in the American specialized literature, and then in the European one, being used and applied to a variety of areas.

Originally entitled *Psychologie consonantiste* (in French), the fundamental work of the Romanian scientist was printed in French in Lugoj, in two volumes, during 1938-1939 and distributed by “Librairie Maloine”, in Paris [4]. It had only two reviews: the first in 1939, in English edition, and the second, by S.M. Strong, in the U.S. journal *Psychological Abstracts* after which it was ignored for a long time. It is not translated into Romanian until late, in 1982. The work comes as a huge dictionary containing, in a condensed way, all the terms of a treaty of modern experimental psychology, with tendencies towards schematization, in the continuous search of a possibly unifying principle, namely: *consonance*. The author himself said that this work was written with the view of achieving a maximum of synthesis (unity) and analysis (plurality). The sociogenetic problematics of the psyche, its subjective specificity, constructivism and the conscience effect are

less represented in Odobleja work. The author creates a psychological logic rather than a psychology of physical procesuality. For Odobleja “psychology is a pivotal science or a so-called relay (in cybernetic terms) or an *interdisciplinary knot*” (in M Drăgănescu, P. Golu, introductory study to *The Consonantist Psychology* [3]).

Odobleja developed a new conception of psychology as a science that integrates all disciplines in the human and the technical area. Pondering on the development of experimental psychology, the author mentions, from the very beginning of the work that it occurred in two directions: that of *conception* and that of *method*. In terms of *conception*, psychology evolves from animism and mysticism to realism and materialism, from transcendental explanation to positivist explanation, based on biology, physics and mechanics; as far as the *method* goes, psychology shifted from subjective introspection to objective observation, and from the latter to experiment, from descriptions and speculations to systematization and applications, from the empirical to laws and classifications.

Ștefan Odobleja conceives a psychology that is in close communication with the other sciences, from mechanics and physics, going through biology and reaching ethics and logics. The human psyche is presented as “a vicious circle of energies, a reversibility, a power transformer in the double sense, an association of convex and concave lenses, focusing or dispersing energy or the physical”, performing, therefore, functions of reception and reaction.

The Consonantist Psychology expresses an original, energy-based concept, intended to replace associative philosophy that was prevalent in the field of psychology. Odobleja states that the mechanism of the triggering and the operation of mental phenomena indicates that the latter “are not, in any event, bound by wire or strings”, as the associationists believed, but are based on resonance. Mental phenomena are related and bound in time, they enter “in consonance” determining each other, causing each other, and substituting and equating each other “through distant action, like the radio processes”. This combination on the principle of resonance and overlapping is a synonymous with synthesis, with the creation of similarities, with consonance. For example, two ideas that evoke each other are consonants. Similarly, two totally different things, can, on account of resonance, obtain similarities through their juxtaposition in time, by means of simultaneous and successive evocation.

The consonance is an interaction with regulatory character: “consonance is a physical phenomenon characterized by similarity, selection and movement (resonance)” and consonantism is a general principle of organization which shows a tendency, specific to different types of systems, towards a state of balance in their relations with the environment [3]. The consonantism “restores the fundamental character of thinking, which is dynamism – because the fundamental property of psychological facts lies in that ideas evoke one another and don’t establish connections among themselves.

A trail-blazer in science, a promoter of general cybernetics, Odobleja was the first scientist that had the great intuition about the role of the “reversible loop” (the *feed-back*), stating it in the shape of the general law that governs the mechanisms and the processes of natural and artificial systems. The *cybernetic character* of the “reversibility law”, as Odobleja called the law of circuits with retroaction must be pointed out, which he threw into relief in all natural and societal processes and phenomena.

Perhaps, Stephen Odobleja’s the main merit is to have found the general character of feedback, a fundamental structure that connects

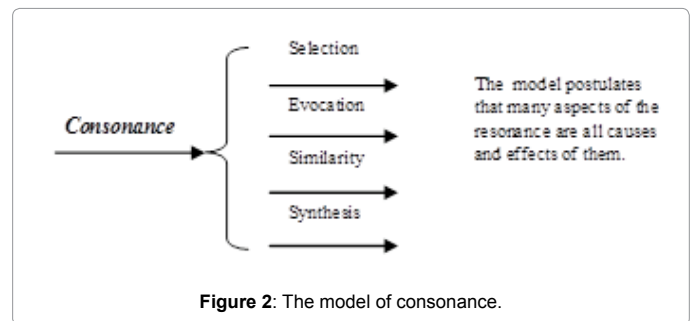


Figure 2: The model of consonance.

man to nature, and that he tries to showcase in various processes and phenomena: “*life is not possible without feedback*”, noted the author, and even: “*psychology is the science of reciprocal actions exercised through stimulation, adaptation or adjustment and response, between an organic structure and its environment*” [3]. He wants to systematize psychology around the concept of consonance, with the aim of reducing the psychological to the physical.

The consonantist psychology is not a work of cybernetics or just a theory on the “law of reversibility”, but a philosophy of mental processes and of science, in general, since the author searches for a number of *general laws*, that apply to all fields of psychology and to economic-social life. Among the fundamental laws that govern the psyche and the physical are the *law of reversibility*, also called the law of *inverse connection* or *feed-back*. Odobleja develops a synthesis of the sciences by establishing a comprehensive research of structures and universal laws, applicable to most sciences. In *The Consonantist Psychology* alongside the law of consonance and the law of reversibility (feed-back), there are 8 other universal laws postulated: the law of *equivalence*; the law of *compensation* (which became essential for the dynamics of systemic organization); the law of *balance* (presupposing a dynamic equilibrium); the law of *reaction*; the law of *cyclical* processes; the law of *transformation* and of *finality* (which means the tendency of the system to achieve an optimal balance). Together, they achieved the most extensive integration of the sciences. Odobleja applies these laws in psychology, medicine, biology, social science, political economy, pedagogy, techniques. Related to the integration of sciences, the system of the Romanian scientist is similar to that of physics, postulated by Albert Einstein. Ștefan Odobleja admirably understood, not only the idea of a system, but also the concept of a hierarchy of systems, beginning from the general and ending with the basic ones, from society to the mechanical-man system.

Ștefan Odobleja intuited the way human cognitive processes are related to the exchange of information between the organism and the environment. Moreover, he intuited the cybernetical unity of forms of culture, when he demonstrated that creative imagination plays a remarkable role in science and in the realm of art. The author recommends that we think in essential, *transdisciplinary* ideas, which serve mental processes and broaden the scope of associations and dissociations, of the *game of ideas*, of “intelligence game” and “creative game”.

Székely named Odobleja” the precursor of the fundamental features of theory and practice of the current model of interdisciplinary unification” [1]. The author notes: “The efforts to unify the fields of science require a broader and deeper understanding of the methodology that applies different types of measurements in a “consonantist” way and under the control of generalized dimensional analysis. This explains why Odobleja deals in detail with the problems of methodology, in fact those of epistemology. At the same time, he explains why his consonantist

psychology greatly exceeds the “normal” field of psychology”. Odobleja is the creator of a paradigm of interdisciplinarity, which may be ground all other sciences. Through the concept of *consonantism*, he developed a new vision of psychology as a science that integrates all disciplines of the technical and human universe, a “science of sciences”.

Ștefan Odobleja’s work can be regarded as fundamental to the architecture of science or a milestone for the ideas of the third millennium, in which his synthetic thinking combines, in cybernetic parlance, original interpretations from psychology, physics, biology, anthropology and other humane applications. The Romanian scientist built a system that shows that the world is unified by a metastructure underlying diversity.

Conclusions

The final goal of this theoretical research is to highlight the great importance of the works of some scientists formed in interdisciplinary fields to the development of Romanian experimental psychology. The application of the methods and mathematical models or the implementation of some cybernetics principles in the psychological experiments had as a purpose, the enrichment and diversification of the experimental psychology research field. The special position occupied by experimental psychology “at the crossroads” of several branches of science, promote the translation of theories, models, methods and principles, from one domain to another.

Hence, the idea that the “strict specialization”, without being harmful is not the “supreme ideal”, nor the “absolute good”... Implicitly, this article pleads for a comprehensive professional training as enabling the connections between different research fields. Consequently, it seems that, even more important than the clear-cut distinction between sciences – is their cooperation, their multi, inter and transdisciplinarity.

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