Glass and eye II. Complexity - individuality - whole - part

In November 2015 (on the 100th anniversary of the announcement of the general theory of relativity by Albert Einstein) at the Jan Długosz University in Częstochowa the conference "Glass and eye. Humanities in dialogue with physics" took place. The initiator of the conference was prof. Zbigniew William Wołkowski from the Paris Sorbonne. The main goal of the first edition of "Glass and Eye" was a meeting of representatives of various scientific disciplines: physicists, mathematicians, philosophers, philologists, artists, psychologists, that is, *scientists* and *literary intellectuals*. An attempt was made to build a space for dialogue and understanding within the so-called "third culture". We were accompanied by the idea that the nineteenth-century separation of "humanists" and "scientists" is completely anachronistic and does not correspond to the actual situation in which particular sciences are located. We wrote then that "an important element of the proposed dispute would be questions about the effectiveness of various methodologies and meta-discourses for the interpretation of cultural phenomena, as well as the field of mutual inspiration of scientific and humanistic culture." The result of this first meeting was a multi-author monograph *Glass and eye. Humanities in dialogue with physics* (Ed. A Regiewicz, A Żywiołek, DiG Publishing House, Warsaw 2017).

The publication of general relativity opens the 20th-century apogee of triumphs of the Cartesian-Newtonian paradigm of science with its cognitive ideal of the total physicalization of nature. Einstein's theory has become the theoretical foundation of a new discipline: space physics. Over the course of half a century, it contributed to the formulation of the Big Bang theory, a revolutionary model of the Universe with a world-image rank comparable only to the coup initiated by Copernicus. Its success in cosmology became the main inspiration for continuing the Cartesian program of total unification of the scientific image of the world, closing the final understanding of nature in one unitarian theory of "everything", of which the first search was taken by Einstein himself. The time of the greatest successes of the theory of relativity turned out to be a decline of the Cartesian vision of the world and its ideal of science, and consequently a picture of relations between the sciences of nature and the teachings about man.

This more than a century-old image is derived from the Cartesian ontological division into material things and spiritual (psychic) beings and from the successes of his method in the mechanistic view of material reality. Windelband's division into nomothetic and idiographic sciences most emphatically embodies it and methodologically underlines it. The first, with an exemplary physics position, *explain* preservation of bodies by assigning them to laws that allow predictions and their past states to be checked later in experiments. The second, due to

the different, non-corporeal nature and internal complexity of their subjects of research, focuses on *understanding* their individual uniqueness in the world of spiritual artefacts. The neopositivism that dominated in the time of the development of relativistic physics, this gap yet strengthened, depreciating the cognitive possibilities of the humanities due to the impossibility of subjecting its results to regimes of empirical verifiability.

Almost half a century after the publication of Einstein's work, when articles by Stephen Hawking and Roger Penrose were published about the peculiarity (the starting point of the Big Bang theory), innovative works appeared in various fields of science revealing failures and limitations of the physicalist ideal of cognition. The first come from the very interior of physical disciplines, the second from the sciences of biological and social life, and the third from philosophical reflection on the nature of scientific cognition. An emblematic example of the first group are the works of Edward Lorenz. They initiated the physics of chaos, with its famous metaphor of the "butterfly effect", depicting the huge limitations of physical laws in predicting the behaviour of even simple systems. The vast majority of phenomena surrounding us are described by nonlinear equations that lead to unstable, chaotic, unpredictable events. It turns out that we can not only predict human behaviour, but also the movement of a double pendulum.

The second group of cognitive innovations is represented by the research of such scholars as Ludwig von Bertalanffy, author of systems theory, Norbert Wiener creator of cybernetics, Ilya Prigogine, researcher of dissipative systems. They demonstrated the fiasco of the explanation of life by reducing it to physicochemical processes and proposed an alternative research approach in which Cartesian bodies and Newtonian isolated systems were replaced by an open system model that allows them to go from biological to social and cultural phenomena. The new trend of holistic research with autonomous conceptual apparatus (homeostasis, synergy, self-organization, etc.) has initiated the direction of interdisciplinary research called the "third culture", that is, a new ideological link between physicalist natural sciences and idiographic humanities.

The breakthrough in the traditional view of the method of empirical science produced in the same decade of the 1960s the concept of a new generation of philosophers of science. Such scholars as Thomas Kuhn, Imre Lakatos, and Paul Feyerabend in their theories of cognition have convincingly proved that there are no "naked" facts that the neo-positivist criteria of science are not able to meet recognized physical theories, that the relationship between the researcher and nature is always mediated by socioeconomic factors - cultural, and also

because in science, an important role is played by metaphors, and one of the important moments of research is creative inventiveness, similar to artistic activity.

In addition, in the last half-century there have been radical changes in the scientific image of reality as well as in the sciences themselves, which led to this breakthrough. We live in a different space and in a new landscape of relations between natural science and human sciences, which prompts us to ***common*** reflection. It is not a simple task. Scientific specializations, with their own hermetic terminology, hinder dialogue even between related fields. Common reference points are therefore needed to enable dialogue. As such, we consider the **part**, **the whole**. **the complexity** along with their additional oppositions and derivatives. Deriving from colloquial experience, they are the basic tool for organizing all areas of research on the status of categorial concepts due to their ubiquity and irreplaceability. They form interrelated order and explanatory schemes: the part assumes the existence of the whole; the existence of the whole invokes the question about the way and the degree of its complexity. Detailed applications can be found in all sciences, with very diverse tracks of utilization of their semantic and heuristic potential. They have different positions, tasks and functions: as conceptual preconceptions, regulative ideas, assertors of research priorities, and finally as typological categories. They can be the starting point for a discussion on what connects and what divides the most important areas of scientific cognition.
Here are examples of their propaganda and quiet presence:

Part

A part as a micro-reductionism of modern natural science, an ontical priority of *any kind* of parts over created wholes, as the ontological basis of each analysis, and discreetly pre-dating certain theories of language.

Whole

The idea of a compact whole lies at the heart of holistic research perspectives and organicist worlds assuming independence and the oneness of the whole. The whole is internal completeness and structural undegradability, *individual* - irreducible to the parts contained in them, the ontological premise of uniqueness.

Complexity

Complexity is the name of a new family of sciences: **the science of complexity**. Complexity - as a superior category towards the part and whole, and certainly binding them - is also a trademark of the search for new forms of regularity in the world. The category of complexity allows to exceed the traditional understanding of parts. Here are two examples.

1) Fractal mathematics: there exist, also in the real world, objects that are more than a two-dimensional surface and something less than a three-dimensional volume (e.g. the circulatory system).

2) Physics of chaos: between traditional forms of regularity, e.g. a stable trajectory of motion and completely chaotic behaviour, there are regularities of a new kind, attractors that represent regularities describing the tendencies of subsequent cycles of changes focusing on the way determined by the attractor.

The symptomatic challenge of modern sciences is to surpass the opposition „part/ whole". Therefore, complexity is a category between extreme chaos and the absolute cosmos. Static distinction of the whole and of the part is not enough, since physical, biological, human, social and cultural realities are characterized by an elaborated complexity, specifically understood by the new distribution, new regularity, production of systems of increasing structural complexity.

Decomposed complexity is something primary in the epistemic order, that is in our familiarity with externality. First of all, it is about the obviousness experienced by everyone, that our first and all subsequent sensually mediated contacts with the outside world are contacts with specific "complexities" (collections, aggregators, overall complexity but also with multiplicity, variety, and variability). In turn, in modern epistemologies, which are influenced by two key ideas of those times - mechanical philosophy and atomism - assuming the primacy of parts over the whole, we observe an influence on the ways of structuring ontology and epistemology and - indirectly - methodology.

To the most famous contemporary attempts to develop (invent?, discover?) a unified "theory of everything" belong, according to John C. Barrow, the concepts of Eddington and Einstein, and in the field of humanities - structuralism and phenomenology. However, they did not bring success. Thus, the multitude of anomalies, the awareness of the incommensurability of the scientific language of description and reality, the impression of randomness of complex events whose waveforms are not algorithmized, frustrating the sense of reality chaos - all this again makes us ask about the possibility of building/discovering? a theory whose simple mathematical beauty would become a guarantee of identity and harmony.

John D. Barrow wrote:

Contemporary authors of theories, that could turn out to be the Theory of Everything, hope to place all laws of nature in a simple and single form. The very fact of seeking such unification tells us something very important about our expectations for the universe - they must originate from a mixture of our previous experiences regarding the world and our innate religious beliefs about its ultimate nature and meaning. Our monotheistic traditions reinforce the assumption that the universe at its core is a unity (...).

Is this not a special moment in the history of science, when it is worth asking again what science and what the humanities teach about the unity and complexity of the world? Is today's interregnum not just a transitional phase between the collapse of one paradigm and the beginning of a new one? Is the absolutized - especially in the humanities - fetish of ambiguity, to bored repeated banal, at any rate, formulas about the "fluidity" of modernity, flickering meanings, collisions of discourses, etc..., and in fact these modern, innovative languages are not rather the effect of short-term passions to what is different? After all, the new is often the forgotten/unsaid old.
In the light of the above remarks, we propose a reflection on the following issues:

- From a particle to a whole and back;
- Elementary particles in the humanities: the smallest units and the great semantic integers;
- The Desire of the Whole: false passion or instinct of truth?
- If and how it is/will be possible a unified theory of everything/unified theory of the humanistic field (Falkiewicz, Nowak);
- Are rhetorical tests tests of thoughts? Metaphor, metonymy, synecdoche, irony;
- Simple questions, complex answers;
- Simple ideas - complexity and uncomplexity of thought;
- Beauty in science: simplicity, symmetry, complexity, space, chaos?
- Music and the rhythm of thinking (thoughts arranged on the music pattern, *musicaque composita*);
- Linear and non-linear thinking;
- Unity and complexity of communication;
- Multiplicity and individuality;
- Simple and complex facts;

- Reductionism;
- Indivisible wholes;
- Simple and complex rules

In connection with the above, we want to invite researchers: humanists, artists and representatives of natural and exact sciences and all to take part in the planned project. The conference, organized by the Jan Długosz University in Częstochowa, is planned for 19-20 October 2020. We suggest that the proposed speeches be prepared in two languages by representatives of various fields of science, for example, literary and physics, cultural studies and biologists, psychologists and mathematics, etc. Applications should be sent by March 31, 2020 at the latest to the email address ....