NOEMA

2022, Vol. XXI, no. 2

Romanian Academy

*

Romanian Committee for the History and Philosophy of Science and Technology

This document was prepared with LaTeX 2_ϵ

Contents

STRUCTURAL-PHENOMENOLOGICAL APPROACH THROUGH MATHEMATICAL AND PHILOSOPHICAL CATEGORIES

Can IT Support a Structural-Phenomenology Based on Category Theory?

Gheorghe M. Ștefan

Politehnica University of Bucharest

Abstract

In 2000 Mihai Drăgănescu published the work *Categories and Functors for the Structural-Phenomenologial Modeling* in which the idea of using category theory to address the limit problems of knowledge is developed in the form of an envelope theory. Thus is defined a mathematical structural-phenomenological theory of categories. In this paper we try to take the first steps towards a detailed theory. A first step involves considering categories defined as artificial neural networks, and a second step is based on a hybrid approach that brings circuits and living entities to the same silicon die.

Keywords: structural-phenomenology, category theory, deep neural networks, nonlinearity, non-formal.

Phenomenology, as the study of phenomena as they appear, is a philosophical approach instantiated in a number of versions equal with its promoters. In this situation, the way in which Mihai Drăgănescu uses the concept of phenomenology has a specificity that we have to mark in order to be able to define what is structural-phenomenology that he proposes. We do this not because his vision is very distinct from the ideas shared by the promoters of various phenomenologies, but because the specificity of Drăgănescu's approach will help us understand to what extent the structural-phenomenological knowledge he proposes is possible supported by the theory of categories practiced supported by information technologies. At the same time, further elaboration is needed due to the way in which mathematics, as a tool, and science as a rigorous mechanism of knowledge are exercised in long-term practice with a formal rigor that imposes increasingly embarrassing limits for a deep understanding of existential phenomena. Can the reductionist mechanisms underlying scientific knowledge be complemented by processes that allow access to the complexities that reductionism hides? Mihai Drăgănescu believed that yes, and offered, in the form of an envelope-type theory, the structural-phenomenology supported by the theory of categories. Can we go from an "envelope theory" to an "detailed theory" with the help of information technologies (IT)? We will try to answer this question in the following.

Formal-structural approach

The involvement of various formalisms in knowledge is a complex process that takes place in modernity. It begins, at the end of the Renaissance, with a slow process of detachment from the incidence of various esotericisms, and takes place through a slow transition in the Baroque period between 1600, the year of the burning of Giordano Bruno, for his attempt to bring Christianity closer of esotericism, magic, hermeticism, or astrology, and 1750, the year of Johan Sebastian Bach's death from a failed surgery. The dis-enchantment of the mechanisms of knowledge occurs through a transition characterized by spectacular hesitations. We mention in this sense the alchemical manuscripts of Isaac Newton which attest to esoteric reminiscences in the Newtonian mentality [Verle '93]. But also the exaggerated attraction to the fascination that forms exert that Johannes Kepler had when he proposed a model of the solar system based on the perfect bodies that Plato proposes in his *Timaeus* as elementary structures. Newton reluctantly detaches himself from the fascination of magic, and Kepler indiscriminately embraces the promise of the world of forms.

The process by which formal-structural knowledge was imposed was driven by the formation of scientific communities in which communication becomes one of the strongest mechanisms for increasing knowledge. The knowledge was organized in forms and structures that allowed the condensed representation of the empirically investigated reality. Kepler formulates the laws of planetary orbits based on detailed measurements made by Tycho Brahe. Brahe's tables could be condensed into formulas describing ellipses. Thus, science highlights the structures it represents using mathematical formalisms.

The success of the dis-enchantmented knowledge, caught in mathematical forms describing structures, has been so great that in about two centuries it has reached the limits from which this way requires major reconsiderations. How can we consider, as a source of knowledge, non-repetitive processes for which the Popperian principle of validation/invalidation cannot be applied? In this sense, since the first half of the twentieth century we have been warned by a Nobel Prize-winning physician about the relationship between complexity and reductionist formal-structuralism:

> *"Our mind is so constructed as to delight in contemplating simple facts. We feel a kind of repugnance in attacking such a complex problem as that of the constitution of living beings and of man. ... Geometry does not exist in the earthly world. It has originated in ourselves."* [Carrel '39]

The uniqueness as a source of structural-formal knowledge is impossible to grasp in the process of conventional knowledge. Often, the human ability to reveal a pattern in a data complex is limited, depriving us of the ability to identify a structure that we can capture in a form.

Phenomenon

We can try to define, following Drăgănescu's approach, phenomenology and the phenomenon in opposition to structuralism and structure, even if this opposition is not absolute. We

are encouraged in this sense by the Kantian distinction between the *object itself* and the *phenomenon*, the distinction which stands at the basis of an evolution which, at the beginning of the twentieth century, crystallized in Saussurean structuralism and Husserlian phenomenology. Between 1900 and 1913, Edmund Husserl published the founding texts of his phenomenology. In the same time de Saussure taught structural linguistics at the University of Geneva.

In the last quarter of the twentieth century, after contributions starting from the philosophy of Martin Heidegger and reaching as far as Francisco Valera's neurophenomenology, without ignoring precursors such as Kant and Hegel, Husserl's phenomenological approach imposes itself as a style of thinking that transcends the limits of the philosophical, just as the structural approach has transcended the limits of linguistics.

If structural thinking reduces the complexity oby providing "third-person" knowledge, phenomenological thinking, which tries to retain all the complexity of the cognitive interaction which it focuses on an experience, is lived in the "person first".

The elements of a system are no longer considered reductionistic, for the simple reason that the whole is not decomposed into elements, he is mentained as a totality that the intuition considers it as a "raw material" subject to the conscious approach.

Evidence, and not the truth is the product of the phenomenological approach. Truth is associated with formal-structured systems of axiomatic theories. Phenomenological objectivity is embodied in the evidence that emerges only in a process in which no form of structural reductionism cannot be accepted. The evidence is a "fragile" manifestation that the "brutality" of a formal approach destroys. Evidence versus truth: it is the most succinct way in which the phenomenology and structuralism can be demarcated. Between them we can highlight an opposition, but also a complementarity. It is a problem of intentionality, which arises in the face of the complexity of the process of knowledge. Drăgănescu believes that existence is a phenomenon and structure an useful representation. We practice the conscious confrontation with existence mainly phenomenologically "in the first person" or structurally "in the third person". Is there a "second person" approach? We ask ourselves if a "dialogical" path is possible, a path on which interaction, direct or mediated by a (intelligent) computer tool, with the reality subject to knowledge is possible and superiorly useful.

Structural-fenomenology

It is no coincidence that the twentieth century begins under the auspices of three challenges whose synchronization brings us to the end of the same century in the face of a fundamental stalemate: a useful *distinction*, between structural and phenomenological, degenerates in a blocking *disjunction*.

The first challenge : David Hilbert holds in Paris, at the International Congress of Mathematicians in 1900, the famous conference [Hilbert '00] in which the problem of decision was implicit in the way Problem 10 is stated, thus referring to an obsessive, seemingly legitimate, aspiration: finding an algorithmic procedure for deciding the truth of correctly formulated mathematical sentences. Structural mentality receives a decisive

blow by proving that the problem of decision has no solution [Gödel '31], a blow that will be surprisingly successful by substantiating science and information technology.

The Second Challenge : Max Planck announced in 1900 the famous equation by which he introduced the concept of quantum energy. From this moment on, the continuous processes in physics are accompanied, even dominated, by discontinuous processes. Planck later acknowledges that the introduction of the energy quantum was perceived by himself as a desperate act of abandoning classical physics, an act imposed by experimental evidence.

The Third Challenge : In 1900 Sigmund Freud published *Interpreting Dreams*. Man ceases to be exclusively a conscious being, who can share with others his whole mental experience. The revelation of the beyond of consciousness in the human mind has opened new avenues for understanding what man and existence might be. The multiplicity of states of consciousness, as an experimental fact, provided the context of much enriched approaches to man's relationship with existence.

These three events, produced in completely distinct fields, will have consequences that will converge, in the second half of the twentieth century, on fundamental reconsiderations, still in the process of assimilation. What could be the way forward to unify the dispersing views imposed by the three challenges? The following paths are possible in this context:

- Accepting some limits as fundamental from the point of view of approaching the rigorous formal-structural sciences
- Trying to develop a theory of everything that unifies areas that are currently addressed separately
- Clumsy attempts to formalize areas that cannot be and do not deserve to be formalized (for example: mathematical poetics).

In this conditions, the answer given by Mihai Drăgănescu was: the ***structural-phenomenological approach***, a method of investigation that can take into account both the aspects that can be reduced to formalizable structures, and aspects of reality that maintain their character as a phenomenon due to the fact that submission to any reductionist attempt affects their essence. In other words, structural-phenomenology presupposes an approach through which we manage to involve in the process of knowing formal entities with non-formal entities.

Mixing non-formal with formal entities

Information technology (IT) allows, in the current stage of development, the definition and realization of devices in which the formal and the non-formal can interact. We will consider only two examples. Both are related to the use of artificial neural networks (NNs).

Non-formalizable "patterns"

The phrase "non-formalizable patterns" sounds somewhat oxymoronic. Not in the case of the very subtle effects of using well-trained NNs. In addition to identifying patterns that are accessible to the human mind, an NN can also take into account subtle patterns that escape the ability with which even the experienced investigator reveals regularities in the training data used to train an NN. These are subtle regularities that escape our formalizing ability, which is why we can consider them "informalizable" and qualified as informal. The way in which the result of training an NN is presented, a lot of matrices of numbers (weights), has a complexity that hides the pattern identified by training, informalizable included.

We thus have a first way in which the Deep Convolutional Neural Network (DCNN) technology allows a mixture of the formal approach with the non-formal one. It should be noted that this mixing is only possible at the level of a technical object. The human mind intervenes only in the design of this process and in its running. It is a form of mixing that takes place in an experiment coordinated by the human mind by selecting the appropriate training data. We can speak of a form of *exteriorization*, in the sense of André Leroi-Gourhan [Leroi-Gourhan '64-65], in a technical object of man's ability to identify patterns.

This first step can take into account manifestations of the real that is approaching the non-formalizable phenomenality. Consequently, we can hope for a structural-phenomenological technology that could emerge in this way.

The special ability that DCNNs have comes from the nonlinear nature of the activating function of neurons. The nonlinearity of these functions (Sigmoid, ReLU, Tanh, ...) is what brings the NN behavior closer to reality which, before being purely phenomenological, is nonlinear. We can take a step forward if we manage to replace non-linear functions with non-formal ones.

Live neurons & silicon chips

If the nonlinearity of NN activation functions brings us closer to non-formal behaviors, from the use of non-formal activation functions we expect the emergence of a phenomenologically induced behavior. Such an approach already exists in the attention of start-up researchers who promote AI-based products enhanced with integrating living cells on silicon dies [Koetsier '20].

Cortical Labs team leader Hon Weng Chong said *"we've taken live neurons that we've extracted from mice embryos or we've differentiated them from stem cells and grown neural networks on the actual chip surface"* [Koetsier '20]. From the same paper we learn that:

> *"...it's all about creating computer system that learn — and that learn faster with less training data. That requires a different approach than standard Intel, Nvidia, or AMD chips ... Cortical Labs hope is that biologically-enhanced AI systems would be able to learn complex actions as well: manufacturing, driving, building, cleaning, and so on. And that the biological chips will learn faster."*

Combining on the surface of silicon circuit structures and living components, a device is obtained that has structural-phenomenological behaviors that reach complexities that circuit structures cannot have. The limitations of the structural-structural are thus transcended by the contribution of the non-formal phenomenology of the living components.

Permissiveness of the category to the non-formal

For the study of phenomena related to consciousness, M. Drăgănescu proposes in [Drăgănescu '00] the use of category theory, motivating this option through the permissiveness that this approach has towards the manipulation of objects that exceed the complexity of the formal-structural ones.

> *"Because in the definition of a category, it is not required that its objects should be sets with elements [Bucur '68], that is usual mathematical objects, a category with its objects being phenomenological senses is called phenomenological category."* [Drăgănescu '00]

At the same time, M. Drăgănescu talks about the possibility of extending phenomenological objects beyond phenomenological meanings (phenomenological information):

> *"When the theory of categories is used for physical theories and especially for the structural-phenomenological realms of reality, it has to be adapted to these."* [Drăgănescu '00]

We believe that we can adapt the phenomenological objects associated with a phenomenological category using the openings offered by IT.

NN-based phenomenological category

The connection that M. D. makes between the theory of automata and the theory of categories will allow us to offer technological support to some phenomenological categories. We quote from the same paper:

> *"A neurobiological structure may be a category of neuronal automata, and in general categories of automata are also to be considered. An automaton may be considered as a category, of which objects are its states. Each state is a structure, a set, and the morphisms between the objects are therefore also functions (from a functional point of view, relations and functions among sets were named formal functions [Bucur '68]). A category of automata is then a category of categories. Each object is a category with an automaton with many states that are the objects of this automaton."*

If we consider a Recurrent NN a generalized form of automaton, then its description will be able to benefit from the integration of a model based on category theory. Thus, even a

conventional NN will be able to provide access to aspects that we have considered phenomenological by opening to aspects that explicit formal-structural approaches cannot achieve. It is a first step that allows the consideration of some phenomenological categories useful for the structural-phenomenological investigation.

Integration of non-formal complexity

A major step will be possible by considering some hybrid structures: integration on silicon of digital circuits with living neurons. It results, in this case, devices whose representation and theoretical manipulation will fall exclusively in charge of approaches based on the theory of categories.

When we facilitate the interaction between circuit structures and living structures, we can also expect behaviors that we can determine from the reductionist perspective of some strictly formal-structural theories. We are not sure that we will get effects that we can capitalize on in useful products. But we must hope that the living involved opens the way to behaviors beyond what the logos can trigger. We will be able to arouse creative processes or, moreover, ethical attitudes.

It should be noted, however, that we are limiting the discussion for the time being to the unconscious living involved in a hybrid device. As the complexity of the living components involved increases, additional problems of opportunity will arise.

Concluding remarks

We conclude that there is a real chance to formulate and develop "detailed theories" to approach knowledge from a structural-phenomenological perspective formulated as an "envelope theory" by Mihai Drăgănescu in 2000. The first steps are outlined in the form:

1. consideration of (recurrent) integrated NNs as complex sets of categories
2. hybrid implementation of NNs using living parts

In the first case, the non-linearity of NN activation functions allows access to patterns that the human mind cannot reveal using its formal abilities. We could talk about hidden forms, but we prefer to consider the knowledge we access in this way as informal. This is a first step towards a structural-phenomenological approach.

In the second case, hybrid devices – circuits & mouse neurons – are used to train, faster and with less training data, NN to perform functions with increased complexity. The activation function is upgraded from non-linear (characteristic of real physical structures) to non-formal (characteristic of real life). One can thus obtain, perhaps, a research environment in which the structural-phenomenological approach supported by the mathematics of category theory to allow overcoming the limits that knowledge has today.

In M. Drăgănescu's vision structural-phenomenology supported by category theory is established as a tool of knowledge usable in solving problems raised by understanding what

consciousness is. In this context, we mention that many authorized voices consider the development of a theory of everything, which unifies the theory of gravity with the quantum one, will not be possible until a theory of consciousness is accepted by the scientific community.

References

[Bucur '68] I. Bucur, A. Deleanu (1968) *Introduction to the Theory of Categories and Functors*, John Wiley, London.

[Carrel '39] A. Carrel (1939) *Man the Unknown*, Harper & brothers Pub., New York and London.

[Davis '04] M. Davis (2004) *The Undecidable. Basic Papers on Undecidable Propositions, Unsolvable Problems and Computable Functions*, Dover Pub. Inc., Mineola, New-York.

[Drăgănescu '79] M. Drăgănescu (1979) *Profunzimile lumii materiale*, Editura Politică. (In Romanian.)

[Drăgănescu '97] M. Drăgănescu (1997) *The Depth of Existence*, HTML Edition by the Romanian Academy Center For Artificial Intelligence. At: `https://www.racai.ro/external/static/doe/` (It is the English version of [Drăgănescu '79].)

[Drăgănescu '00] M. Drăgănescu (2000) Categories and Functors for the Structural-Phenomenologial Modeling, *Proceedings of the Romanian Academy, Series A, Mathematics, Physics, Technical Sciences, Information Science*, **1**(2).

[Gödel '31] K. Gödel (1931) Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme, I, *Monatshefte für Mathematik und Physik* **38**:173–198. (English version published in [Davis '04].)

[Hilbert '00] D. Hilbert (1900) *Mathematical Problems. Lecture delivered before the International Congress of Mathematicians at Paris in 1900*, At: `http://aleph0.clarku.edu/~djoyce/hilbert/problems.html`

[Kato '99] G. Kato, D. C. Strippa (1999) A sheaf theoretic approach to consciousness, *The Noetic Journal*, **2**(1):1-3.

[Koetsier '20] J. Koetsier (2020) AI Startup Combines Mouse Neurons With Silicon Chips To Make Computers Smarter, Faster, *Forbes*, 30 May, 2020. At: `https://johnkoetsier.com/ai-startup-combines-mouse-neurons-with-silicon-chips-to-make-computers-smarter-faster/`

[Leroi-Gourhan '64-65] A. Leroi-Gourhan (1964-56) *Le geste et la parole*, 2 vols. Albin Michel, Paris.

[Verle '93] L. Verlet (1993) *La malle de Newton*, Gallimard. (Romanian translation: *Cufărul lui Newton*, Nemira & Co., 2007.)

Scientifically and Philosophically About the Category of Pleasure(s)

Ana BAZAC

In memoriam Evanghelos Moutsopoulos (1930-2021), leading Greek philosopher, refined phenomenologist opening paths in the understanding of man in *kosmos*, of music and of *kairos*, member of the Academy of Athens, honorary member of the Romanian Academy: his deep sense of awareness, his shrewd holism, his spirit of justice and beauty as a way of life.

Abstract

Challenged by the concept of pleasure(s), considered by Evanghelos Moutsopoulos as expressing one of the most important criteria and values of the human life, the paper deploys an analysis of pleasures as conditions of the (human) Being and also as "more-than-being". Since the pleasures are feelings, these ones are caught as relationships of the consciousness with its internal and external environment. Therefore, the levels and dimensions of the consciousness light how and why the human consciousness creates meanings, articulated and transmissible, and how only accompanied by pleasures these meanings are produced in a solid way, the only one that assures the existence and development of the human being.

Keywords: pleasure(s), feelings, affects, rhythm, consciousness, sentience, aura, non-living and living systems, individual and society.

Contents

Captatio benevolentiae

We could see pleasure as a *category*[1]: in the Aristotelian *linguistic* meaning of the concept of category, pleasure is the *expression* of an attribute, or predicate, of the human existence. The meanings[2] of the human existence themselves are expressed through the many predicates man discovers in his experience of life. The notions themselves are predicates, and the categories are the *most general* notions: what can be said about existence can be ordered according to the most general notions, because otherwise the enunciation would remain ephemeral (and the things expressed – "accidental"[3]) and could not be communicated to those who are not present in the time of enunciation. The categories are ordering *frames* of notions and *criteria* to differentiate the individual predications. Appropriately, in the expression of a predicate we can grasp the superposing levels of the general, the particular, and the predicate of the predicate: in "Socrates is man" we discern that: "man" is a category, "man" is the predicate of the individual Socrates, and that "man" has its predicate "animal".

Then, although in Aristotle pleasure is not a category, it may be subsumed to two categories, each of them polar: *action* and *passion*. Actually, the acting and the suffering – as two ends of a relation – can be seen as the genera of the feelings they involve, pleasure and displeasure. And as both action and passion admit degrees and contraries[4], so the pleasure does. If action and passion occur in the course of relations, need time to develop and thus involve change, pleasures too deploy in this way[5].

But all the Aristotelian categories have both a linguistic and an ontological meaning. From this standpoint, the pleasures are things measurable with the temporal "before" and "after", as well as "simultaneity", as well as with the "six species of movement". Pleasures are events which born, are destroyed, increase, decrease, alter and shift, i.e. pass from one cause to another one on a scale of priority towards other pleasures or displeasures. All of these situations require a non-reductive

[1] For the role of categories in metaphysics, see Abraham Edel, "Aristotle's Categories and the Nature of Categorial Theory", *The Review of Metaphysics*, Vol. 29, No 1, 1975, pp. 45-65.

[2] Aristotle, *Metaphysics*, in *Aristotle in 23 Volumes*, Vols.17, 18, translated by Hugh Tredennick. Cambridge, MA, Harvard University Press; London, William Heinemann Ltd. 1933, 1989, V, 7, 1017a: "(2.) The senses of essential being are those which are indicated by the figures of predication; for 'being' has as many senses as there are ways of predication".

[3] *Ibidem*.

[4] J. L. Ackrill, Aristotle, *Categories*, and *De interpretatione* (1963), Oxford University Press, 1974, 9, 11b1-2, p. 30.

[5] For an ontological standpoint, see Ludger Jansen, "Aristotle's Categories", *Topoi*, 26, 2007, pp. 153–158.

way to understand them from different perspectives, and this obviously involves the concreteness of situations and not their abstract concepts.

In this respect, the following analysis does help.

Introduction

The common parlance has borrowed the image about pleasures from Epicurus: they are goals of life, but reason must govern on them[6]. This common view is *ethical* and the European history of thinking has glossed long time about the place of pleasures in the moral decisions of the human being.

However, the contemporary philosophy has outrun the priority of the ethical focus, by connecting the scientific research of pleasures to philosophical interpretations. One of the philosophical schools of these up-to-date interpretations is *phenomenology*. It is plausible to think that it ensued as a reaction to Kantian constructivism, i.e. to the apparently too subjective knowledge of the world. Actually, neither the Kant's epistemology is psychology and nor phenomenology is deprived by an implicit development that is full of suggestions concerning the causality of objective and subjective processes and concerning the consequences these processes entail.

Anyway, the analysis presented here follows the deep insight of the concept of pleasure(s) by the phenomenological *and* analytical view of E. Moutsopoulos, as he liked putting his first name only as a capital letter. This insight was and is developed and confirmed by the scientific research of the last decades.

First of all, the better topic is *pleasures*[7] at plural, because the concept at plural sends to the idea of *heterogeneity* of pleasures, manifested on the different existential levels of the human person (somatic, affective, communicative, intellectual, of communion/social) and according to different degrees of

[6] Diogenes Laërtios, *The Lives and Opinions of Eminent Philosophers*, Translated by K. D. Yonge, 1915, Project Gutenberg, Book X, XXXI, 5, p. 474.

[7] Ε. Μουτσοπουλου, Αι Ηδοναί. Φαινομενολογική έρευνα ενίων προνομιούχν συειδησιακών κατστάσεων[*The Pleasures. Phenomenological research of some singular privileged states of consciousness*] (1967), second edition still in Greek, 1975. Unfortunately, the book was not yet translated into a language of universal circulation. But it was translated into Romanian (the second edition) by Claudiu Sfirschi-Lăudat, Bucureşti, Omonia, 2005.
Other papers were written by E. Moutsopoulos directly in French – his second language – and English; we mention only *Le problème du beau chez Petros Vrailas-Armenis*, Aix-en-Provence, Éditions Ophrys 1960; *La conscience de l'espace*, Aix-en-Provence, Orphys, Institutions philosophiques réunies; 1997; *Le problème de l'imaginaire chez Plotin* (1980), Paris, Vrin, 1980, 2000; *La structure de l'imaginaire dans la philosophie de Proclus*, 1985), Paris, L'Harmattan, 2006; *Structure, présence et fonction du kairos chez Proclus*, Académie d'Athènes, Centre de Recherche sur la Philosophie Grecque, 2003; *La musique dans l'oeuvre de Platon*, Paris, P.U.F., (1959) 1989; *Kairos. La mise et l'enjeu*, Paris, Vrin, 1991; *Kairicité et liberté, Académie d'Athènes, Centre de Recherche sur la Philosophie Grecque, 2007; Reflets et résonances du kairos, Académie d'Athènes, Centre de Recherche sur la Philosophie Grecque*, 2010; *Variations sur le thème du kairos: De Socrate à Denys*, Paris, Vrin, 2002; *L'univers des valeurs, univers de l'homme: Recherches axiologiques*, Académie d'Athènes, Centre de Recherche sur la Philosophie Grecque, 2005; his last book, *La conscience intentionnée*, Académie d'Athènes, Centre de Recherche sur la Philosophie Grecque, 2016; and articles from which I mention: "Esthétique et philosophie de l'art", *Diotima*, 14, 1986, pp. 41-58; "Aesthetics: Art as a Pragmatic Axiology of Man", *Philosophia*, 17-18, 1987-1988, pp. 120-152; "L'idée de kalokagathia et sa fonction éthique et esthétique en Occident, Les enjeux actuels de l'éthique", *Entretiens I.I.P.*, de Tokyo, Centre Internat. pour l'Étude Comparée de la Philosophie et de l'Esthétique, 1995, pp. 21-34.

intensity, thus involving concrete data generating concrete results. Just this heterogeneity avoids the reduction to an abstract unity seen only ethically. Actually, the ethical "measurement" is but gaining from the analysis of the scientific tackling of pleasures.

Then, the importance of pleasures became a scientific problem at the extent philosophy had pointed their aspects and after it did this: this importance was and is highlighted by physiology, psychology, sociology. Phenomenologically, E. Moutsopoulos has demonstrated that the *states of consciousness* have a *privileged* level since they are *intensified* by pleasures. Thus, the privileged level of consciousness is at stake.

The structural explanation of the frame

The biological rhythms

E. Moutsopoulos started from philosophical concepts as they were revealed by art[8], the utmost Greek emblem of a practice enjoyed in the leisure time and the social life[9]. One of these concepts is *rhythm*, and it opened up the semantic analysis of pleasures, namely, the different degrees of pleasant feelings named by different words, in their progression. And although these words/notions were more important in signalling the degrees of feelings than the concept serving as a framing for the play of degrees of feelings, the present paper considers it a key for the understanding of the biological ground of feelings.

The first phenomenological cognisance about living structures is their functioning in a rhythmical manner. In the whole biological level – and indeed, in the whole system of consciousness – there are *rhythms* of activities having "positive" and "negative" phases, alternating each other and generating results which tend to impose a *balance* in the functioning of the systems they act within. The phases themselves involve and generate oscillations around the necessary balance to the functioning of systems. In its turn, the balance signals the dialectical unity and necessary reciprocal limiting of "order" and "disorder" in each part of the organism and in the organism as such. The necessary "order" must not be thought in an absolute manner, and only at the extent it reflects and assures the coherent dynamic of the system it is good, as the "disorder" is not necessarily the absolute opposite to "order" and when it is necessary to the system it is good. Therefore, the phases of the rhythms tend to *compensate* each other, but this is only a tendency. In fact, as the biological systems are inserted in larger biological systems, having a relative autonomy but subordinated to the unitary system encapsulating them – as in the Russian dolls model – so the rhythms of each of them generate *emergent* responses specific to each system but having a relative, actually conditioned, power to radically transform the unitary system.

The biological rhythms are*bivalent*; we see this bivalency in the *bottom-up* influence of fundamental chemical reactions at the level of cells, in the influence of physical forces through the medium of chemical reactions and linking the rhythms of cells into rhythmical behaviour of groups of cells, and of organs, in the influence of biochemical reactions between organs, but also in the *top-down* influence of integrative forces of the organism on organs, groups of cells and cells. Thus, the excitement of every cell within systems of cells, in the internal organs as well as in the sense organs, takes place as reaction / oscillation of each component of the cell (each sub-system of the cell) in its connections with internal and external excitement factors. According to these factors, each component of the cell,

[8] E. Moutsopoulos, —em La musique dans l'oeuvre de Platon, Paris, P.U.F., 1959.
[9] C. M. Bowra, *The Greek Experience*, Cleveland and New York, The World Publishing Company, 1957, esp. pp. 73, 76, 90

as well as the cell itself, oscillates so as the result being a balancing state of both the sub-systems and the system of cell. But the whole process of balancing by the instrumentality of rhythmical oscillations in the matter-energy-information exchange at the level of each sub-system and each system of the organism is manifesting also at the level of the organism: as both 1) external impulses reception from the sense organs and these impulses' processing in every sub-system and every system in order to control the balance in these sub-systems and systems, and 2) the internal messaging from the consciousness that represents the whole organism: to at least groups of cells and organs, and to the organism in its wholeness.

The action-reaction and the non-living systems

Before arriving to the feeling that is always related to a conscious process, let's mention the *action-reaction* couple[10] without which the movement itself of the non-living systems is not conceivable. The model of living systems (*res vivens*) – at the level of electrical chemical informational basis of molecules – was already producing wonder in scientific communities, since they faced the "sentient" quality of protein molecules which purposefully change their conformation to allow in and out ions, or which change following the ligatures with other molecules[11]. But is there not a similar process, involving action-reaction, in non-living systems? And could we not explain the reactive process at the level of atomic and quantum?

It is not the place to elaborate on the intermingling and superposition of physical forces, chemical rules, magnetic and electrical binds[12]. The "sentience" of apparently amorphous matter was underlined philosophically: as "senses" felt by/emanated from the *matter-information unity* at the level of the depth of the Being or profound matter, we may say "sub-quantum". The sense is typically the result of the consciousness in its relation with the world: it is the *meaning* developed in the exercise of knowing, both *before* the ordered structural approach – as *intuition* and pre-image of the phenomena – and *during* and *after* knowing, sometimes as *that which remains* when the logic and details of the structural approach are no longer present.

The Romanian electronics engineer Mihai Drăgănescu, really feeling the need to interpret philosophically the insertion of information in the material world, has considered that the matter-information unity at the depth of Being[13] would give the fundamental senses, called ortho-senses: the ortho-sense *of existence*, that *of movement*, of *coupling-decoupling*, of *interaction, integration* in living, of *information* and electrical loads. The physical objects are, in the model of Mihai Drăgănescu, even "observers" of the material world, since they respond to this world following the information assimilated and assumed that the world exists and that (as they exist) they must answer. Mihai Drăgănescu's model is complex: it is *circular*, because it shows that the intentionality of consciousness comes from deep unity between matter and information, from the permanent messages of this

[10] This fundamental relation of action-reaction in the physical-chemical world, under the name of *interaction*, was opposed to *communication*, specific to living systems, as behaviour-variable relation. See Erich Hamberger and Herbert Pietschmann, *Quantenphysik und Kommunicationswissenschaft: Auf dem Weg zu einer allgemeinen Theorie der Kommunication*, Mit einem Beitrag von Jörg von Hagen, Freiburg/München, Verlag Karl Alber, 2016.

[11] Ladislav Kovàč, "Life, chemistry and cognition: Conceiving life as knowledge embodied in sentient chemical systems might provide new insights into the nature of cognition", *EMBO Reports*, 2006, June, 7 (6), pp. 562-566.

[12] See only the explanation of the consciousness with quantum states, Stuart Hameroff and Roger Penrose, "Conscious Events as Orchestrated Spacetime Selections", *Journal of Consciousness Studies*, 3, 1996, pp. 36-53.

[13] He preferred the concept of Being for inorganic matter, while for the living one the concept of Existence.

unity in which consciousness bathes[14]. So, the sense created by human consciousness is transposed into the depth of matter and then the fundamental senses reverberate as human meanings. The senses are only intuition of the appearance of things, so of phenomena, they are different from the ordered knowledge of the structures, as it is deployed in science: the senses correspond rather to philosophy.

Therefore, from the causal relationships in the matter-information unity, structured in multi levels spaces and studied by the "structural" sciences, Mihai Drăgănescu designed a philosophical ontology centred on the capacity of the consciousness to feel senses and transposed these senses at the level of fundamental matter as fundamental senses.

But are these fundamental senses feelings of the quantum world? Are the fundamental physical forces – rather from the electromagnetic and the strong force – which cause / explain the holding together of matter at atomic level etc., felt? Does a feeling correspond to the information that doubles the fundamental matter, or even information would be a feeling? Well, we do not (yet) know. What is known is that the model of superior, living systems was taken over in order to imagine a philosophical ontology of the non-living fundamental matter. This taking over – starting from the superior level in order to better understand the inferior ones, though the inferior is the root of the superior – is always interesting, including because by reversing the knowing road from top to bottom, this apparently anti-intuitive technique extrapolates notions specific to the acme of a complex of systems to its bottom.

What does an animal feeling suggest?

The living system is the original locus of feelings. Their realm is the animal life, and rather the contradictory pinnacle of animal life, the human one. Letting aside the philosophical speculation, nowadays we conceive of the feeling as only *instinctual* in animals and the new-born human child, but that develops at the level of consciousness as the infants acquire experience and constitute as humans.

Why this? In order to understand what an instinctual feeling does mean, we remind two approaches.

1. Beyond the scientific neuronal explanation of instincts – that includes also the components of the neuronal level – we again arrive to the *meta*, philosophical questioning and philosophical sketching of answers.

In the ancient thinking, we find some paths which, all of them suggested the derivation of concrete instinctual feelings (as need to eat etc.) from what was called since modernity, "instinct of life". This first inclination or vital impulse – indeed, something *instinctual*[15] – was that to *persist*, to exist

[14] Beingness generates (human) awareness, Mihai Drăgănescu, *The Depth of Existence* (1979), `https://www.racai.ro/external/static/doe/toc.html`, Chapter 7.

[15] Or something that *is not consciously chosen by man in virtue of his reason.* Epictetus emphasised the difference between reason and thus capacity to choose and do (or not do) different things – a natural faculty of humans, allowing the conclusion that they do *two kinds* of things: some ones being *in their exclusive* power to reason, deliberate, choose, strain their efforts to consciously do (or not do) something, and things which are *not* the result of reason etc., but are given by nature. The difference highlighted by Epictetus – see Franco Scalenghe, *Synopsis of all the passages containing the terms 'Proairesis', 'Proairetic' and 'Aproairetic' in the works of Epictetus*, `https://web.archive.org/web/20150210224944/%20http://epitteto.com/Sinossi%20PRO.PRO.APRO.ENG.html` – between acts resulted from conscious will and acts inscribed in the natural composition of the human mind-body unity, so resulted from instincts if we use this modern word, is not tantamount to the later observation of Leibniz that the human freedom is according to what a human can choose from his own will, not forced by others.

in one's own individuality[16]. In the quote from the footnote we observe both the natural impulse to exist and, intertwined, the natural impulse to be *conscious of* the individual existence, as well as their proof in the natural attraction of living beings to things which assure the impulse to persist, or their natural repulsion of things jeopardising the individual existence

And, the Stoics continue, this doesn't mean that the first impulse would be toward pleasures, because the pleasures are only "accessories" – or, in modern language, signs – through which nature facilitates the vital inclination[17].

According to the notions used by the ancients, the instinct of life was related to the impulse of the soul toward material things men yearn for and toward immaterial things as vice, virtue, the beautiful, the good, the bad[18]. This impulse was/is thus proved in the desire of the soul, and is not in the structure of reason: though reason can conduct some desires, at least to some extent, reason is a faculty of humans, and the mastering of instincts is not fully and exclusively a question of this faculty[19].

The idea of primary vital impulse as a fundamental feeling was taken over later by Spinoza and Leibniz as *conatus*, under the Latin translation of the Stoics, reverberating also in modern times both in philosophy (Bergson, Camus) and the biology of the vital force[20]. It's important to note that the natural vital impulse had in antiquity a methodological content: the impulse to persist meant at the same time: the already mentioned awareness of one's own existence and the fact of "feeling good" in one's own existence[21]. To persist meant to feel "at home" (*oikeiosis*) in one's own

[16] The Stoics "say that the first inclination which an animal has is to protect itself, as nature brings herself to take an interest in it from the beginning, as Chrysippus affirms in the first book of his treatise *On Ends*; where he says, that the first and dearest object to every animal is its own existence, and *its consciousness of that existence*. For that it is not natural for any animal to be alienated from itself, or even to be brought into such a state as to be indifferent to itself, being neither alienated from nor interested in itself. It remains, therefore, that we must assert that nature has bound the animal to itself by the greatest unanimity and affection; for by that means it repels all that is injurious, and attracts all that is akin to it and desirable", Diogenes Laërtios, *The Lives and Opinions of Eminent Philosophers*, same edition, Book VII, LII, 85, pp. 290-91 (I underlined, A. Bazac).

[17] "... pleasure, if there be any such thing at all, is an accessory only, which, nature, having sought it out by itself, as well as those things which are adapted to its constitution, receives incidentally in the same manner as animals are pleased, and plants made to flourish.
Moreover, say they, nature makes no difference between animals and plants, when she regulates them so as to leave them without voluntary motion or sense; and some things too take place in ourselves in the same manner as in plants. But, as inclination in animals tends chiefly to the point of *making them pursue what is appropriate* **to** *them*, we may say that their inclinations are regulated by nature. And as reason is given to rational animals according to a more perfect principle, it follows, that to live correctly according to reason, is properly predicated of those who live according to nature. For nature is as it were the artist who produces the inclination", *ibidem*.

[18] Franco Scalenghe's translation in Italian of *Stoicorum Veterum Fragmenta* (ed. Hans von Arnim, Vol. I-III, Leipzig, Teubner, 1903-1905), as *Tutti i frammenti greci*, Libro III, referring to Stabaeus in SVF III, (p. 169, "the usual impulsive posture of the soul", on which the impulses to something second – food etc. – are forged (AB, this can be considered a prefiguring of Bolzano's intentionality), to Clemens of Alexandria in SVF III, p. 176, again to Clemens of Alexandria in SVF III, p. 151 (vice and virtue are not natural things, so there is no natural impulse to them, the humans choose them) etc.

[19] If we use the term of Epictetus, the mastering of instincts is not fully and exclusively a question of proairesis, of reasonable human power.

[20] See Ana Bazac, "Conatus and the worth of life in a time of crisis", in *Philosophy and Crisis: Responding to Challenges to Ways of Life in the Contemporary World*, 2013 Conference Proceedings, G. Maggini, H. Karabatzaki, V. Solomou-Papanikolaou and J.Vila-Chã (Eds.), vol. II, Washington D.C., Council for Research in Values and Philosophy, book series IV: "Cultural Heritage and Contemporary Change", vol. 11, November 2018, pp. 137-152.

[21] Anthony A. Long, "Hierokles on Oikeiosis and Self-Perception", in *Hellenistic Philosophy*, Volume I,

existence. In this respect, when an animal, say, a dog, is hurt, it does no longer feel good "in its skin" and its vital impulse pushes it to re-balance its parts and functions, and it continually licks its injured paw even if this one does not hurt much. And all of these: as *natural* instincts. In man these instincts are covered by *cultural* acquisitions: ideas – carried by words – motives, values, ideal goals and formulations, sometimes even transcending and opposing the direct vital purposes. Thus, the vital impulse to persist and the above cultural acquisitions do not superpose: both elements have a mutual relative autonomy. Anyway, through culture the animal adaptive processes in order to survive *and in as good condition as possible* receive new "vital forces": they are the impetus that competes with instincts, sometimes concurrent with them and sometimes diverging from them.

Scientifically, we can observe three aspects.

First, the vital impulse is the metaphorical description of a first manifestation of life, the *copying* of matter by itself. It is about the RNA *hypothesis*: before the DNA able to encode proteins, there were RNA molecules, acting as catalysts for chemical reactions but also being able to store genetic information in the form of sequences of the nucleotides A, C, G and U. The RNA strands copied themselves and competed with other RNA strands. In this process, the RNA enzymes built proteins and also transferred the above-mentioned genetic information into a more stable DNA[22].

Second, the vital impulse has emerged from a "cognitive impulse" manifesting at the level of living molecules, and this "cognitive impulse" has generated a process of *autopoiesis*, of construction of more complex structures which in their turn gave rise to more complex structures and so on (Humberto Maturana). This *autopoiesis* has manifested as vital impulse / generated it, but the vital impulse as such is not the result of a neutral internal complexification of the living structures (although it is "stored" in the genes), but the genes themselves and the vital impulse are formed in an "ontogenic-phenotype/ontogenic-niche *relation*, and not in the conservation of a particular genotype" because "although nothing can happen in the life history of a living system that is not permitted by its total genotype, whatever happens in it arises in an *epigenetic* manner, and it is not possible to properly claim that any features that arises in the life history of an organism is genetically determined"; thus, "it is behaviour what guides the course of the history of living systems, not genetics"[23].

Then and accordingly, the vital impulse is a principle of coherence generation in/of nature as such, in/of all the species which, just in order to strengthen their structural stability as a basis of their capacity to persist, *harmonise* the vital impulse of every one of them/all of them. In this respect, at least at the level of mammals, the instincts involve a certain pleasure. This once more contributes to what is of greatest importance for the understanding of harmonisation, mostly being cooperation, to the creation of new, more complex structures just as a result of the cooperation itself. These complex structures better preserve their stability. (This is the reason why a new physics supporting

Edited by K.J. Boudouris, Athens, International Center for Greek Philosophy and Culture, 1993, pp. 93-104.

[22] Felix Müller et al., "A prebiotically plausible scenario of an RNA–peptide world", *Nature*, Vol. 605, 2022, pp. 279-284.

[23] Humberto Maturana-Romesin and Jorge Mpodosis, "The origin of species by means of natural drift", *Revista chilena de historia natural*, v. 73, n.2, 2000, (consulted 5 July 2022).
"Behaviour" means here the response of the organism to its environment, i.e. the power of experience in environment; the organism's experience is codified in genes. For example, K. Tambets et al., "Genes reveal traces of common recent demographic history for most of the Uralic speaking populations", Genome Biology, 19, 2018. Or, in a joking tone, not the pedigree ("genes") determines the behaviour of dogs, but their experience in environment, including the cultural selection made by humans, Kathleen Morrill et al., "Ancestry-inclusive dog genomics challenges popular breed stereotypes", *Science*, 376, 475 , 2022, pp. 1-17.

the process of emergence of complex systems is coined with the Greek prefix eu (εὖ) meaning good)[24]. See the empirical research that emphasises the interspecies cooperation[25].

2. However, beyond the philosophical intuitions, the present science integrates the *behaviours* which *express* the action-reaction pattern of living beings, inscribed into the constitutive genetic structure of species.

The scientific tackling of behaviours, inherently having its basis in neurophysiology that manifests as psychology, focuses on the appearance of reactive systems that links their natural basis (the instincts with their neuronal and molecular origin) with the *concrete experience* of living beings and with the cultural/social "second nature" of man. The animal psychology has disclosed marvellous phenomena of human-animal similarity in sensitivity and behaviours[26], and has emphasised dimensions of the states of consciousness varying between species (perceptual richness, evaluative richness, integration at a time, integration across time, and self-consciousness)[27]. But methodologically, the research of the results – easier because these ones are more visible – calls for the research of their causes. The complexity of behaviours' causes and their intertwining has led to the development of psychology and to what is euphemistically called *neurosciences* (actually, mostly neurophysiology and neuropsychology), with their euphemistic pendant *philosophy of mind*, discussing and demonstrating the neuronal origin and correspondence of states of mind and suggesting a necessary synthesis about a synthesis of these states and their basis.

The awareness of feelings

The synthesis of states of mind which are, ultimately, expressed by behaviours, is what Locke has named *consciousness*. It was described by phenomenology (Merleau-Ponty[28]) and psychiatry and psychoanalysis, inherently interpreted from without (as philosophy) (in Henry Ey[29]), as a field, an organised structure of the individual's experience, namely, of *actualisation of its experience* and trans-actualisation of the subject as Self. The feelings, generated by the encounter of the individual with its environment, are only at the extent they are conscious, i.e. present for the person. They are *represented* as present, the self-consciousness of the Self being, *inter alia*, just the mirroring of the feelings which have a generation and trajectory in a lower level of mind, in what Aristotle considered

[24] Paulo Castro, Jose Ramalho Croca, Rui Moreira, Mario Gatta, "On the Foundations of Eurhythmic Physics: A Brief Non Technical Survey", *International Journal of Philosophy*, Vol. 5, No. 6, 2017, pp. 50-53.

[25] Marilyn L. Fogel, and Noreeen Tuross, "Transformation of plant biochemicals to geological macromolecules during early diagenesis", *Oecologia*, 120, 1999, pp. 336-346; Marilyn L. Fogel et al., "Unusually negative nitrogen isotopic compositions of mangroves and lichens in an oligotrophic, microbially-influenced ecosystem", *Biogeosciences*, 5, 2007, pp. 1639-1704; Stefan Schouten, Ellen C. Hopmans, J.S. Sinninghe-Damste, "The organic geochemistry of glycerol dialkyl glycerol tetraether lipids: A review", *Organic Geochemistry*, 54, 2013, pp. 19-61. Etc.

[26] Ana Bazac, review of Georges Chapouthier, *Kant et le chimpanzé. Essai sur l'être humain, la morale et l'art*, Paris, Belin, 2009, *Studia Universitatis Babeş-Bolyai, Philosophia*, Volume 62 (LXII), 1/2017, pp. 183-190; Georges Chapouthier, *Sauver l'homme par l'animal: retrouver nos émotions animales*, Paris, Odile Jacob, 2020, and Ana Bazac, the review in *Noema* 2021, pp. 159-172, for the references.

[27] Jonathan Birch, Alexandra K. Schnell, Nicola S. Clayton, "Dimensions of Animal Consciousness", *Trends in Cognitive Sciences*, Vol. 24, Issue 10, October 2020, pp. 789-801.

[28] Maurice Merleau-Ponty, *La structure du comportement*, Paris, Presses Universitaires de France, 1942; *Phénoménologie de la perception*, Paris, Gallimard, 1945.

[29] Henry Ey, *La conscience*, Paris, Presses Universitaires de France, 1963.

a "vegetative soul", a part of the soul or rather an ability of the complex, i.e. intellective soul[30]. If the consciousness has a pathology that depletes its organisation of the presence of the Self in the world and its capacity of actualisation of feelings, then the peculiarity of consciousness is better grasped.

Therefore, consciousness means the *organisation of the presence of the Self within the organisation of representations of the lived experience*. It is self-organisation, generated by the multi- strata and inter- strata interactions between all of the elements of the consciousness, increasing its order and decreasing its entropy but, obviously, not annulling it and uncertainty. But defined in this manner, consciousness is/involves *mindfulness*, quality of being aware of both the actual experience and the Self[31].

From the above it's difficult to oppose the *intentionality* of the consciousness – the famous idea usually retained from the Brentano-Husserl tradition in phenomenology – to its executive power of *representation*. Neither Husserl – when he described the *hyletic* part, the sensory data stored in consciousness and thus being unintentional, and the noetic/forms constitution part of the consciousness, always intentional – did oppose intentionality and representation. Because the sensory data (*qualia*), only perceived, involve their unique flashing ephemeral impression, in no way intentional, but interpreted as meanings only in/after intentional focuses[32], and interpreted in the consciousness with the help of fragments of representations and images, of symbols (even in forms of *Urphänomenen*, in Goethe's term); and for this reason they are *immanent* to the consciousness, but they are brought to life by intentional animating *morphe*, or within intentional processes. While these processes involve more than the *qualia*: *representations* and *images* (they themselves being complex results of the processing of the information they as well their external origin carry), different kinds of *symbols* – even abstract, formal, as the representations of written or spoken words – and *ideas* in different degrees of abstraction as symbolising the meanings[33] which are interesting for the listener and to which he/she answers. These representations, images, symbols and ideas are formed in the human mind, but they constitute an *external* realm to the intentional processes of actualisation: they are the *noema* constituted in the process of *noesis*, of knowledge formation: and always in the interaction of the consciousness and the world.

But to oppose the *intentionality* of the consciousness to its constitution through representations is difficult not only because to feel a feeling is or can be a very strong intention. When we can feel a certain emotion, we focus/our consciousness focuses on it – concretely on its elements, its causes as we suppose or imagine them – on its combustion and results. Actually, even the intentionality is interdependent with representation. We intend to interact with something not only because we see it in front of us – in fact, we do not aim only at what is visible, palpable – but rather because we have different types of representations of that something *or* of what we consider interesting (possible) to give a certain something. For example, we intend to see reality from an absolutely new viewpoint. We do not know the new point of view neither the reality it would be useful, and obviously nor the

[30] See Stanislas Cantin, "L'âme et ses puissances selon Aristote", *Laval théologique et philosophique*, 2(1), 1946, pp. 184–205.

[31] The therapeutic role of mindfulness cannot be neglected. See Sebastian Sauer, Siobhan Lynch, Harald Walach, and Niko Kohls, "Dialectics of mindfulness: implications for western medicine", *Philosophy, Ethics, and Humanities in Medicine*, 6:10, 2011, pp. 1-7.

[32] See the useful analysis of Kenneth Williford, "Husserl's hyletic data and phenomenal consciousness", *Phenomenology and Cognitive Sciences*, 2013, pp. 1-19.

[33] Although this is not the place to elaborate, it is important to understand that the *clarity of meanings* – ultimately, their goal and reason to be – is chiselled in the environment of concrete and abstract notions, and of different degrees of concreteness and abstraction, and thus involves the mind's discipline and endeavour *to not confuse* the concrete and the abstract and their different degrees. The mindfulness itself is related to the clarity of meanings.

new theory we intend to construct. But our consciousness does not see/understand this "something" only by focusing on (on what?) – although it longs for it – and thus it begins to review the known interesting aspects possibly related to our intentional object. Of course it brackets the existing theories about these aspects: it wants to consider that it longs for with a fresh look, but it does this just because it represents them, and later combines different representations, analyses them and sketches different alternative representations. In fact, observation and raw description start from the always unique human experience, but they are expressed, even in the solitary human mind, with words which cannot remain at the level of the individual, because even the individual notions suppose and suggest general foundations. Differently put, we begin to know when we focus on something interesting for us – knowledge begins with the intentionality of consciousness – but the process of knowing involves the processing of representations[34] in the human mind, including the constitution of new representations.

The states of mind, like the feelings, are also the object of the intentionality of consciousness. Thus, when we feel good there are two aspects: one is our well-being as such, the result at the level of organism of the combination of different states of somatic equilibriums in the many functions of organs, and the awareness of this well-being. The first aspect sends to our mind the signals of well-being, but only when our consciousness had processed the totality/most part/the most intense signals and unites this processing being interested to characterise it, so having the intention to characterise it, we say/know that we feel good.

Letting aside the almost simultaneity of the two aspects, the feelings are felt because we are aware of them: of simple sensations (of pain, of well-being) and of complex states as pleasures, happiness and unhappiness. And, once more, our awareness is not expressed at/only at an unarticulated level but also and rather on the level of articulation of representations.

Sentience and consciousness

Consciousness as intersection of levels and dimensions

The awareness of feelings unveils a constitutive *hierarchy* of the consciousness: as the functions of the consciousness have been constituted, a basic level/function is that of instrument of *knowing* the external world[35] – thus, the level of access consciousness to the world – its *reflective* efficiency[36]. But this is not at all the only aspect that would say something about consciousness. Consciousness is not only a set of responding procedures to the world, this one and perhaps the imperfect character of procedures alone being guilty for the results of the consciousness. And even though it is clear that the *phenomenal* consciousness of the feelings experienced by the humans[37] helps the access consciousness – if we distinguish these feelings from what is external to the focused awareness – in fact, these two levels are intertwined[38], this phenomenal consciousness warns not only about the richness of phenomenal reactions in the world (richness that challenges our capacity to know it) but also about the *constructive* efficiency of the consciousness, about the level of self-enhancing

[34] See David Marr, Vision: *A Computational Investigation into the Human Representation and Processing of Visual Information* (1982), The MIT Press, 2010.

[35] External to the level of awareness, i.e. of the specific intentionality of consciousness; thus, the internal states, the feelings are or can be seen as external, too.

[36] "It's cold, warm etc.; so I will...".

[37] "I feel good etc.".

[38] Uriah Kriegel, "The Concept of Consciousness in the Cognitive Sciences: Phenomenal Consciousness, Access Consciousness, and Scientific Practice", in P. Thagard (Ed.), *Handbook of Philosophy of Psychology and Cognitive Science*, Amsterdam, North Holland, 2006, pp. 195-217.

construction of representations as the newest and superior level of consciousness that supports the previous levels.

In the activity of the brain, to the above access consciousness "areas that are specialised for sensory and motor functions (such as processing sound, visual and movement information)" correspond. While to both the phenomenological and the next mentioned *evaluative* levels synergistic information processing, i.e. integration of information of "complex signals from across different brain networks" from the whole brain, is specific. And just the weigh of the synergy-heavy area, its expansion and transformation, is that which differentiates the humans from even superior animals[39].

Actually, the complexification of the human brain in its functions and material capacity is the result of the evolution of humans and their more and more complex *experience* in an always new and complex environment. The human consciousness has developed in a *social/cultural* frame, and thus the *representative* consciousness is and reflects social/cultural experiences, social/cultural human relations. That's why the consciousness as such involves the representations of *values* as criteria of the organisation of the reflective and phenomenal representations. Clearer: the organisation[40] of reflective and phenomenal representations cannot be taking place/cannot exist without their *evaluation*[41] within the human mind (and obviously with words). In this respect, the evaluative process is another level of consciousness that assures the constancy in the evolution of individual consciousness.

This constancy doesn't mean conservatism or psychical rigidity, it does not refer to the concrete contents of values but to their function and capacity to being criteria in a pattern of analysis of sensations, perceptions, representations: states of mind related, inherently, to the multi-dimensional human experience. This "methodological" pattern responds to the diachronic constitution of the human consciousness, i.e. through the actualisation of the human experience and confronting it.

In other words, the constancy governs the *diachronic* dimension of consciousness, intersecting with the synchronic/*actualisation* dimension that gives the peculiarity of the consciousness as such. The field of consciousness is the intersection of these dimensions. And obviously, actualisation itself is not tantamount to a cutting off of the present from its relations with the past and the future, to a *carpe diem* view, ignoring everything that would not have meanings for the simple living, the simple existence in present. Actualisation doesn't mean "to live in present", but to be aware of the lived experience. It is also a "methodological" pattern of the consciousness. It has space and time dimensions and the present lasts as long as it is structured in an act. E. Moutsopoulos' insistence on *kairos* revealed not only a temporal moment, fugitive in the dialectical play of "not yet", "already", "too early", "too late", but an action moment, because the *kairos*, as every temporal instance, is/are only as *contents*, as actions (intentions, deliberations, choices, actualisations).

This state of awareness sent to the understanding of the consciousness as more than *sentience* of experience, including of having mental states which signal to the individual animal that the experience is not only asking its reaction but also that it is good/bad for its being –. Yes, by this sentience, the animals have a self-actualisation, they act and react from the standpoint of each one's feeling of individuality. And all of these legitimate the careful – let say, human – treatment of

[39] Andrea I. Lupi et al., "A synergistic core for human brain evolution and cognition", *Nature Neuroscience*, 2022.

[40] To the organisation of mental representations (generally, states of mind) the organisation of behaviours corresponds. For a non-mechanical understanding of the concept of organisation, see A.R. Luria, *The Nature of Human Conflicts, Or Emotion, Conflict and Will: An Objective Study of Disorganisation and Control of Human Behaviour* (1930), Translated by W. Horsley Gantt, With a foreword by Adolf Meyer, New York, Grove Press, 1932, esp. pp. 6-9.

[41] E. Μουτσοπουλου, Φαινομενολογία των αξιών(1967), also translated only in Romanian, by the same publishing house, in the same year, also by Claudiu Sfirschi-Lăudat, with a preface by Christos Dedes.

animals. But this argument about the natural state of animals, i.e. about the object of the attitude, is not the only one, it obviously concerns the subject, the human being. And the argument from its viewpoint is related to *moral* sentiments, something absolutely specific to humans.

Pity, refrain from cruelty, image of the human dignity itself when one produces suffering to not only another human but also to all beings which are helpless, dependent, weak, defenceless: all of these sentiments exist not because they arose from the biological ability of humans to sense, by a molecular mechanism of neurons, the intentions of others[42] – actually, this ability is common in animals, primates and birds – so from a molecular coding of information[43] generating superposed feelings about both new "objects" which are living (and which are members of the same species), so because the above sentiments issue and lead to a clearer difference between the "I" being and the other ones (from the same species or not). But because these sentiments develop *only in the web of social relations* where the humans understand the others as intentional agents and learn to share intentions[44], this learning process itself developing the use of symbols with both reflective and normative dimensions. In this way, the *meanings* have appeared, created and polished in the *Mitwelt* or the world of living together. And the above sentiments have been the first embodying[45] the social interdependence, obviously developing with the evolution of the human society.

The peculiarity of the human consciousness

Therefore, consciousness evolved only in the social frame that required and developed the *meanings* through the articulated language that preserves them beyond the present moment[46] – articulated language that is a mediated form of communication, related to the *mediated* form of security of existence (through tools using processes) and where language "has not only its semantic function: function of categorization of impressions, but its pragmatic or regulatory (or controlling) functions as well. By using language man overcomes the direct influences of environment, and his behavior becomes no more field-linked, but is goal- or plan-linked"[47], the consciousness is also a *circumscribing of the human individual – as a person – as a Self.*

The common to humans and animals "neuroanatomical, neurochemical, and neurophysiological substrates of conscious states" and the animals' "capacity to exhibit intentional behaviours"[48] do not annul the uniqueness of the human consciousness. The actualisation mechanism is included in the

[42] Vittorio Gallese, "The 'shared manifold' hypothesis. From mirror neurons to empathy", *Journal of Consciousness Studies*, Volume 8, Numbers 5-7, 1 May 2001, pp. 33-50.

[43] Robert R. Trail, "Thinking by Molecule, Synapse, or Both? From Piaget's Schema to the Selecting/Editing of ncRNA" (2005), *The General Science Journal*, no. 2, 2008, pp. 1-34.

[44] Michael Tomasello, *The Cultural Origins of Human Cognition*, Harvard University Press, 1999, and Michael Tomasello and Hannes Rakotzy, "What Makes Human Cognition Unique? From Individual to Shared to Collective Intentionality", *Mind & Language*, Vol. 18, Issue 2, April 2003, pp. 121-147.

[45] Christopher Boehm et al., "Egalitarian Behavior and Reverse Dominance Hierarchy [and Comments and Reply]", *Current Anthropology*, 34 (3), 1993, pp. 227–254; Christopher Boehm, "The natural selection of altruistic traits", *Human Nature*, 10, 1999, pp. 205–252; Christopher Boehm, "The moral consequences of social selection", *Behaviour*, 151(2-3), 2014, pp. 167-183.

[46] See one of the first moments of the history of the human communication: before the electrical oscillations of the electrical potential of neurons – as a way of communication between them and along the nervous system – there are electrical oscillations of fungi as their language; see Andrew Adamatzky, "Language of fungi derived from their electrical spiking activity", *Royal Society Open Science*, 9, 2022, art. 211926.

[47] A. R. Luria, "Metaprinciples in neuropsychology", *Skolepsykologi*, Argang 8, Nr. 6, 1971 (Denmark), pp. 407-408.

[48] Five years of the Cambridge Declaration on Consciousness, 7 Jul 2017, `https://www.animal-ethics.org/five-years-of-the-cambridge-declaration-on-consciousness/`.

meta look on one's own states[49] and its synthesis as the unitary Self. The consciousness is the *meta* look/ the knowledge on/rather about the knowledge and feelings of the human in its unitary personhood. Thus, the consciousness is self-*consciousness*[50]. Not only for Descartes, self-consciousness is self-knowledge and therefore, the basis of knowledge as such. And just the unitary Self – without which there is no knowledge at all – allows the top-down deployment of causality from the integrity of the organism/person to the functions and equilibrium power of organs etc.: although limited, just the consciousness of the unitary Self has the capacity to control or retard the local disequilibria of organs etc., in order to preserve the unique person.

Consequently, the verification realised by the consciousness concerns not only the accuracy of access and responses, including of feelings, but also the internal coherence of the criteria and judgements/*meta* look the consciousness is able to have about its own decisions. In this, the consciousness is the most transparent: it cannot hide to itself its own exploits: not the others are the most intransigent judges of its behaviour, but itself.

What is specific to the human consciousness is its capacity to create *meanings* at the level of the individual consciousness and to *express* them:

- so as they be the basis of the self-organisation and capacity of emergence (creation of new meanings) and development of the individual psychical life, and
- so as they be the bricks of the emergence and development of the collective psychical life.

The creation of articulately expressed meanings distinguishes the human psychical life from that of animals, regulated mostly by instincts which hoard the eras' access to the external and the internal phenomenal world.

Consciousness as aura

Finally, the field of consciousness is unitary because it is not an amorphous collection of the psychical life (we are aware in reflection, knowledge, sensitivity, attention, perception, memory, self-perception), but the *organisation* of the different psychical phenomena from the standpoint of the unitary Self. In this respect, we may hazard to consider this field an "aura of ideas"[51]:

[49] Anastasia Efklides, Plousia Misailidi (Eds.), Trends and Prospects in Metacognition Research, New York, Springer, 2010; Asher Koriat, "The Feeling of Knowing: Some Metatheoretical Implications for Consciousness and Control", *Consciousness and Cognition*, 9, 2000, pp. 149–171.

[50] Wayne M. Martin, Stoic Self-Consciousness, Self-Comprehension and Orientation in the Stoic Theory of *Oikeiosis*, 2006, pp. 1-24. Available at: `http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.405.2438&rep=rep1&type=pdf`. .

[51] I used *aura* as a synonym for a *halo*, a space surrounding the brain and full of its fruits as representations/"holograms"/meanings, a space formed as an *atmosphere* [as the ancient ατμίς(steam, exhalation, breath, smoke)] of sensation, energy, vibration. From this standpoint, the aura is unique, as a brain/human organism is, if we do not forget Walter Benjamin's meaning of the aura (*The Work of Art in the Era of Mechanical Reproduction*, 1936), and at the same time it is as it would be at a "distance" from the brain: the world of ideas is something absolutely different from the trivial material clew that seems to be rather part of the substance body.
The entire comparison with aura is taken from Ana Bazac, *The intentionality of the consciousness: from phenomenology to neurosciences and back. The attitude of Evanghelos Moutsopoulos towards the phenomenology of the consciousness*, Postface (in English, pp. 103-158, and its translation into Romanian, pp. 159-207) in the Romanian translation (by Ana Bazac, București, Omonia, 2017) of E. Moutsopoulos, *La conscience intentionnée*, Académie d'Athènes, Centre de Recherche sur la Philosophie Grecque, 2016.

- *ideas* which are coherent transposition in words of different images or representations of the objects of the human's intentionality in all the forms of psychical life, and
- *aura* because it is the collection of the psychical life, and this collection is a kind of colloid where the magnetic fields around axons and the electro-magnetic fields generated by synapses, together with the complex, superposed chemical (and electro-chemical and biochemical)[52] reactions of the doubling and high plasticity of bio-chemical basic structures (cells/neurons

[52] But the chemical interactions emphasise the physical laws, as for example those of thermodynamics. For this reason, the chemical interactions – specific to the inanimate world – are deterministic, thus predictable, with all the apparently exotic phenomena as the accumulation of energy in a piece of matter.
In contrast, the biochemical relations suppose something more than chemical determinism, a qualitative new level of existence, that when there are functions (and not only physical forces and energy) and *"ends"* to assure the functioning of the systems based on functions; and thus, when *information* and its transfer and clash are used for those functions and ends;
this level of existence, *life*, occurs when the *information* related to energy and energy imbalance/lack in a defined situation realises "the 'rectification' of microscopic fluctuations" in order to arrive to free/optimal energy, i.e. when this information "is 'inherently' reproducible and thus able to start an unlimited process of adaptation towards optimum function", or information is a "replicative or metabolic machinery" (Manfred Eigen, *From Strange Simplicity to Complex Familiarity: A Treatise on Matter, Information, Life and Thought*, Oxford, Oxford University Press, 2013, pp. 231–234, 494, 575); in its turn, information – *meaning* "semantic information" or meaning – is the result of the movements of matter in discrete information space (where these movements means a change of meaning), and where matter manifests as differentials of energy/potential gradients in order to both *transmit* to other matter recipients clouds of possible situations so as these recipients/rather some possible situations to last and to receive from the inputs of potential gradients selective functions so as these recipients/rather some possible situations to last;
therefore, information means that a process of *goal-directed activity* is in course of establishing, that this process allows and generates the transition from chemical to biological, and that "in the biological the target structure is initially indeterminate and only takes shape during the evolutionary process", when many reproductions and errors in the reproductions of the possible situations occur (and just these reproductions/copies arriving in different points of the information space assure their reception and, ultimately, their selection). Thus, the "conditional readiness" of biological structures is forged, and the meaningful informational process does not take place if both its two extremities do not exist. More: just because of the many possible situations and the complexification of biological structures, the informational process which aims at the simplest ways to match the states of energy with the material structures, becomes more and more complex because this process comes in biological/living structures, *op. cit.*, pp. 437, 404, 438, 446, 405, 443;
life means "sentience – the capacity to exhibit a variety of potential internal states, which respond to the immediate state of the environment", therefore ability of auto-transformation [Ladislav Kovác, "Life, chemistry and cognition: Conceiving life as knowledge embodied in sentient chemical systems might provide new insights into the nature of cognition", *Embo Reports*, 2006, June, 7 (6), pp. 562–566 (p. 565), already quoted].
But life lies in a natural physical space, so it "must satisfy thermodynamics and must be materially and energetically open" [H. R. Maturana, "Autopoiesis". In: Zeleny M. (ed.), *Autopoiesis: A theory of the living organization.* Westview Press, Boulder CO., 1981, pp. 21–33 (p. 22)], i.e.: since, according to the thermodynamic demonstrations, the transition toward low entropy/low disorder weakening/even destroying the internal energy able to produce work takes place in a close system, it results that a living system aiming to maintaining itself must be materially and energetically open. "Even though – Maturana specifies – they are necessarily closed in their dynamics of states".
In fact, life – that means the *most complex molecules / the most complex matter in the universe* – is "a closed network of molecular productions that recursively produces the same network of molecular productions that produced it and specifies its boundaries, while remaining open to the flow of matter through it, is an autopoietic system, and a molecular autopoietic system is a living system" [H. R. Maturana, "Autopoiesis, structural coupling and cognition: A history of these and other notions in the biology of cognition", —em Cybernetics & Human Knowing, 2002, 9 (3–4), pp. 5–34 (p. 10)]. "Autopoiesis occurs only in the molecular domain". "Molecules interact with other molecules in a way

with their internal components, groups of cells, synapses and axons), thus a colloid where the exchange of matter, energy and information[53] through these structures is in a dynamic but

in which the result of their interactions does not participate at any moment in the genesis of that result. The notion of autopoiesis, as a characterization of the organization that makes a molecular system a living system, is an abstraction of what an observer sees as a continuous result of the spontaneous operation of the molecular dynamic architecture that constitutes the living system through processes that are structurally congruent yet blind to the consequences to which they give rise" (p. 13).
If so, and the molecules as such/as chemical matter not having any internal purpose, life still occurs whenever and wherever the conditions for the existence of the above molecular processes exist: "a living system will arise and be conserved in any part of the cosmos where the molecular conditions that make it possible take place: a living system as a molecular system occurs as a closed dynamic molecular architecture that in its continuous transformation through thermal agitation continuously gives rise to itself" (p. 11). The only requirements are the (law of) "conservation of organization (autopoiesis in the case of living systems) and the law of conservation of adaptation, that is operational congruence, with the medium in which a system (a living system in our case) exists" (p. 15).
Life is characterised by *autopoiesis* because "organic molecules are immensely complex. They consist of thousands of atoms that can be arranged in billions of ways. Simply knowing the chemical ingredients of a protein does not tell us much about its structure. Extremely long chains of amino acids are folded up into a compact bundle so that the hot spots – the active sites of the protein – are held on the outside at just the right position. Folding a protein is similar to the task of pushing a mile-long stretch of string marked in blue at six points, and trying to fold the string up into a bundle so that the six points of blue all land on different outside faces of the bundle. There are uncountable ways you could proceed, of which only a very few would work. And usually you wouldn't know which sequence was even close until you had completed most of it. There is not enough time in the universe to try all of the variations", Kevin Kelly, *Out of Control: The New Biology of Machines, Social Systems, and the Economic World* (1995), Chapter 15: Artificial Evolution, on line.
An example of natural construction of organic molecules is the antibody/immunoglobulin, a protein produced by plasma cells in order to neutralise pathogens. But first, see the four macromolecules of life: the Ribonucleic (RNA) and Dezoxiribonucleic (DNA) acids, the protein and the carbohydrate, the last two in many forms.
The variations of living molecules are explained through the creation/learning of (the most suitable) algorithms and their *parallel* (and not in sequence) running. Therefore, the living systems – and not only the human consciousness – are characterised by learning and *changing*, these processes making the living systems more and more complex, i.e. maintaining them through circular processes between the superior and inferior levels of organisation, and adaptation of structures according to rules; see Alvaro Moreno, Kepa Ruiz-Mirazo and Xabier Barandiaran, "The Impact of the Paradigm of Complexity on the Foundational Frameworks of Biology and Cognitive Science", pp. 311–333, in *Handbook of the Philosophy of Science*. Volume 10: Philosophy of Complex Systems, Volume editor: Cliff Hooker, Amsterdam, Elsevier, 2011: "only when the network theory toolkit became available to explore the intricate and emergent structure-function mappings in metabolic, neural, ecological, developmental, behavioural and other types of phenomena, did the true complexity of life and cognition begin to be fully acknowledged and the old foundational framework progressively transformed, substituting its traditional simplifying assumptions by more encompassing and realistic ones" (p. 321); "the organization of living systems consists in different nested and interconnected levels which, being somewhat self-organized in their local dynamics, depend globally one upon the others. This means that both the components and the sub-networks contribute to the existence, maintenance and propagation of the global organizations to which they belong. And, in turn, those global organizations contribute to the production, maintenance and propagation of (at least some of) their constitutive components" (p. 322); "what really matters in biological evolution is not so much the generation of complexity, but its functional and selective control" (*ibid.*).
But all of these processes show "the expansion of life" in matter/universe (as said Vladimir Vernadsky, *La biosphère* (1926), Paris, Félix Alcan, 1929), highly possible (Freeman J. Dyson, "Time Wihout End: Physics and Biology in an Open Universe", *Reviews of Modern Physics*, Vol. 51, No. 3, July 1979, pp. 447–460): though this expansion – that seems to annul/reduce entropy – is not possible without death and the entropy process.

[53] The unity of matter-energy-information has a complex dialectic only mentioned here. On the one hand, there are matter-energy exchanges at the level of quanta which are specific only to this level (the weak

coherent state of suspension and dispersion. The *coherence* is given just by the unitary Self,

interaction; the strong interaction); then there are matter-energy exchanges which transcend the level of quanta, or rather bound it with the one of atoms and molecules (electromagnetic forces and field, responsible for the chemical processes); then there are matter-energy exchanges which transcend these levels and relate them with the *mezzo* and macro ones (gravitation). Therefore, on the one hand, each level of interaction is specific and cannot be reduced to/substituted with another one; so, it seems the material levels do not communicate. On the other hand, there are communication processes between them, at least because of the existence of fields (electromagnetic, gravitational). And at the level of the living, this dialectic is more interesting. All of these suggest the possibility of emergence of the new (representations, feelings, ideas), and the old extreme viewpoints about the origin of emergence from bellow or from the superior system of the organism are surpassed, also through the play of constraints created by both the internal mechanism of the various sub-systems of the organism and consciousness and of the organism as such and the consciousness at all the levels. See Terrence Deacon, Tyrone Cashman, "Eliminativism, Complexity, and Emergence", in *The Routledge Companion to Religion and Science*, Edited by James. W. Haag, Gregory R. Peterson, Michael L. Spezio, Routledge, 2012, pp. 193-205.
[Therefore, where is here the information? Probably, it occurs through the communication process that, however, is only to be fully understood. We can remind here only an aspect indirectly highlighted by E. Moutsopoulos, *La conscience intentionnée*, p. 15: as the cosmic creation in Neo-Platonism consisted of both the emergence/(progressio) phase of the movement of creation by the One (the Soul), emergence of nature, cosmos and the individual souls of humans, and the phase of conversion/(*conversio*) when the One is already transfigured within the individual souls, but these souls keep the memory of their origin, as information and the consciousness, the more they are used the more they develop; or the more the information created by and in the consciousness expands, the more it develops, preserving a dialectic of the new and the old, and of discontinuity and memory and continuity].
The present reduction of information to computing – though necessary and fruitful; in fact, only in this manner can information be processed – does not fully explain information.
More than 30 years ago, Maturana (H. R. Maturana, "Autopoiesis". In: Zeleny M. (ed.) *Autopoiesis: A theory of the living organization*. Westview Press, Boulder CO., 1981, pp. 21–33) could say that "I have not used such notions as coding, message, information, or transmission of information" because "They refer to relations in a metadomain of descriptions, and do not determine relations of contiguity between the components of the composite unity described"; therefore, information would be a concept/manner of understanding the complex systems. Nowadays we know that information is something more.
Anyway, information as a component of the *consciousness* – and not only of the brain – is indispensable to understand that it (information) functions as the observer in micro-physical experiments. In other words, it allows not only the constitution of representations and ideas – as if this constitution could be without the "supervisor" level of awareness about the representations, ideas and their constitution – but also the (rational and affective) controller of this constitution. In fact, this process as such involves two levels of informational dynamics: one is that of the "controller's" level that takes place as if the world of the consciousness would be a classical/macro/mezzo object world and thus where the information is free, i.e. affordable as by humans in their classical mezzo world, while the other informational level is that of the "observers"/information embedded in the matter-energy dynamics and thus a "virtual" and probabilistic result, depending on the concrete matter-energy dynamics which in turn is depending too, on various environmental conditions. I made this suggestion through an analogy with the process of quantum mechanics in relation with (through measurements) the observer, see Chris Fields, "If Physics is an Information, What is an Observer?", *Information*, 3, 2012, pp. 92–103, doi:10.3390/info3010092. Clearer: if the information at the level of matter-energy dynamics is a question of "computational" effort, information at the level of the meanings /the "controller" is not free, it depends on the level of matter-energy-information dynamics.
Obviously, we need the concept of information in order to arrive to the meanings resulted from all the matter-energy exchange processes in the brain, so to the ideas born in the consciousness. These meanings result from the consciousness' previous experiencing of the correspondence of these meanings – i.e. mental contents – with the world; this experience/correspondence led to "valuable information" and also to a specific one: that of the *logic of things* (that there are always a succession of effects from causes, and that *the logic of the mind is correspondent to the logic of the world*). This information about the logic of things has constituted through/as patterns. (The above aspect of the correspondence between the human logic and the logic of the world was grasped by the ancients: the Greeks marveled about the matching of the human logos to the logos of the *kosmos*).

> i.e. the unique and unitary awareness of the world. The ideas converging to the meaning of unitary Self *organise* the entire aura from the standpoint of the unitary Self, the unitary Self-consciousness. And we may hazard that the ideas – constituted on the basis of mental images and representations, and from that complex and scintillating, sparkling aura of psychical states – come into presence, become objects of the consciousness only when a direction of intentionality is determined by the Self and world interaction.

We may presume that the aura can be/describe a certain autonomy of the information carried by the electrical oscillations towards their material basis, autonomy generated just by the living organism's tendency to persist, and which tendency is assured just by the brain and its complexification. The aura could be to constitute starting from the need of associativity and memory.

We may presume that the matter-energy-information reactions/ exchanges create *virtual models* constituted from information and acting as feedbacks within the above reactions/exchanges. We only presume and begin to demonstrate at neurophysiologic level that these models have a changing "basis" (different trajectories between molecules etc.) and that they must avoid both *inefficiency* and waste: for example, and as in the decision of the consciousness, the decision of neurons to transmit to which other neurons their information needs a balance between too much choice and too much "methodological" limits/constraints of these excessive possibilities, as well as it needs a rapid – learned – evaluation, so as no neuron be without function and, at the same time, no neuron faces too much message-passing. The above-mentioned virtual models constitute the "aura" of the brain, aura that eventually may be grasped with specific instruments. But what is important is its "content"[54], i.e. the contents of the virtual models, or that which is the "physical bearer" of consciousness apart from the first bearer (the brain), or even the consciousness as such. In fact, —em consciousness is both its states and its results (the *contents forming the aura: ideas, feelings*).

I used the metaphor of the aura because – influenced also by Popper's "worlds" – it suggests the *externalisation* of projections resulted from the multiple relations/connections of various "contents"/information in the brain (and stored in different types of memory), including those of patterns of different connections. This externalisation seems "normal" since the connections and information produced in the brain are infinite; the old pictures of different personages having an aura around their head illustrate this conception. On the other handed, *the externalisation may not exist at all*: because information is not worn out when it is used, and because, though physical, information is not matter as such. In the brain there are both *types of relations/connections* which change rapidly with the change of contents, and *types of patterns of* relations/connections: all these types are related each other and emphasise the organised character of the living structures. Anyway, these relations form projections, information stored at the same time as contents, patterns (types of connections between contents), and models.

The virtual projections are information on the basis of which people act, or ideas, and people are aware of these information or ideas. The awareness of all of these is stored too, separated from the projections of ideas as such. In other words, both a specific content and the awareness of/about this content are stored. Thus, consciousness cannot be separated from its operations (which thinkers

As a result of the meanings formed in that manner, people could grasp the logic of things and this logic seemed to them so wonderful that they could arrive at the conclusion (Galileo) that the world may be understood in mathematical language. It is obvious that the spring of computer sciences is the follow-up of this conclusion.

[54] Wilhelm Wundt has used this word, as mental content of the psychic relations, for example as in one of the four laws/explanatory principles in psychology: "the principle of connecting relations (every mental content is related to others from which it receives its meaning)", in Martin Kusch, *Psychologism: A Case Study in the Sociology of Philosophical Knowledge* (1995), London and New York, Routledge, 2005, p. 132.

tackle at psychological, logical and epistemological level). And there is a mutual dependence of the consciousness and its projections: the first is the background warning about the ideas/projections produced inside.

But that internal mutual dependence is also depending on the exterior environment experienced by the consciousness and without which the organism and thus the Self cannot exist/persist. Obviously, there is a fundamental difference between the relations of non-living systems with their exterior environment and the relations of the living systems with their environment. The latter systems use the matter-energy-information exchange with the environment in order to repair any degree of their internal organisational degradation, just opposite to the non-living systems (excluding the artificial, created ones) which rather waste the external matter-energy-information[55].

Emphasising the pleasures

Preamble

The ideas – which are, ultimately, *representations of meanings*, revealed by the instrumentality of the information theory and philosophy as capacity to provide reference and to process information[56] just in order to light meanings in all their structural and positional forms[57] – are more than contents, models and patterns. They are also vectors and triggers of *feelings*. Between these feelings – of *desires, needs, aims, of power* and *powerlessness*, of *knowledge* and *ignorance*, of *awareness*, of *well-being* and *suffering*, of *love* and *hate*, of *dispositions*, of *freedom* and *lack of freedom*, of *will to manifesting oneself*/one's own abilities and of the *sense of plenitude*, of the *sense of obstacles* and the *sense of emptiness*, of *the time in front of us*/of the length of life, and of the *sense of the end* – our topic concerns, following E. Moutsopoulos, the *pleasures* (as negation of pains).

The organism, that is to say promoted by the unitary composition of all the sub-systems and systems of the organism, experiences different states as a result of the degree of balance (or homeostasis) at the level of every system and also at the level of the organism as a whole. The biological rhythms

[55] See Terrence W. Deacon and Tyrone Cashman, "Steps to Metaphysics of Incompleteness", *Theology and Science*, Vol. 14, No. 4, 2016, pp. 401-429 (416).

[56] The fact that "natures computes"/every living system computes, thus the fact of ubiquity of computation, means information processing everywhere, thus the above-mentioned matter-energy-information unity. But if life needs information processing, information processing no needs life, Gordana Dodig-Crnkovic and Rickard von Haugwitz, "Reality Construction in Cognitive Agents Through Processes of Infocomputation", in Gordana Dodig-Crnkovic and Raffaela Giovagnoli (Eds.), *Representation and Reality in Humans, Other Living Organisms and Intelligent Machines*, Springer, 2017, others from which it receives its meaning)", in Martin Kusch, *Psychologism: A Case Study in the Sociology of Philosophical Knowledge* (1995), London and New York, Routledge, 2005, p. 132.
See Terrence W. Deacon and Tyrone Cashman, "Steps to Metaphysics of Incompleteness", *Theology and Science*, Vol. 14, No. 4, 2016, pp. 401-429 (416).
The fact that "natures computes"/every living system computes, thus the fact of ubiquity of computation, means *information* processing everywhere, thus the above-mentioned matter-energy-information unity. But if life needs information processing, information processing no needs life, Gordana Dodig-Crnkovic and Rickard von Haugwitz, "Reality Construction in Cognitive Agents Through Processes of Infocomputation", in Gordana Dodig-Crnkovic and pp. 211-232 (225).

[57] See Gordana Dodig-Crnkovic and Raffaela Giovagnoli (Eds.), *Representation and Reality in Humans, Other Living Organisms and Intelligent Machines*, Springer, 2017.

are of "lowering and ascending, of straining and relaxing", said E. Moutsopoulos[58]. They are *felt* as *pleasant* and *unpleasant* psycho-somatic states, in their various degrees and mixing. From the standpoint of unitary sensing of these states, in humans, but also in some animals, there are in *crescendo* and also in *various* forms: *good mood* and *bad mood, contentment* and *dissatisfaction, pleasure* and *displeasure, gladness* and *delight, happiness* and *infelicity*.

The *feeling* of all of these states at the level of organism – feeling that results from the composition of electro-chemical reactions at all the "subordinated" levels of cell components, cells, groups of cells, organs, with the synthetic psychical reactions they themselves manifesting as cognition and emotion – signals the above-suggested *tendency to persistence*, i.e. to balance at all of these levels, including that of the organism, and thus the tendency to resume vital oscillations. The tendency to persistence is visible as *persistent processes* without which the living systems with all of their component sub-systems would disintegrate. It's clear that persistence is limited: actually, it is limited by the *decay processes*, resulted from gradual exhaustion of the systems (cells etc.) to carry the matter-energy-information exchange in a balanced way. Both processes are felt as pleasant or unpleasant.

Beyond the exhaustion of systems, the dialectical play of persistence and decay of living systems manifests because there are countless internal and external factors contributing in the vital processes; and neither the so many factors nor the vital processes are fully predictable. But the present scientific and philosophical outlook understands the complex of *both predictable reactions and unpredictability* related to both "input" factors and "output" results. The mechanistic view is not absurd: we know that the influence of substance A on the cell is such and such, and not the same as when the cell faces substance B[59]. However, the living systems confront and respond to n internal and external factors, and their composition is changing, giving birth to new states. *Persistence takes place through emergence*, apparition of the new at all of the levels of the living systems. Thus persistence is not opposed to emergence and is generated by the combination of bio-chemical reactions at all the levels of the organism *and* the feeling of the states of the organism as a whole, even though these states reflect those at all its levels.

The tendency to persistence becomes real through many different ways given just by the new results of reactions. It was called *equifinality* by Ludwig von Bertalanffy: the tendency to keep the existence of the unique organism through different paths / answers of and to the reactions of the organism as a whole and of and to its different parts and levels. Or it was called *self-organisation* of the living system and its different sub-systems, reflecting rather a blind mechanical causality at the level of these sub-systems.

Actually, the mechanical causality is proved by the calculability of the states[60] of living systems

[58] Ε. Μουτσοπουλου, Αι Ηδοναί. Φαινομενολογική έρευνα ενίων προνομιούχν συειδησιακών κατστάσεων[*The Pleasures. Phenomenological research of some singular privileged states of consciousness*] in the Romanian translation, p. 11.

[59] "The fact that every potential state in a given dynamic system, whether stable or unstable, can be mathematically calculated from its preceding state shows that a dynamic system is governed by *efficient causality*", Spyridon A. Koutroufinis, "Beyond Systems Theoretical Explanations of an Organism's Becoming: A Process Philosophical Approach", in Spyridon A. Koutroufinis (Ed.), *Life and Process: Towards a New Biophilosophy*, Berlin, Boston, De Gruyter, 2014, pp. 99-132 (p. 102).

[60] Barbara Muraca, "Teleology and the Life Sciences: Between Limit Concept and Ontological Necessity", in Spyridon A. Koutroufinis (Ed.), *Life and Process: Towards a New Biophilosophy*, Berlin, Boston, De Gruyter, 2014, pp. 37-70: "(the) internal purposiveness corresponds to a very complex reciprocal causation rather than to any model of final causation" (p. 37), and "while internal purposiveness is not linked with will or mind in any form, agency or intentionality imply 'a mental anticipation of future states', and can be ascribed exclusively to entities that can perform such anticipation" (p. 41). AB: 1) thus the AI is not excluded; 2) the author analysed in the paper does not distinguish between agency

and their sub-systems, but this is only a step in our knowledge of things, as this is only a basic feature of what is commonly understood as reality. And because this mechanical causality too was very difficult to be understood – since the ordered, mechanical causality takes place in systems, and system-environment systems, full of tensions, and any tension generates its own dialectical process of emergent structures, which at their turn generate new emergent structures seeking to control the new tension, and so on – the fathoming of mechanical causality as such was somehow hindered by alternative concepts as the vital impulse, teleology, freedom and spontaneity of construction. But until the "mechanical causality", including of the underlying physical and chemical processes, was not deciphered in its *finesse* – and not only in its "geometry", if this joke is allowed – neither the purposive, random, spontaneous, environment dependent causality of the living systems, and especially of the humans', can be understood beyond the philosophical suppositions. So, on the one hand, a progress of this research and on the other hand, the historical impatience of the critiques from the standpoint of alternatives (the well-known criticism of Newton and Descartes position) have led to the actual flowering of the integrative view with its innovation of concepts and methodology[61].

Genus proximum: the affects

The pleasures – as all the feelings – are *affects*. They affect us, our consciousness, our cognition and our awareness, our reactions to the world, our connections with the world. The *sensible experience* is that which is the consciousness' form of existence, and this form is a *pattern* for all the manifestations of the consciousness: no manifestation exists without being lived, thus felt.

The affects have a profound *origin*: in our *unconsciousness* that is itself formed of different levels, according to the ontogenetic strata of impressions/imprinting of experience. But this origin is not the single one – the other one is the *complexity of our insertion in the world* – and thus they are *complex* and affect us in a complex manner. And if we consider also the intermingling of affects – from those appetitive to those linked to both the will to persist and the will to have (beautiful) reasons to be of our existence and our deeds, and from sensations to cognition, as well as from the positive to negative affects – we once more grasp their complexity that affect us. And more or once more: the unconscious origin does not exist for the individual if it is not felt and *ultimately* is not transposed into its awareness, obviously expressed only sometimes in words. However, both the aware state of the consciousness and the unconsciousness constitute a *dynamical and contradictory unity* that results from the mutual causation and influencing by their different aspects and sides: a unity that is a crossroads, an intersection of forces and information.

The affects give worth to our sensible experience, namely, they strengthen it and generate infinity of interpretations our consciousness endeavours regarding the sensible experience. Actually, the affects *integrate* within the sensible experience and colour it: this is all the more evident through the medium of the expressing of affects. The words multiply the meanings of the sensible experience and give it symbolic contents.

The affects strengthen the awareness of the Self. What does this mean? Through affects, the *individual* is more aware of the interdependence of its feelings and that they pertain to a single entity, the Self. This one is seen as a whole, an individual *whole* – that is more than the sum of feelings and more than a certain feeling/some feelings that has/have a paroxysmal intensity.

---

that does not necessarily suppose consciousness, and consciousness that is intentional (or intentionality that means consciousness), this distinction is also distinction between different ends.

[61] See only Andreas Weber, "The 'surplus of meaning'. Biosemiotic aspects in Francisco J. Varela's philosophy of cognition", *Cybernetics & Human Knowing*, 9 (2), 2001, pp. 11-29; Matteo Mossio, Leonardo Bich, *What makes biological organisation teleological?*, Synthese, Springer Verlag (Germany), 2014; Alvaro Moreno and Matteo Mossio, *Biological Autonomy: A Philosophical and Theoretical Enquiry*, Dordrecht, Springer, 2015.

But since the affects result from and in our insertion in the world, they light not only the uniqueness of the individual Self – and the contents of its symbolic experience are in no way depending only on the biological functions of the brain and its unity with the body, but equally on the social experience and the social symbols generated by society in its social division, thus on contradictory symbols where struggling around the dominant ones which constitute the material principle and means of social control[62] – but also its appurtenance to the *whole* of the human species. Through affects, the individual is aware of being a *species being*. The whole of the human species is a meaning lived and felt, and obviously expressed, in the development of affects. This is a peculiarity of the humans: to feel parts of the whole species, to understand the meaning of the whole human species – and thus to be species beings – and to connect the own individual Self to the "species Self".

Through affects, the humans experience to belong to *two wholes*: the individual Self and the species. These wholes are not mutually excluding. The humans experience and learn that the individual Self is more than "my feeling now", no matter how intense this one, because this Self exceeds the moments, the fragments, the ephemeral, the unique or continuous feelings. But they experience also they appurtenance to a more comprising Self that defends them as individuals and gives their ultimate reason to be, but that is depending on the fulfilment of the individual Selves of *all* the humans and of every human. We cannot oppose the individual Self to the human species in a simplistic "methodological individualism": historically generated, this "methodological individualism" ignores the determinism generating group/social coagulations and reduces the individual to some behaviour schemes. But obviously, we cannot oppose the individual Self to the human species in a simplistic "methodological collectivism": if the group structures do not regard all the humans and every human when they cause social behaviours and changes, they are not legitimate to be patterns of social causality, and the practice of these group structures are only historical, transient. The species whole that surpasses us is good for us only at the extent that it supports the fulfilment of our individual Self at the level of *all* and every one of us.

For this reason, we cannot reduce consciousness (or mind, if one summarises consciousness as "ideas about") to the brain, neither the origin of the psychical life to the brain or to the unconsciousness, nor we can absolutely oppose consciousness and the unconsciousness, and we cannot explain the human person exclusively as a neurological being, depending exclusively on the functions of the brain[63]: the *integrative* approach, relating culture and the social environment to the whole individual[64], thus emphasising the role of *values* in the formation and mobilisation of the individual consciousness, is *sine qua non* for the understanding of the human person. Consequently, the affects – which, once more, are expressed or, with a medical word, have symptoms (both expressed in language and outside it) – and generally the multi- dimensions of the person's consciousness should be considered in *critically* seen theories. This methodological demand arises from the power relations structuring the environment of the human person, i.e. from the fact that no epistemological description of man can be ignorant of this objective feature of society, thus can avoid the *historical and social determinism* on theories. This determinism was proved, for example, even in the decreeing of (mental) diseases by medical authorities (see Foucault), this enabling their chemical[65] (and electrical) cures according

[62] Walter Lippmann, *Public Opinion* (1922), Mineola, New York, Dover Publications, 2004, p. 128: "the leader knows by experience that only when symbols have done their work is there a handle he can use to move a crowd. In the symbol emotion is discharged at a common target, and the idiosyncrasy of real ideas blotted out"; Stanley Milgram, *Obedience to Authority: An Experimental View*, London, Tavistock, 1974.

[63] Jan De Vos, Ed. Pluth (Eds.), *Neuroscience and Critique: Exploring the Limits of the Neurological Turn*, Routledge, 2015.

[64] As it was revealed in Eva Jablonka, Marion J. Lamb, *Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral, and Symbolic Variation in the History of Life*, Revised edition, Cambridge, Mass., London, England: A Bradford Book, The MIT Press, 2014.

[65] Joanna Moncrieff, *The Myth of the Chemical Cure: A Critique of Psychiatric Drug Treatment*, London,

to "well-established" theories. If epistemology fails to view the "reality" itself considered by theories of man as an historical/cultural/social construct[66], it fails to sustain scientific theories, and efficient ones.

A strange specific difference of the human consciousness

Generally, when discussing the problem of human consciousness the presence of *rationality* is that which is emphasised. The high level of rationality, handling symbols and continuously developing at more and more abstract meanings, having logic and many superposed *meta* logics and interpretations, is obvious for every one. And, as it was mentioned, this *high level* is considered the *differentia specifica* of man, many animals sharing with this one the feeling of individuality in its clash with the environment.

What is common to man and animals is thus the *subjective experience of the world*, the fact that the world appears to the individual animal and human being having the colours and vibrations of the relationship with it, not as its absolutely objective face. Of course, for the individual man those colours and vibrations are much more intense than for the animals, because man amplifies them quantitatively and qualitatively. The world that is *for* us is not the world in front of us, although they resemble very much. And the capacity of man that consciously reacts not only to the world *in front of* it (as it appears through the medium of "the most neutral" concepts possible) but also to alternative representations imagined in a cascade of creativity once more shows how rich the human subjective experience of the world is.

The common indicator or sign of the human subjective experience of the world is the articulated language, transposing and corresponding to the self-fulfilling imaginative power of consciousness. This was assumed by the IT and AI constructors. And the IT and AI progress lies – beyond the exceeding of "less data and poor information" and beyond the capacity to solve uncertain problems[67] – precisely in the development of language, "teaching" the machines how to link symbols and meanings and how to link meanings in order to arrive to new meanings.

However, the human consciousness has a sign that is shared – at a certain extent – with animals, but not yet with AI: the pleasures.

The subjective experience means that it is *felt*. And since the AI machines have programmes concerning their "knowledge" that transposes information into verbal and written signs, they could have also programmes which create the correspondence of information and signs with feelings. A machine can be taught to say "I like" and to understand why.

But to express pleasures is not tantamount to pleasures, as to express information is not tantamount to know. This is the reason of defining the human consciousness as —em ability to feel pleasures

Palgrave Macmillan, 2008.

[66] Bruce E. Levine, *A Profession Without Reason: The Crisis of Contemporary Psychiatry—Untangled and Solved by Spinoza, Freethinking, and Radical Enlightenment*, Chico, Ca., A.K. Press, 2022, pp. 18-19: "Philosophers such as Spinoza and genuine scientists recognize that *consensus reality* is not synonymous with *reality*, and that *conventional wisdom* is not the same as wisdom...Consensus reality is the agreed upon reality by a society or community. . . Conventional wisdom refers to generally accepted beliefs about how best to navigate consensus reality. . . .In any society, consensus reality is not viewed as consensus reality, but as *reality*".

[67] These words posing the problem of solving uncertain problems with poor data and information are from Ernst Cassirer, *Substance and Function* (1910) and *Einstein's Theory of Relativity* (1920), Chicago, The Open Court Publishing Company, 1923, p. 253.
Nowadays, a basis of solving uncertain problems is grey theory, and it is suitable for modeling the interaction of scientific research and the spontaneous circumstances and rhythm it implements.

(and displeasures). The *differentia specifica* of the human consciousness seems to be not the high degree of reason – meaning that the difference between animals and man would be only of degrees, and not of essence – but paradoxically the capacity to feel pleasures. This capacity – itself common to animals and man, also in different degrees, determined by the level of rationality and complexity of *living being-environment systems* – became visible in the comparison of man and AI. This one – at present – can transmit beautiful meanings, but "have no subjective experience of the world", have no consciousness[68].

The phenomenon of pleasures

As mentioned, the pleasures manifest in degrees. Fist of all, there is a *pleasant* state of the *organism*, reverberated both in the unconsciousness and the awareness, as a

- *good humour*, a basis for the further development of the affective sensitivity of both the organs and the organism, and the consciousness; actually, full of promises of pleasures/stronger pleasures
- then the expressions of good humour are expressions of pleasures occurred in this well-being state of the organism: *satisfaction, relaxation, joy, merriment, delight, euphoria, even happiness.*

The good humour itself gets us noticed on the *pleasant state of the organism.* Since a pleasant state arrives only when/after an unpleasant state vanishes – it's the visibility of pleasures *only in relation* with pain, as the ancients observed – and since the existence of the organism cannot be conceived of /cannot be in pain because pain/the prolonged pain signals disequilibrium, illness, thus obstruction of the organism's persistence, we can suppose that the pleasant state, as absence of pain, is the *original* one. And it is almost *permanent* – a necessary condition to development, to sustainability – manifesting in different forms and from all the biological levels of the organism as both successive and concomitant. As a result, we speak not only about the pleasant state as an original condition of the organism's existence itself, but also about the feeling of this state as an original condition of man. In humans, this feeling manifests – irrespective here of its unconscious ground – as a *state of consciousness* and, concretely, as good humour.

Therefore, the permanent state of well-being/comfort of the organism, and obviously its feeling: this is the ontogenetic basis of pleasures as *confirmation of the Being.*

But the confirmation by a pleasure is temporary; hence the existence of the organism marked by a *ceaseless* flux of pleasures, of different kinds and intensity, but not depriving the organism of at least a dominant pleasure *in every moment.* Because: the pleasures are *stimulants* of life, and without them life withers. And if so, the pleasures must always vary, in kind and intensity: otherwise they are not even felt/not felt at their meaning and stop their stimulant, mobilising function and power. Actually, pleasures repeat themselves in new circumstances but they are felt as new feelings, although related to a past pleasure – this was E. Moutsopoulos' phenomenological note –.

Obviously, the pleasures and their stimulant function reflect the multi-causality of the human organism, i.e. the social/cultural condition that frames and is imbued within the human experience. In this respect, unpleasant states of the organism may coexist with pleasures; or clearer, if there is a pleasure (let say, intellectual, or linked to social communion, to affects as love), the unpleasant physical state of the organism can be neglected for a while.

[68] See Ai-Da Robot, *The Intersection of Art and AI* — TEDxOxford, May 29, 2020, `https://www.youtube.com/watch?v=XaZJG7jiRak`.

The pleasures as feelings involve a strong *volitional* strain: they are / their increase is intentionally sought for. And the seeking is not only for the variety of pleasures but also for their permanence even though in alternations[69]. Nevertheless, the intentional strain doesn't mean that the individual is a slave of pleasures, but that the ontogenetic need of pleasures is in harmony with the human sensitive/affective, rational, judgement/axiological abilities. This was the key of ancient ethical theories: the good behaviour as end of the human reason to be, the pleasures in their relationship to the value of the human actions, are the scope. The ancients did not propose hedonism, the search for pleasures at any cost as reason to be of man and its behaviour, but eudaemonism, happiness as a result of reasonable, good deeds. Consequently, we must distinguish pleasures as *existential need* from pleasures *momentarily sought for and manifested*.

In this respect, we can observe that in the history of modern thinking the above distinction either was not made – in the name of a utilitarian ethics of pleasures as constitutive for humans – or the goal of ethics became a utilitarian search for happiness (considered as a maximising sum of maximising pleasures). However, following the tradition of Aristotle, the *social* goal and object of eudaemonism was considered the core of the pursuit of happiness[70], and the fulfilment of life itself[71]. Unfortunately, the philosophical and scientific research nowadays "discovers" too late both the truth of reasons and the truth of facts of this old achievement[72].

Pleasures of what?

Since we mentioned the "domains" of pleasures (somatic, affective, communicative, intellectual, of communion/social), we can observe their tableau that follows Maslow's structure or hierarchy of needs. In the famous psychological model of Maslow[73], the human needs are transposed into motivations, and these ones are mediated in the consciousness by values. People have not only pressing existential needs (to eat, to shelter etc.) but they value the material basis of existence (in good health). And obviously when the everyday pressing needs are met, the humans long for safety, love and belonging, esteem and self-actualisation, which they need and value.

Maslow made this hierarchy in order to focus on the pressing character of needs/motivations and on their *unity* and *permanence*. He did not intend to suggest a social hierarchy when only few people would have superior motivations linked to self-actualisation; he never conceived this hierarchy as a pyramid. He only pointed that without the pressing existential needs met – and we could think that those for love and belonging are existential – one cannot expect much exertion for subtle cultural debates and going up as a dilettante.

[69] For the understanding of the subjective well-being and its intentional background see Daniel Kahneman, Edward Diener, Norbert Schwarz (Eds.), [*Well-Being: Foundations of Hedonic Psychology*, New York, Russell Sage Foundation, 2003.

[70] John Stuart Mill, Autobiography (1873), New York, Columbia University Press, 1960, p. 100: "Those only are happy who have their minds fixed on some object other than their own happiness".

[71] Jean-Marie Guyau, *Esquisse d'une morale sans obligation ni sanction*, 1884, discussed by Moutsopoulos, but also Jordi Riba, *La morale anomique de Jean-Marie Guyau*, Paris, L'Harmattan, 1999.

[72] Iris B. Mauss, Maya Tamir et al., "Can Seeking Happiness Make People Happy? Paradoxical Effects of Valuing Happiness", *Emotion*, 11 (4), 2011, pp. 807-815; I. B. Mauss, N.S. Savino et al., "The pursuit of happiness can be lonely", *Emotion*, 12(5), 2012, pp. 908–912; Brett K. Ford et al., "Desperately Seeking Happiness: Valuing Happiness Is Associated With Symptoms and Diagnosis of Deppression", *Journal of Social and Clinical Psychology*, 33 910), 2014, pp. 890–905; E. Diener, "Subjective well-being: The science of happiness and a proposal for a national index", *American Psychologist*, 55(1), 2000, pp. 34–43.

[73] A. H. Maslow, "A Theory of Human Motivation", *Psychological Review*, 50, 1943, pp. 370-396.

The Maslow model was developed, but it remained related only to the individual and, maybe inherently, without including contents of values. But it drew attention to the multi-strata *concomitant* needs/values/motivations.

In like manner, the pleasures reveal the *unity* of feelings, related not only to physiological needs and reactions but also to values even far from the person's strict needs. As the needs are permanent and from all the categories suggested by the Maslow model, so the pleasures accompany them, including the strain to accomplish them.

Since each need is permanent – irrespective here of the successions of needs – the humans need to "taste" the fulfilment of all needs, so to enjoy their life: that is not reduced to eating and entertainment, but is magnified by pleasures of action, of thinking to the others, of having social ideals, of understanding the reason to be of the human person.

The functions of pleasures: to be privileged states of consciousness

1. The result of the degrees of enjoyment challenged by pleasures is what E. Moutsopoulos calls "privileged state of existence": because the *existence intensifies and enhances during and from pleasures*. Pleasures are the pendant of the privileged state of existence because they themselves are a tension and a culmination of existence. Through pleasures, the consciousness grasps existence in a more intense manner and projects itself – its own creations as reasoning, values, affects – in a more intense manner on existence. Through pleasures, the human existence itself enriches, augments.

2. The pleasures are determined not only by the neurophysiology of the entire body – and not only by the mechanisms within the brain – but also by the external world as it is mirrored and symbolised by the consciousness. In this respect, the pleasures are not only states of mind, i.e. parts of the consciousness causing its growth as well as of the entire organism, but also they are determined by the consciousness, namely, the ideas (representations, symbols) from the consciousness enhancing or tempering and lowering the pleasures.

Thus the pleasures are privileged states of the consciousness because they *intensify* it / they contribute to the development of the human consciousness by intensifying it.

3. Pleasures are *privileged because they enhance – feel, are aware of – the being of the Self.*

Being aware of the being of the Self is a very realistic position: it avoids and removes any illusions about the Self as autonomous from the body. This is why animals (those with nervous systems) and man share conscious self-awareness, obviously in different degrees. The pleasures signal and reinforce the human conscious self-awareness of the *unity* of body and mind/the Self.

But, because there are different kinds of pleasures, including intellectual – accompanying all kinds of knowledge and enhancing it – some of them, namely the intellectual ones, are related to the *most privileged* state of mind/consciousness, the *human reason*. Reason is the tool that produces not only awareness of the mind body unity, but also *alternative* images such as *illusions* about the separateness of mind/Self from the body and the persistence of the soul (as the Self) after the destruction of the body[74]. And the more aware the consciousness is the more the capacity of interpretations, including of different kinds of illusions, increases. In this respect, we can distinguish the *methodological* value of Descartes' dualism from its historical limits; as well as we can distinguish the historical forms

[74] Let's remind in Plato's tradition Emperor Hadrian's poetry dictated on his death bed (138 C.E.): *Animula, vagula, blandula/ Hospes comesque corporis...* (Little soul, little wanderer, peeking out from my body's cover, host and lodger...).

and limits of ideas/theories about man, evolution, essence, from their core. Only when this core is considered in a static way, outside the ontological and existential dynamics, thus in a-historical and a-social way, becomes it absurd as knowledge develops.

Reason is the most privileged state of consciousness because it creates, it constructs not only representations but also new realities. And in order for reason to deploy, the pleasures *increase* its availability and abilities. This is their contribution not only to help the animals, and between them the humans, to feel themselves and thus to persist, but also to help the humans to expand and cultivate their uniqueness.

Instead of conclusions

Though the phenomenological analysis does not need ethics, its deployment arrives to imply it; but not as starting point – as the ethical analysis does – and not as a circular explanation.

Including through pleasures, the Self inserts in the flux of communications which made the society.

Pleasures enhance the consciousness, this one is stronger to conceive of, feel and make the human life lived and pleasant to be lived. E. Moutsopoulos considered that by pleasures the consciousness arrives to a state of "more than being" (*plus-être*). What does this mean, what is more than being for the human individual? It means that the contents of life – symbolised in the consciousness – are that which gives value to life. The pleasures are not only triggers and markers of a content of life, but they directly enhance it.

And pleasures are subjective, but this is not/does not lead to solipsism: where my consciousness confirms without troubles my choices of pleasures. As every state of consciousness, the pleasures *objectify* and in this process they inherently need the *confirmation of other consciences* of my choices: just in order to increase their value and the value of my pleasures. The "more than being" they are for me depends on the "more than being" these pleasures mean to others.

Therefore, the permanence of pleasures for the *ontos* of man suggests their quality to being the main source of the fulfilment of man, or a least a main source. The "more than being" of the individual is to create, to feel fulfilled, to manifest qua human, to dare to initiate everything that is necessary for others to have a human life, with a human content, with a rich human content.

References

[1] Ackrill, J. L., Aristotle, *Categories*, and *De interpretatione* (1963), Oxford University Press, 1974.

[2] Ai-Da Robot, *The Intersection of Art and AI* — TEDxOxford, May 29, 2020, `https://www.youtube.com/watch?v=XaZJG7jiRak`.

[3] Adamatzky, Andrew. "Language of fungi derived from their electrical spiking activity", *Royal Society Open Science*, 9, 2022, art. 211926.

[4] Aristotle, *Metaphysics*, in *Aristotle in 23 Volumes*, Vols.17, 18, translated by Hugh Tredennick. Cambridge, MA, Harvard University Press; London, William Heinemann Ltd. 1933, 1989.

[5] Bazac, Ana. "Review of Georges Chapouthier, Kant et le chimpanzé. Essai sur l'être humain, la morale et l'art, Paris, Belin, 2009", *Studia Universitatis Babeş-Bolyai*, Philosophia, Volume 62 (LXII), 1/2017, pp. 183-190.

[6] Bazac, Ana. "Conatus and the worth of life in a time of crisis", in *Philosophy and Crisis: Responding to Challenges to Ways of Life in the Contemporary World, 2013 Conference Proceedings*, G. Maggini, H. Karabatzaki, V. Solomou-Papanikolaou and J.Vila-Chã (Eds.), vol. II, Washington D.C., Council for Research in Values and Philosophy, book series IV: "Cultural Heritage and Contemporary Change", vol. 11, November 2018, pp. 137-152.

[7] Birch, Jonathan, Alexandra K. Schnell, Nicola S. Clayton. "Dimensions of Animal Consciousness", *Trends in Cognitive Sciences*, Vol. 24, Issue 10, October 2020, pp. 789-801.

[8] Boehm, Christopher et al. "Egalitarian Behavior and Reverse Dominance Hierarchy [and Comments and Reply]", *Current Anthropology*, 34 (3), 1993, pp. 227–254.

[9] Boehm, Christopher. "The natural selection of altruistic traits", *Human Nature*, 10, 1999, pp. 205–252.

[10] Boehm, Christopher. "The moral consequences of social selection", *Behaviour*, 151(2-3), 2014, pp. 167-183.

[11] Bowra, C. M. *The Greek Experience*, Cleveland and New York, The World Publishing Company, 1957.

[12] Cantin, Stanislas. "L'âme et ses puissances selon Aristote', *Laval théologique et philosophique*, 2(1), 1946, pp. 184–205.

[13] Cassirer, Ernst. *Substance and Function* (1910) and *Einstein's Theory of Relativity* (1920), Chicago, The Open Court Publishing Company, 1923.

[14] Castro, Paulo, Jose Ramalho Croca, Rui Moreira, Mario Gatta. "On the Foundations of Eurhythmic Physics: A Brief Non Technical Survey", *International Journal of Philosophy*, Vol. 5, No. 6, 2017, pp. 50-53.

[15] Chapouthier, Georges. *Sauver l'homme par l'animal: retrouver nos émotions animales*, Paris, Odile Jacob, 2020, and Ana Bazac, the review in Noema 2021, pp. 159-172.

[16] De Vos, Jan, Ed. Pluth (Eds.). *Neuroscience and Critique: Exploring the Limits of the Neurological Turn*, Routledge, 2015.

[17] Diener, E. "Subjective well-being: The science of happiness and a proposal for a national index", *American Psychologist*, 55(1), 2000, pp. 34–43.

[18] Diogenes Laërtios. *The Lives and Opinions of Eminent Philosophers*, Translated by K. D. Yonge, 1915, Project Gutenberg.

[19] Dodig-Crnkovic, Gordana and Raffaela Giovagnoli (Eds.). *Representation and Reality in Humans, Other Living Organisms and Intelligent Machines*, Springer, 2017.

[20] Dodig-Crnkovic, Gordana and Rickard von Haugwitz. "Reality Construction in Cognitive Agents Through Processes of Infocomputation", in Gordana Dodig-Crnkovic and Raffaela Giovagnoli (Eds.), *Representation and Reality in Humans, Other Living Organisms and Intelligent Machines*, Springer, 2017, pp. 211-232.

[21] Drăgănescu, Mihai. *The Depth of Existence* (1979), `https://www.racai.ro/external/static/doe/toc.html`.

[22] Edel, Abraham. "Aristotle's Categories and the Nature of Categorial Theory", *The Review of Metaphysics*, Vol. 29, No 1, 1975, pp. 45-65.

[23] Efklides, Anastasia, Plousia Misailidi (Eds.). *Trends and Prospects in Metacognition Research*, New York, Springer, 2010.

[24] Ey, Henry. *La conscience*, Paris, Presses Universitaires de France, 1963.

[25] *Five years of the Cambridge Declaration on Consciousness*, 7 Jul 2017, `https://www.animal-ethics.org/five-years-of-the-cambridge-declaration-on-consciousness/`.

[26] Fogel, Marilyn L. and Noreeen Tuross. "Transformation of plant biochemicals to geological macromolecules during early diagenesis", *Oecologia*, 120, 1999, pp. 336-346.

[27] Fogel, Marilyn L. et al. "Unusually negative nitrogen isotopic compositions of mangroves and lichens in an oligotrophic, microbially-influenced ecosystem", *Biogeosciences*, 5, 2007, pp. 1639-1704.

[28] Ford, Brett K. et al. "Desperately Seeking Happiness: Valuing Happiness Is Associated With Symptoms and Diagnosis of Deppression", *Journal of Social and Clinical Psychology*, 33 910), 2014, pp. 890–905.

[29] Gallese, Vittorio. "The 'shared manifold' hypothesis. From mirror neurons to empathy", *Journal of Consciousness Studies*, Volume 8, Numbers 5-7, 1 May 2001, pp. 33-50.

[30] Hamberger, Erich and Herbert Pietschmann. *Quantenphysik und Kommunicationswissenschaft: Auf dem Weg zu einer allgemeinen Theorie der Kommunication*, Mit einem Beitrag von Jörg von Hagen, Freiburg/München, Verlag Karl Alber, 2016.

[31] Hameroff, Stuart and Roger Penrose. "Conscious Events as Orchestrated Spacetime Selections", *Journal of Consciousness Studies*, 3, 1996, pp. 36-53.

[32] Jablonka, Eva and Marion J. Lamb. *Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral, and Symbolic Variation in the History of Life*, Revised edition, Cambridge, Ma., London, England: A Bradford Book, The MIT Press, 2014.

[33] Jansen, Ludger. "Aristotle's Categories", *Topoi*, 26, 2007, pp. 153–158.

[34] Kahneman, Daniel, Edward Diener, Norbert Schwarz (Eds.). *Well-Being: Foundations of Hedonic Psychology*, New York, Russell Sage Foundation, 2003.

[35] Koriat, Asher. "The Feeling of Knowing: Some Metatheoretical Implications for Consciousness and Control", *Consciousness and Cognition*, 9, 2000, pp. 149–171.

[36] Koutroufinis, Spyridon A. "Beyond Systems Theoretical Explanations of an Organism's Becoming: A Process Philosophical Approach", in Spyridon A. Koutroufinis (Ed.), *Life and Process: Towards a New Biophilosophy*, Berlin, Boston, De Gruyter, 2014, pp. 99-132.

[37] Kovàč, Ladislav. "Life, chemistry and cognition: Conceiving life as knowledge embodied in sentient chemical systems might provide new insights into the nature of cognition", *EMBO Reports*, 2006, June, 7 (6), pp. 562-566.

[38] Kriegel, Uriah. "The Concept of Consciousness in the Cognitive Sciences: Phenomenal Consciousness, Access Consciousness, and Scientific Practice", in P. Thagard (Ed.), *Handbook of Philosophy of Psychology and Cognitive Science*, Amsterdam, North Holland, 2006, pp. 195-217.

[39] Levine, Bruce E. A Profession Without Reason: The Crisis of Contemporary Psychiatry—Untangled and Solved by Spinoza, Freethinking, and Radical Enlightenment, Chico, Ca., A.K. Press, 2022.

[40] Lippmann, Walter. *Public Opinion* (1922), Mineola, New York, Dover Publications, 2004.

[41] Lupi, Andrea I. et al.,"A synergistic core for human brain evolution and cognition", *Nature Neuroscience*, 2022.

[42] Luria, A.R. *The Nature of Human Conflicts, Or Emotion, Conflict and Will: An Objective Study of Disorganisation and Control of Human Behaviour* (1930), Translated by W. Horsley Gantt, With a foreword by Adolf Meyer, New York, Grove Press, 1932.

[43] Luria, A. R. "Metaprinciples in neuropsychology", *Skolepsykologi*, Argang 8, Nr. 6, 1971 (Denmark), pp. 407-408.

[44] Long, Anthony A. "Hierokles on Oikeiosis and Self-Perception", in *Hellenistic Philosophy*, Volume I, Edited by K.J. Boudouris, Athens, International Center for Greek Philosophy and Culture, 1993, pp. 93-104.

[45] Marr, David. *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information* (1982), MIT Press, 2010.

[46] Martin, Wayne M. *Stoic Self-Consciousness, Self-Comprehension and Orientation in the Stoic Theory of Oikeiosis*, 2006, pp. 1-24. Available at: `http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.405.2438&rep=rep1&type=pdf`.

[47] Maslow, A. H. "A Theory of Human Motivation", *Psychological Review*, 50, 1943, pp. 370-396.

[48] Maturana, H. R. "Autopoiesis". In: Zeleny M. (ed.) *Autopoiesis: A theory of the living organization*. Westview Press, Boulder CO., 1981, pp. 21–33.

[49] Maturana-Romesin, Humberto and Jorge Mpodosis. "The origin of species by means of natural drift", *Revista chilena de historia natural*, v. 73, n.2, 2000, (consulted 5 July 2022).

[50] Mauss, Iris B., Maya Tamir et al. "Can Seeking Happiness Make People Happy? Paradoxical Effects of Valuing Happiness", *Emotion*, 11 (4), 2011, pp. 807-815.

[51] Mauss, Iris B., N.S. Savino et al. "The pursuit of happiness can be lonely", *Emotion*, 12(5), 2012, pp. 908–912.

[52] Merleau-Ponty, Maurice. *La structure du comportement*, Paris, Presses Universitaires de France, 1942.

[53] Merleau-Ponty, Maurice. *Phénoménologie de la perception*, Paris, Gallimard, 1945.

[54] Moreno, Alvaro and Matteo Mossio. *Biological Autonomy: A Philosophical and Theoretical Enquiry*, Dordrecht, Springer, 2015.

[55] Milgram, Stanley. *Obedience to Authority: An Experimental View*, London, Tavistock, 1974.

[56] Mill, John Stuart. *Autobiography* (1873), New York, Columbia University Press, 1960.

[57] Morrill, Kathleen et al. "Ancestry-inclusive dog genomics challenges popular breed stereotypes", *Science*, 376, 475 , 2022, pp. 1-17.

[58] Mossio, Matteo, Leonardo Bich. *What makes biological organisation teleological?*, Synthese, Springer Verlag (Germany), 2014.

[59] Moncrieff, Joanna. *The Myth of the Chemical Cure: A Critique of Psychiatric Drug Treatment*, London, Palgrave Macmillan, 2008.

[60] Μουτσοπουλου, Ε. *Φαινομενολογία των αξιών* (1967), translated only into Romanian, by Omonia, 2005, by Claudiu Sfirschi-Lăudat, with a preface by Christos Dedes.

[61] Μουτσοπουλου, Ε. *Αι Ηδοναί. Φαινομενολογική έρευνα ενίων προνομιούχν συειδησιακών καταστάσεων* [The Pleasures. Phenomenological research of some singular privileged states of consciousness] (1967), second edition still in Greek, 1975. Translated only into Romanian (the second edition) by Claudiu Sfirschi-Lăudat, Bucureşti, Omonia, 2005.

[62] Moutsopoulos, E. *La musique dans l'oeuvre de Platon*, Paris, P.U.F., 1959.

[63] Müller, Felix et al. "A prebiotically plausible scenario of an RNA–peptide world", *Nature*, Vol. 605, 2022, pp. 279-284.

[64] Muraca, Barbara. "Teleology and the Life Sciences: Between Limit Concept and Ontological Necessity", in Spyridon A. Koutroufinis (Ed.), *Life and Process: Towards a New Biophilosophy*, Berlin, Boston, De Gruyter, 2014, pp. 37-70.

[65] Riba, Jordi. *La morale anomique de Jean-Marie Guyau*, Paris, L'Harmattan, 1999.

[66] Sauer, Sebastian, Siobhan Lynch, Harald Walach, and Niko Kohls. "Dialectics of mindfulness: implications for western medicine", *Philosophy, Ethics, and Humanities in Medicine*, 6:10, 2011, pp. 1-7.

[67] Scalenghe, Franco. *Synopsis of all the passages containing the terms 'Proairesis', 'Proairetic' and 'Aproairetic' in the works of Epictetus*, `https://web.archive.org/web/20150210224944/http://epitteto.com/Sinossi%20PRO.PRO.APRO.ENG.html`.

[68] Schouten, Stefan, Ellen C. Hopmans, J.S. Sinninghe-Damste. "The organic geochemistry of glycerol dialkyl glycerol tetraether lipids: A review", *Organic Geochemistry*, 54, 2013, pp. 19-61.

[69] Tambets, K. et al. "Genes reveal traces of common recent demographic history for most of the Uralic speaking populations", *Genome Biology*, 19, 2018.

[70] Tomasello, Michael. *The Cultural Origins of Human Cognition*, Harvard University Press, 1999.

[71] Tomasello, Michael and Hannes Rakotzy. "What Makes Human Cognition Unique? From Individual to Shared to Collective Intentionality", *Mind & Language*, Vol. 18, Issue 2, April 2003, pp. 121-147.

[72] *Tutti i frammenti greci*, translation in Italian of Stoicorum Veterum Fragmenta (ed. Hans von Arnim, Vol. I-III, Leipzig, Teubner, 1903-1905) by Franco Scalenghe.

[73] Trail, Robert R. "Thinking by Molecule, Synapse, or Both? From Piaget's Schema to the Selecting/Editing of ncRNA" (2005), *The General Science Journal*, no. 2, 2008, pp. 1-34.

[74] Weber, Andreas. "The 'surplus of meaning'. Biosemiotic aspects in Francisco J. Varela's philosophy of cognition", *Cybernetics & Human Knowing* 9 (2), 2001, pp. 11-29.

[75] Williford, Kenneth. "Husserl's hyletic data and phenomenal consciousness", *Phenomenology and Cognitive Sciences*, 2013, pp. 1-19.

HISTORY

First Oil Congress in the World

Mir-Yusif Mir-Babayev

Azerbaijan Technical University

Abstract

A lot of companies, large and small, sprung up during Baku's first oil boom in the 19th century. Though rivalry was often fierce, the oil industrialists soon realized that they could advance many of their interests better through co-operation than competition. Thus, the first Congress of Baku Oil Industrialists was held from 26 October to 8 November 1884. The congresses continued to function more or less every year up to the Bolshevik revolution of 1917. At that time Baku was part of imperial Russia and the biggest names in the empire's oil industry – the Nobels and Rothschilds – took part in the Baku congresses, a sign of the meetings' importance.

Keywords: oil congresses, Council of the Oil Congress, Baku oilmen (industrialists), Baku Branch of Imperial Russian Technical Society, Baku-Batum pipeline, Nobels and Rothschild companies.

Introduction

The first congress of the Baku oil was established in 1884 in Baku; further these congresses continued to function until the revolutionary events of 1917. The status of this representative organization was approved by Russian Emperor Alexander III in February 1884. The first congress was opened in October 26 in 1884 and within two weeks of its meetings was concerned discussion on a wide range of issues of further development of the oil business. An important place in the activities of this organization have been and the social issues. During the next ten years were opened: a school for the children of workers and employees, an excellent library, well-equipped hospital and a pharmacy. The significance of congresses was determined by the convention that they took part of the Russian empire's largest oil producers, including and "Russian Rockefeller" Ludwig Nobel (who headed the Council of the Congress until 1888), Rothschild brothers (Alphonse and Edmond), Haji Zeynalabdin Taghiyev, Shamsi Asadullayev and many other oilmen (industrialists), which determined the face of the oil business in Russia and especially in Azerbaijan.

Main part

Starting already with the II congress of representatives of the company "Brothers Nobel" regularly attended the oil congress, and Emanuel Nobel (son of Ludwig, who led the company after his

father's death in 1888) regularly took an active part in them. The Russian government has also been involved in the oil congresses and every time they are sent to the representatives on behalf of the Minister of State Property, or Economy Minister, or the Minister of Transport. Congresses were used to organize and coordinate the activities of Russian businessmen, and the main purpose of the Congress was to "Express the possibility of the oilmen to the government their needs, aspirations and desires. However, meetings were necessary not only oil owners, but also the government, which is much more convenient it was to lead the leaders of oil companies and oil industry representatives gathered in one place at one time.

In the case of the US government, there was observed the following: it is not controlling its owners, tried in every way to help them, because it understood the significance of the activities of the oilmen as a whole. In his memoirs, John D. Rockefeller noted:

> *"Every time we succeeded in a foreign land, it meant dollars brought to this country, and every time we failed, it was a loss to our nation and its workmen. One of our greatest helpers has been the State Department in Washington. Our ambassadors and ministers and consuls have aided to push our way into new markets to the utmost corners of the world"*[1].

It is worth to mention that the congresses have been beneficial not only to large businesses, but much of small companies and private oil producers: combining solutions around a particular issue, they could have an impact on their more successful rivals.

Another thing - the major oil producers (Nobels, Rothschilds, and others), used the platform of the Congress for their own purposes. That is, large firms, such as "Bra Nobel", Rothschild "Caspian-Black Sea Society", "Baku Oil Society", used the congresses, along with other ways to solve problems. Basic argument of large firms in public debates with their opponents were not public, but behind the scenes action: used well-established relationships with the central government. For example, the company "Bra Nobel" risky and unpopular way with western capitals to obtain effective results, preferred its own way, which consists in verified methods agreed upon and approved by the government.

On the other hand, meetings that brought together both large and medium-sized oil industrialists contributed to the decision (approval) collective views on an issue. This equates to some extent of the "all sufficiency" oilmen and guaranteed them certain indulgences and privileges. Here we note that in almost every year held congresses it took part and more than 150 small manufacturers (companies), which also tried to use oil conventions in their own interest.

Investigating materials of the congresses it is noticeable that a red thread through them passed the collective voice of the Baku oil, concerned the promotion of domestic petroleum products to the West. Already in I-st congress was listed under number 12 theme "On the most favorable conditions of export of kerosene and lubricating oils abroad, cheaper freight, storage of goods in the field sales organization for agent reception and holiday shoppers, etc." [2].

And at the VI Congress addressed the issue of "The consequences for our exports of kerosene by tankers crossing the permission of the Suez Canal"[3].

---

[1] *Memoirs of an American billionaire John Rockefeller*, 1909. Printing house "Columbus", St.-Petersburg, p.98.

[2] *Proceedings of the I Congress of Oilmen in Baku from 26 October to 8 November of 1884*, Baku, Printing house of V. Neruchev, 1885, p.4-5.

[3] *Proceedings of the VI Congress of Oilmen in Baku, January 15-17, 1890*, Baku, Printing house of newspaper "Caspian", 1890, p.1.

The problem of "Developing our sales of kerosene in general, and the filling, in the markets of the Far East" was discussed at the XI Congress[4].

Council of the Congress of the Baku oilmen had the office and the secretariat, as well as the bank account, growing both through fees collected from random oil production, and due to industrial activity. Special Statistical Office functioned within the Council of Congresses, which responsibilities included the collection, processing and publication of all information relating to the oil business. Since its inception (1884) Council of the Congress organized a network of specialized technical libraries for the employees of the oil industry; the first in this network was organized the Library for employees of the Council. By 1911 in the library, there were more than 10 thousand books in Russian, English and German languages, mainly on technical subjects.

From January 10, 1899 Council of the Congress began to publish in Baku once every two weeks the newspaper "Oil Business" (OB) / Neftyanoe Delo, since 1908 - this is a magazine. Council of the Congress also published as "Surveys of Baku oil industry", both magazines are invaluable statistical database for researchers and historians around the world on the oil business. From the beginning of XX-th century till 1917, this journal had a correspondent office in London. After the October Revolution of 1917, the magazine OB, as well as most of the magazines published in the Russian Empire, was closed (by the decision of the Bolshevik's Baku Council of People's Commissars in May 1918). It must be noted that during the First World War, the magazine continued to publish data on the state of the oil industry noting that the war completely disrupting the country's economy.

In September 1918, the Azerbaijan Republic reopened the magazine; his editor was a well-known journalist in the Caucasus – P. M. Karamurza. In March 1920, the last issue of the magazine with the former name was published. After the establishment of the Soviet power in Azerbaijan, in May 1920, the magazine was renamed into the Azerbaijanskoye neftyanoye khozyaystvo ("Azerbaijan Oil Industry"), which is still published. Currently, the magazine "Azerbaijan Oil Industry" is the oldest monthly scientific and technical magazine of oil and gas industries in the world.

Well-known oilman Viktor Ragozin (1833-1901) on the I-st Congress advised the following to address one of the major problems of that period, namely, for rapid deployment of Russian (Baku) kerosene in Europe:

> *"Seek Russian Railways northbound them to lower the rate on overseas post, and that you, at this position, respectively, have found it possible to raise the domestic tariff. This is the first sentence. The second proposal is that the tariff for bulk cargo was compared with the rate for containerboard product. If Russia thinks of decreasing use of freights and moves a lot of kerosene in Europe, it will meet the lack of barrels in the US and will need its own. In the interests of the provision we need to apply to the Transcaucasian railway tariffs were compared for container and bulk commodity"*[5].

And at the VI emergency oil Congress, considering the problem of the construction of kerosene pipeline, V.I. Ragozin stated that:

> *"It is necessary to recognize as the best position only such that will transport everything that we produce, and this can be achieved only with sweeping changes in methods of*

[4] *Proceedings of the XI of the next Congress of Oilmen in Baku from April 21 to May 2, 1897*, Baku, Printing house "Aror", 1897, p.84-91.

[5] *Proceedings of the I Congress of the oilmen in Baku from 26 October to 8 November 1884*, Baku, Printing house V. Neruchev, 1885, p.33-35.

> *transportation. That is why I consider this question closely connected with the question of tariffs and the kerosene pipeline"*[6].

It is necessary to emphasize the Baku period of Viktor Ragozin's activity - from 1883 to 1892. As noted above, the first congress of Russian Oil Producers, which opened on October 26, 1884 in Baku, where Ragozin arose a question about the necessity of the state geological exploration of oil deposits. At the next session of the Congress (October 27), in its report "The most advantageous conditions of export of kerosene and lubricating oil abroad", he revealed an extensive program of development the exports of Russian (Baku) of petroleum products, in which the main issue was to ban the export of raw materials and half-raw materials from Russia.

We should note that the authority of the Ragozin (pioneer of Russian oil refining, industrial producer of oleonafts in Russia) was very high. This is clear from the materials of the first congress of the oilmen held in Baku. Oilman V. A. Bashkirov to introducing him to participants of the congress, said the following

> *"V. I. Ragozin little familiar to us in Baku, but his name as a major figure in the oil industry, it is known not only in Russia, but also in Europe. He came here to take part in the congress. In the first two sessions you were pleased to see how energetic and active, he began to work"*[7].

In 1884 in connection with the establishment of "Partnership of S.M. Shibayev Co.", Ragozin became a manager of the Baku branch of the company. In a short time, due to a serious organizational and technological transformation "Partnership ..." has become one of the leading Russian companies in the production of lubricating oils. In 1884, Ragozin while working in Baku stressed during its activities in the oil business from 1873 to 1883:

> *"I was trying to solve almost the main issue - the full refining, made famous Russian lubricants trading in the world, took them to Europe, America and Egypt and made the subject of exclusion ..."*[8].

At the first Russian wide exhibition of objects lighting and heating (1888) Ragozin was introduced as exhibits a large collection of refined products from Baku oil. After the exhibition, he was awarded an Honorary Diploma for "The introduction of the first oil refining lubricating oils, works extremely useful for installation in Russia their production and dissemination of these oils in Russia and abroad". In 1889, at the World Exhibition in Paris, mineral oils of the Shibayev's company (led by V. I. Ragozin) received a gold medal, and oil field's equipment of this company obtained a bronze medal.

Ragozin took an active part in the first seven congresses of the Baku oilmen. At the last congress (Baku, 29.10.1890), in which he took part, he reported "About some improvements in the conditions of our foreign exports of petroleum products". The red line of the report was the idea that only the excellent quality of the Baku oil products will ensure success in the competitive abroad with American-made products. At the meeting of the Baku Branch of the Imperial Russian Technical Society (BB IRTS) in 04 of May, 1891 he made a report: "Techniques of processing of oil due to the

[6] [*Proceedings of the VI extraordinary congress of the oilmen in Baku, January 15-17, 1890*, Baku, Printing house of newspaper "Caspian", 1890, p.5.

[7] *Proceedings of the I Congress of the oilmen in Baku from 26 of October to 8 of November 1884*, Baku, Printing house of V. Neruchev, 1885, p.78-79.

[8] G. V. Kolesnichenko (2001) *Essays on Studies in the History of Yaroslav l refinery named after D.I. Mendeleev*, Rybinsk, Printing house Mikhailov Posad, p.19.

oil crisis", which first showed the basis of the new technology of processing of petroleum distillates using gasoline vapors. In 1892 Viktor Ragozin completed his job at the company of Shibayev S.M. and forever left Baku.

The problem of rapid construction of the pipeline (kerosene pipeline) was addressed at the XVII Congress of the oilmen (December 8, 1901, January 9, 1902) while discussing the topic "About the question of what measures could contribute to the spread of oil products to displace foreign coal". There were the oilmen, who zealously supported the idea of pipeline construction, including A. Rothschild, H.Z. Taghiyev, I. Ilimov and S. Baghirov. Alphonse Rothschild stood security for the project to the tune of one million rubles in 4% domestic bonds, at the Petersburg branch of the Lyon loan association. It is appropriate to recall that the length of the world's greatest kerosene pipeline Baku-Batum (1897-1907) was 829 versts (1 versta is old Russian measure of length; equals 1067 meters) and the principal author of the project pipeline owned by Trans-Caucasian railway, was a professor at the St. Petersburg Institute of Technology, N. L. Shchukin (after 1936 Batum was renamed to Batumi). In the future, this unique pipeline helped to Russia (later the Soviet Union) to compete with the American oil industry.

As it is known, in Russia by the end of the 70's - early 80's of the XIX century has dominated the domestic (Baku) kerosene, due to high activity of the Bra Nobel Co. on the Absheron peninsula. It's very interesting to read the thesis of the historian Irina Dyakonova, which states that *"... the turning point that opened within 1877, to some extent explained by the fact that in the autumn of this year, state-owned collection of duties on imported kerosene was translated into gold calculus, which gave the customs duty on American kerosene partially forbidden character"* is essential to read.

Next, the historian Dyakonova notes that

> *"...the abolition of excise duty, held in 1877, played a significant role Robert and Ludwig Nobel, who managed to attend the relevant government committees and had already prepared for their own benefit decisive intervention in the Russian oil business which they launched in 1879. The turning point in the import of kerosene, the incipient in 1877 received its logical conclusion in 1879-1883 with the direct involvement of "Branobel". In 1883 Russian imports of kerosene almost came to naught, and the use of Russian kerosene has increased to 11.553.880 pounds"*[9].

In that period, there was a change monopoly in place of a foreign (American) was the Russian monopoly in the face of the Nobels and the Rothschilds. Later, in 1914 according to the Council of the Congress of the Baku oilmen (XXXIII Congress), the share of the three monopolistic groups ("Bra Nobel", "Oil" and "Shell") accounted for 69.5% of the export of oil products from Baku. These groups held more than 60% of crude oil in the Russian Empire, two thirds produce kerosene and fuel oil, as well as all profits from the sale of lubricating oils.

The "oil" stories have not true facts about the direct contact between John D. Rockefeller and the Nobels, but there are examples of the use of Nobels all the best of the American experience. The leaders of the company, "Bra Nobel" in the first place Ludwig and his son Emanuel, not only to compete in domestic and foreign markets with Rockefeller, but also learned from him. For example, in 1897 (after the Chicago exhibition) Emanuel Nobel speech to the Ministry of Finance on the representation of the firm participation rights capital "Branobel" in other companies, openly refers to the experience ≪Standard Oil≫, considering it exemplary. And that is characteristic of such, the noted right Emanuel Nobel received in 1898.

During this period, many Russian oil experts believed and considered to the American experience in the oil business as a model. For example, a member of the XI Congress of Oilmen in Baku Levenson

[9] I. A. Dyakonova (1980) *Nobel corporation in Russia*, Moscow, Printing house "Mysl", p.63-64.

E.S., delivered a lecture about "The Development of the sales of our general and kerosene tanker in particular on the markets of the Far East", said:

> *"A radical solution of this issue, as well as general organization of the whole Russian kerosene exports, it should be recognized only permanent association of export American ≪Standard Oil≫ or the formation of a privileged company"*[10].

Interestingly describes in his book, "Memoirs of an American Billionaire J. Rockefeller" the secret of success of the company's founder, he wrote

> *"I attribute the success of the Standard Oil Company only its sound policies: the continued expansion of its sphere of influence. It did not stop at any cost to the application of the best and more convenient methods of fabrication. It sought out the best people everywhere and pays them higher salaries. She did not hesitate to sacrifice the old machines and plants for the acquisition and construction of new and improved. It sought to create marketing not only for their own manufactured goods, but also for all sorts of by-products, sparing no expense to introduce them to all corners and ends of the vast world. It did not stop in front of millions of the cost of finding ways to reduce the cost of receiving and distribution of kerosene in the pipeline, for the invention of special wagons, tankers and tank wagons. It established a railway station in the liquid centers of all districts in the country to reduce the cost savings and delivery of kerosene".*

Here we should emphasize that the business rivalry between Nobels and Rockefeller throughout the history of the Bra Nobel Company has not been able to approach in its capabilities to the level of Rockefeller. For example, if in 1882, Rockefeller had a capital of 140 million rubles (in comparable prices), the Bra Nobel Co. - at 12 million rubles. In our opinion, Rockefeller's Standard Oil acted as a powerful landmark for the largest and most organized Russian companies to achieve the best results in the Baku oil business.

As a result, in the 1899-1901 by the absolute number of produced oil of Russian (Baku) oil industry ranks first in the world, giving 11.5 million tons of oil a year, and the US - 9.1 million tons[11].

Further, at the XVI Congress of the oilmen operations totaling Council of the Congress concluded:

> *"1) the Russian kerosene is not ousted from foreign markets by American kerosene, 2) the export of Russian kerosene abroad is not reduced, and prices do not drop it there, 3) the demand in England and Germany on the Russian kerosene is not reduced, and prices are on the Russian and the American kerosene stand tall; 4) all overhead costs for the delivery of one pounds of kerosene to consumer markets abroad 49.3 kopecks. 5) profit exporting Russian kerosene increased gradually, starting with the size of 5.2 kopecks. with pounds and reaching lately and even 17.3-30.7 kopecks. with a peck"...*[12].

A detailed analysis of the works of oil Congresses gives a reason to believe that they discussed not only the in the practice, but barely nascent state of applied science about oil. At congresses have repeatedly made their point views well known to the oil production of scientists and industrialists: D. I. Mendeleyev, Taghiyev Haji Zeynalabdin, Naghiyev Musa, Asadullayev Shamsi, Lysenko K. I., Carl Engler, Ragozin V. I., Ludwig Nobel, Emanuel Nobel and many others.

[10] *Proceedings of the XI Ordinary Congress of Oilmen. Baku from April 21 to May 2*, 1897, p.87.

[11] M, F, Mir-Babayev (2011) The role of Azerbaijan in the world's oil industry, *Oil-Industry History (USA)*, **12**(1)109-123.

[12] *Proceedings of the XVI of the next Congress of Oilmen in Baku on December 8, 1901. January 6, 1902* Volume I, Baku, Printing house of the partnership, 1902, p.313.

For example, presenting on the I-st congress of Dmitry Mendeleyev was satisfied with the depth of the issues and problems discussed at the congress. The scientist said that *"...the free cohesion figures in the same industry to discuss their interests and desired is major news not only for Baku, but also for all of us ... Open consideration of issues and cases free industry is to be welcomed"*.

Briefly about the famous Azerbaijani oilman (industrialist) Haji Zeynalabdin Taghiyev (1838-1924): he was one of the most respected oil magnates in Russia and the Muslim world. Born into a poor family, he began his working life as a bricklayer and finished as a millionaire businessman. H. Z. Taghiyev & Co., founded in 1872, became a powerful oil company over the next 25 years, combining all branches of the oil industry, upstream and downstream. On January 11 of 1886 H. Z. Taghiyev spoke at the session of BB IRTS about "How to overcome oil industrial crisis?" in which he described most efficient export of kerosene from Baku. The speech was very timely and useful, so it was published and distributed among all members of BB IRTS and Baku oilmen (industrialists). In 1887, his company produced 7 million poods of oil and 2 million poods of kerosene. He invested in all spheres of the national economy: oil production, building of trade centers, flourmills, fisheries and opened the first textile mill in Baku. He is maybe even better known, however, as a philanthropist. He established the first high school for girls, the first drama theatre and the Shollar pipeline to bring fresh water to Baku. Taghiyev was elected honorary chairman of the Muslim, Russian, Jewish and other societies, which existed in Baku at that time.

Here, we emphasize that the oil theme in the creative life of Mendeleyev held a key position. His participation in the making of Russian (Baku) oil industry in the second half of the XIX century, was a multi-object (he was in Baku several times)[13]. Extensive research on the oil issue of the scientist is not only recommended a series of practical measures to change processes in their factories, but also advised us not to be afraid to implement several radical changes.

An interesting fact is that already in the I Congress (1884) Baku oilmen have put forward the idea of "catch up and overtake America". The main words that sound in the Congress were: "We promise to pour kerosene all over Europe", "Compared with the American kerosene", "Our rights to compete with America", etc. It was not empty boasting. Later, in his memoirs, John D. Rockefeller paid tribute to Baku industrialists (Standard Oil Co. was a major competitor to Baku companies):

> *"It is a common thing to hear people say that this company has crushed out its competitors. Only the uninformed could make such an assertion. It has and always has had, and always will have, hundreds of active competitors; it has lived only because it has managed its affairs well and economically and with great vigor. To speak of competition for a minute: Consider not only the able people who compete in refining oil, but all the competition in the various trades which make and sell by-products - a great variety of different businesses. And perhaps of even more importance is the competition in foreign lands. The Standard is always fighting to sell the American product against the oil produced from the great fields of Russia, which struggles for the trade of Europe, and the Burma oil, which largely affects the market in India"*[14].

Let's remember that global oil production in 1900 amounted to 1224.2 million poods, including the Russian Empire - 631.1 million poods (51.6%), including extraction of oil from the Baku oil region - 603.8 million poods, and the US - 516.7 million poods (42.2%). At the end of 1901, Russia's share of global (world) oil production was 53%. Significant contribution to the leadership positions of the

[13] M. F. Mir-Babayev (2011) The role of Azerbaijan in the world's oil industry, *Oil-Industry History (USA)*, **12**(1)109-123.

[14] *Memoirs of an American billionaire John Rockefeller* (1909) Printing house "Columbus", St.-Petersburg, p.98.

empire has made by “Bra Nobel Co.” on the oilfields of which were produced 86.8 million poods of oil from 113 production wells and, were produced about 30 million poods of kerosene.

In 1900-1905, a cartel formation was concluded between the “Bra Nobel” and the Rothschild’s “Mazut” association according to which Emanuel Nobel and Rothschild’s brothers joined forces in exporting Russian kerosene to foreign markets. Already by the end of 1901, the “Nobmazut” cartel transported 43% of fuel oil, 57% of kerosene and 67% of the technical oils extracted from Baku oil. By pursuing a coordinated economic policy, “Nobmazut” successfully countered the other major player on the world’s kerosene market, the American Standard Oil Co., which was trying very hard to gain a footing in the Caucasus and Absheron oil markets. Standard Oil Co. tried in every possible way to cooperate with the Rothschild’s’ “Caspian-Black Sea Co.”, but no deals that would contradict Russia’s interests ever took place, contrary to rumors circulating in the Russian press.

The cartel also controlled the London oil company Consolidated Petroleum Co., formed in August 1900 with a fixed capital of 500,000 pounds sterling and a competitor for American oil companies. “Nobmazut” cartel was the only representative of British companies on international markets.

At the XVI congress, considering the serious allegations against the companies exporting oil from small oil industrialists, it was noted that the main reason for the sharp fall in prices of kerosene was the same as in America - the problem of uncontrolled oil production. In conclusion, we would like to note once again that the participants were well-known oil Congresses oil and public figures (the Nobels, the Rothschilds, H. Z. Taghiyev, V. I. Ragozin, Musa Naghiyev, Shamsi Asadullayev, V. I. Timiryazev, D. P. Konovalov, V. A. Bashkirov, N. A. Sokolov, B. A. Ogulevich, A. M. Feigl, C. V. Hagelin, I. G. Garsoyev, I. N. Pershin, M. B. Pappe, E. S. Levenson and others), as well as famous researchers of oil (D. I. Mendeleyev, K. I. Lysenko, D. V. Golubyatnikov, K. V. Harichkov, I. N. Glushkov, A. A. Bulgakov, S. K. Kvitko, C. Engler, I. I. Yelin, R. A. Vishin, L. G. Gurvich, V. F. Herr, M. M. Tikhvinsky, V. I. Frolov, Mancho A. L., Inchik F. A. and others).

This eventually led to the fact that Baku oil congresses have become generators of many ideas in the field of oil and played a significant role in the technical education of the oil in Baku and in the Russian Empire as a whole. Detailed study of the Congresses’ materials, one find a lot of interesting ideas and suggestions on the oil business, which was much discussion at the conventions, and then put into practice: the correct development of oil fields, the means of contributing to raising the scientific and technical aspects of the Caucasian oil industry, on the prevention of fountains and the introduction of a better way to store crude oil; about the most advantageous conditions of kerosene’s export and lubricating oils abroad - reducing the cost of freight, storage of goods in the field sales organization for agencies reception and holiday shoppers, etc.

A proceeding of the Congress of the Council of the Baku oilmen clearly showed who the real oil leader was. Each big oil company has a certain number of votes in the Council. The right to vote was determined by power companies and the volumes of its production. According to the charter of the Board, the right to vote gave the first ”production from 100 to 500,000 poods of oil per year, production from 100 to 200,000 poods of lighting and lubricating oils and transferring from 1 million to 2 million pounds.” To obtain the second and each subsequent vote, you had to have a production of 2 million pounds of oil production to 800,000 poods, and the pumping of 8 million pounds per year, respectively.

Also, we should emphasize that according to many foreign experts who have studied the history of the oil business, it is following the pattern of the Baku editions of the Council of Congresses (”Oil business” and ”Overview of the Baku oil industry”), as well as the journal “Proceedings of the Baku Branch of the Imperial Russian Technical Society” (founded in Baku in January of 1886), were built in the future guidelines for the preparation and processing of oil statistics in many countries around the world. By the way, these magazines published the results of awarding the laureates with the

little-known Russian Emanuel Nobel Prize, established in 1904 in Baku[15], [16] .

Conclusion

Those pledges at the I-st Baku Oil Congress – Let's overtake America! – were fulfilled. In 1899-1901, Baku's oil industry led the world in terms of the volume of oil extracted – 11.5 million tons per year; America was in second place with 9.1 million tons. In 1901 Russia, which included Baku at that time, produced 53% of the world's. High output was not without its own problems, though. The 16th Oil Congress considered serious charges to the oil exporters from smaller oil industrialists over the fall in kerosene prices. However, it was noted that the main cause for the sharp fall in prices for kerosene was the same as in America – the problem of uncontrolled output. The oil congresses played an important role in the development of the oil industry in Baku. In 1920 after the establishment of Soviet power in Azerbaijan Congress Council was abolished: no more congresses were held and the congress council was liquidated.

References

[1] *Memoirs of an American billionaire John Rockefeller*, 1909. Printing house "Columbus", St.-Petersburg, p.98.

[2] *Proceedings of the I Congress of Oilmen in Baku from 26 October to 8 November of 1884*, Baku, Printing house of V. Neruchev, 1885, p.4-5.

[3] *Proceedings of the VI Congress of Oilmen in Baku, January 15-17, 1890*, Baku, Printing house of newspaper "Caspian", 1890, p.1.

[4] *Proceedings of the XI of the next Congress of Oilmen in Baku from April 21 to May 2, 1897*, Baku, Printing house "Aror", 1897, p.84-91.

[5] *Proceedings of the I Congress of the oilmen in Baku from 26 October to 8 November 1884*, Baku, Printing house V. Neruchev, 1885, p.33-35

[6] *Proceedings of the VI extraordinary congress of the oilmen in Baku, January 15-17, 1890*, Baku, Printing house of newspaper "Caspian", 1890, p.5.

[7] *Proceedings of the I Congress of the oilmen in Baku from 26 of October to 8 of November 1884*, Baku, Printing house of V. Neruchev, 1885, p.78-79.

[8] Kolesnichenko G.V., 2001. *Essays on Studies in the History of Yaroslavl refinery named after D.I. Mendeleev*. Rybinsk: Printing house Mikhailov Posad, p.19.

[9] Dyakonova I.A., 1980. *Nobel corporation in Russia*. Moscow: Printing house "Mysl", p.63-64.

[10] *Proceedings of the XI Ordinary Congress of Oilmen. Baku from April 21 to May 2, 1897*, p.87.

[11] Mir-Babayev M.F., 2011. The role of Azerbaijan in the world's oil industry *Oil-Industry History*, v.12, #1, p.109-123.

[12] *Proceedings of the XVI of the next Congress of Oilmen in Baku on December 8, 1901*. January 6, 1902. Volume I, Baku, Printing house of the partnership, 1902, p.313.

[13] `http://www.petroleumworld.com/issues20051101.htm`

[14] Mir-Babayev M.F. The Rothschild's brothers' contribution to Baku's oil industry *Oil-Industry History*, 2012, v.13, #1, p.225-236.

[15] `http://www.petroleumworld.com/issues20051101.htm`

[16] M. F.Mir-Babayev M.F. (2012) The Rothschild's brothers' contribution to Baku's oil industry, *Oil-Industry History (USA)*, **13**(1)225-236.

The Copernican Revolution in Transylvania

MIHOLCSA Gyula

Romanian Television

Abstract

The evolution of our thinking is a very interesting and instructive story. The standard bearers are founders of religions, philosophers, sometimes scientists too. The pioneering work of the latter was little understood by most of people. Our aim in this paper is to present a concrete situation, in which we could fallow the previous ideas: the acceptance of the heliocentric theory of Copernicus in Transylvania. We will do it through two paintings on wood of the Solar system, in two Transylvanian churches: one in a Greek-Catholic church in Șurdești (Maramureș county), and the other in a Unitarian church in Ocland (Harghita county). Although they were made in the same period, these two paintings represent two opposite systems: the geocentric one and the heliocentric one. How was that possible?

Keywords: solar system, Copernicus, geocentric, heliocentric, Transylvania.

1 Introduction

The aim of this paper is to find out how the heliocentric theory of the solar system penetrated Transylvania, according to which the Earth is not in the center of the solar system, but the Sun, and the planets revolve not around the Earth, but around the Sun, together with the Earth. We will approach this problem not through the prism of the scientific works of the time, works that were not accessible to ordinary people, but through the prism of those possibilities, to which the broad masses of people had access.

Although very few could see, today everyone knows that the Earth is round, rotates around its axis, and moves around the Sun. Some have supported this idea for over 2000 years, however, most people have only been familiar with this idea for about 200 years.

In the north of Transylvania, in Șurdești (Maramureș County), there is an old wooden Uniate (Greek-Catholic) church. Inside the church there is an interesting mural painting, made in 1783. (Figure 1).

Fig. 1: The interior of the Uniate (Greek-Catholic) church in Șurdești (Maramureș County)

It depicts the solar system. It is one of the variants of the geocentric model, in which the Earth is at the center of the planetary system (Figure 2).

Fig. 2: The ceiling of the Uniate church in Șurdești (Maramureș County, photo 2016)

There are several wooden churches in Transylvania, from the same period, where we can see painted on the ceiling the whole geocentric representation of the solar system, such as Ulciug (Sălaj County),

the painting dating from 1781 (Figure 3).

Fig. 3: The ceiling of the Uniate church in Șurdești (Maramureș County, photo 2016)

In the southern part of Transylvania, in the village of Ocland on the Homorod Valley (Harghita County) there is an old stone church. It had once been Roman Catholic, becoming Unitarian after the 16th-century Religious Reformation. Inside, above the pew with painted benches, there is a coffered ceiling, made in 1771, on the occasion of the renovation of the church (Figure 4).

Fig. 4: The interior of the Unitarian church in Ocland (Harghita County), with a coffered ceiling.

One of the tapes depicts the solar system. This time, it is Copernicus' heliocentric solar system, *Systema Copernicanum*, with the "S" Sun at its center (Figure 5).

Fig. 5: Painted box from the Unitarian church in Ocland (Harghita County, photo 2017).

What is interesting about the two paintings (Figures 2 and 5) is that both are in places of worship, only 300 km apart, and both were made in the late eighteenth century. How is it possible then that the solar system is portrayed in such contradictory conceptions?

2 Solar Systems

To understand this difference, we must go back in time to where the two conceptions of the universe were born. The Greeks, like the Babylonians, the Chinese, or the ancient Egyptians, studied the vault of heaven and the motion of the Sun, the Moon, and the stars. People believed that some of the celestial bodies were gods who decided the fate of the world, as well as that of humans, so if they could foresee their movements, they would guess their own future. That's why they followed their movements very closely.

2.1 Anaximander's geogentric system

Viewed from Earth, all celestial bodies, including the Sun, appear to revolve around the Earth. And so the first cosmological model was born: The universe is a huge empty globe, in the middle of which is the Earth and around which orbit all the celestial bodies: the Sun, the Moon, the planets and the stars. This was formulated by ANAXIMANDER of Miletus (A.C. 610-546), who thus created the world's first mechanical model: The earth is - floating freely - in the center of the spherical world, without leaning on anything. Around it, at different distances, the stars rotate, then the Moon, and the farthest, the Sun. Their movement is explained by the wind created by the Sun, by the evaporation of water from the hydrosphere that surrounds the Earth.

Over time, this system has been improved. Ancient astronomers quickly realized that most stars were motionless, but there were a few that moved relative to them. These were the "wandering stars," the "errant stars," or, in their current name, the planets. In total, they discovered seven[1] such celestial bodies, which had a visible motion with the naked eye (at that time there were no telescopes) to the "fixed" stars: the Moon, Mercury, Venus, the Sun, Mars, Jupiter and Saturn. HERACLITUS of Ephesus (A.C. 535-475) proposed this order of the planets, concerning which can cover which, so it can pass in front of it.

The question was: why do the stars move, why do the planets move, who and how are they set in motion? Since the universal gravitational attraction was unknown at the time, the Greek astronomer, mathematician, and geographer EUDOXUS of Knidos (A.C. 397-345) assumed that these planets were trapped on huge concentric spheres, all centered in the middle of the Earth, spheres that rotate evenly[2]. which causes the celestial bodies trapped on them to revolve around the Earth. These spheres had to be transparent (because all the planets and stars could be seen through them), so they were supposed to be made of crystal. Each planet had its own crystal sphere, and on the eighth sphere, the largest, the "fixed" stars were supposed to be trapped.

Along the way, it was discovered that the motion of the planets relative to the fixed stars is extremely complex: they move sometimes faster, sometimes slower, and sometimes even backwards. Explaining this retrograde motion has presented astronomers with a lot of trouble for 2,000 years.

These complicated movements made it necessary to introduce new crystal spheres, so that by combining their uniform movements, the complex motion of the planets could be explained. By A.C. 325, the Greek astronomer and mathematician KALLIPOS of Kyzicos (A.C. 370-300) has already reached 34 crystal spheres for the 7 planets.

2.2 Aristotle's geocentric system

Based on these models, as well as the observations and measurements made, ARISTOTLE (AC 384-322) described the final structure of the universe: in the middle of the universe is the Earth, and around it revolves all the others, each planet in its own perfect orbit. circular composed of several concentric "spherical celestial" layers, made up of "ether" (Figure 6). The celestial spheres of the planets are surrounded by the largest sphere, that of the stars, so the universe is not infinite, because beyond the sphere of the stars there is nothing left (Figure 2, Figure. 5)

2.3 Aristarchus' heliocentric system

But ARISTARCHUS of Samos (A.C. 320-250), the greatest astronomer of antiquity, had a completely different view of the universe. He stated (A.C. 270) that it is not the Earth, but the Sun, that is at the center of the Universe, and the Earth, the other planets, and the stars revolve around the Sun (Figure 7). In addition, he claimed, the Earth revolves around its own axis.

This model was rejected by the society in which he lived, and for all these statements, ARISTARH was accused of blasphemy and exiled not only from his city, but also from Greece, thus preserving the unitary, geocentric conception of the world.

[1] Also 7 celestial bodies are represented on the paintins on figures 2, 3, 5 and 6

[2] Since the planets were considered gods, they could only move "perfectly": circular and uniform motion.

Fig. 6: The geocentric solar system of ARISTOTLE, from the book by Andreas CELLARIUS (1661)

2.4 The Egyptian hybrid system

But there were other concepts in antiquity. The Egyptians, worshipers of the Sun God, claimed that two of the planets move differently: Venus and Mercury do not revolve around the central Earth, but around the Sun, which revolves around the Earth (Figure 8). The Greek philosopher and astronomer HERACLIDES Ponticus (A.C. 390-322) took this model (through A.C. 350) and popularized it in Greece. Moreover, he considered that the Earth is not fixed, but rotates around its axis, from west to east, making a complete rotation in 24 hours.

This model of HERACLIDES was taken over in the 5th century (around A.D. 410) by the Latin encyclopedist Martianus CAPELLA (A.D. 360-428) from the Roman province of Africa (now Algeria). He describes it in his book on the seven liberal arts[3], *De nuptiis Philologiae et Mercurii*, the liberal

[3] Martiani CAPELLAE: *De nuptiis philologiae et mercurii artibus liberalibus*, Francofurti, 1836.

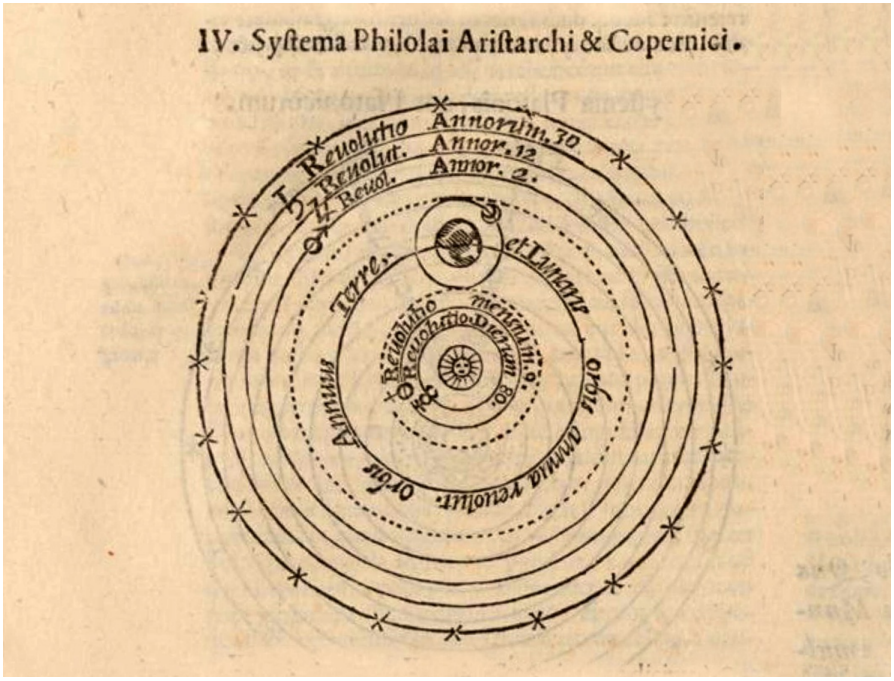

Fig. 7: The heliocentric planetary system of ARISTARCHUS, from RICCIOLI's book (1651: p.102)

arts suggested by the seven planets then known: grammar, dialectics, rhetoric, geometry, arithmetic, music, and astronomy.

This model is presented in NABOTH's book, *Primarum de Coelo et Terra*[4], published in Venice in 1573, 30 years after the publication of COPERNICUS book, which was not yet banned by the Church. This book also presents COPERNICUS' model.

2.5 Ptolemy's geocentric system

Aristotle's conception was carried forward around 150 by the Roman mathematician and astronomer Claudius PTOLEMY of Alexandria (87-165), who also considered in his work *Megiste Syntaxis*[5] that at the center of the universe is the motionless Earth, and around it all other celestial bodies rotate (Figure 9).

PTOLEMY, however, had another explanation for the retrograde motion of the planets, namely that the planets are not fixed on their spheres, but describe circular motions, that is, epicycles around their place on the sphere. With the help of these complex movements, PTOLEMY was able to

[4] Valentino NAIBODA: *Primarum de Coelo et terra institutionum*, Venetiis, 1573.
[5] *The Great Treaty*, transmitted to posterity through the Arab chain, under the title *Almagest*

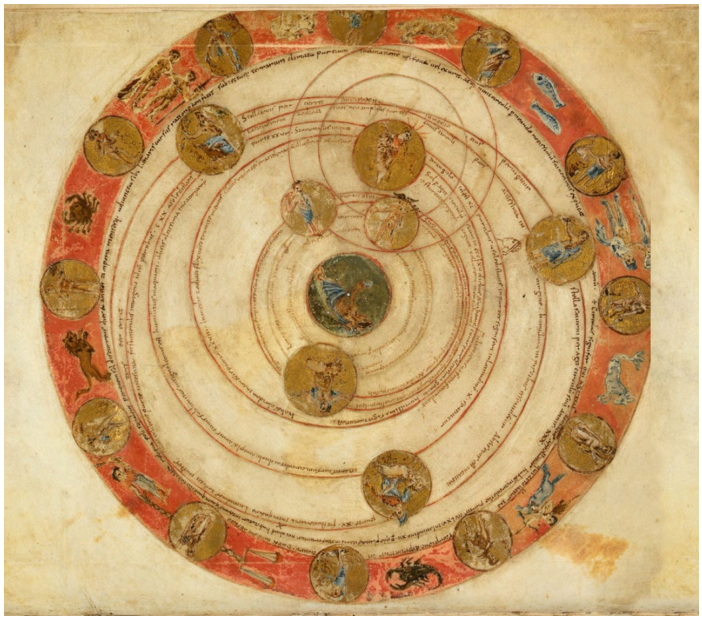

Fig. 8: Martianus CAPELLA's geocentric planetary system. The image is the representation of the position of the seven planets, on March 18, the year A.D. 816. [source: Wikimedia Commons]

explain the motion of the planets with satisfactory accuracy and thus predict or reconstruct their position at the time of a person's birth. This model has been considered the basic model of the universe in astronomy for 1500 years, and has met the requirements of astronomers, astrologers, and calendar writers.

2.6 The Christian geocentric system

A new religion was born in medieval Europe: Christianity. In a few centuries it spread throughout Europe, becoming the only religion. The basis of religion was the Bible. The geocentric system - Aristotelian or Ptolemaic - corresponded entirely to the ideology of the growing Christian church, because it was in line with the basic idea that man, as a creature created by God, must be in the center of the universe, in the middle of a perfect planetary system:

> *5. He set the earth on its foundations, so that it should never be moved* [Psalm 104:5].

Joshua speaks of stopping, therefore, of motion, only in the case of the Sun and the Moon [Joshua 10:12 and 13]:

> *12. At that time Joshua spoke to the Lord in the day when the Lord gave the Amorites over to the sons of Israel, and he said in the sight of Israel, "Sun, stand still at Gibeon, and moon, in the Valley of Aijalon."*

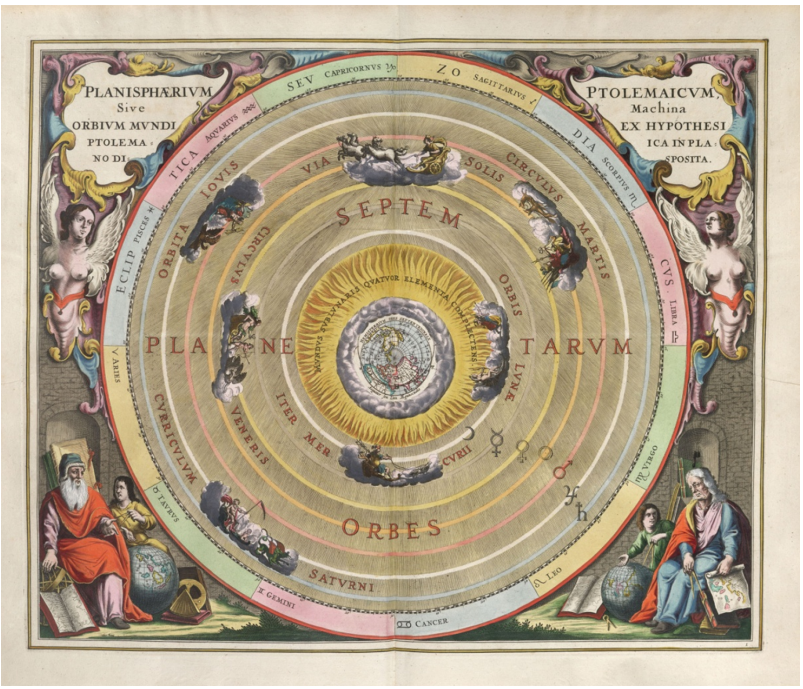

Fig. 9: PTOLEMY's geocentric planetary system [CELLARIUS, 1661]

> *13. And the sun stood still, and the moon stopped, until the nation took vengeance on their enemies.*
>
> *Is this not written in the Book of Jashar? The sun stopped in the midst of heaven and did not hurry to set for about a whole day.*

This verse from the Book of Joshua was most often quoted as proof of the stillness of the earth. Thus the Aristotlian geocentric conception of the world became the longest-lived theory of all time, remaining valid for 2000 years (Figure 10). In the Middle Ages, ARISTOTLE'S physics was taught in schools and universities, as well as this conception of the universe.

2.7 Copernicus' heliocentric system

But the age of the Renaissance, of the Religious Reformation, of the first technical revolution, of the great geographical discoveries, of the discovery of the pattern and of the founding of the universities, meant a decisive turning point in the evolution of the conception of the universe. It all started with navigation. Ships moving away from land and wandering the seas, as well as caravans crossing the desert, were guided only by the Sun and the stars. This is how the creation of more and more accurate astronomical maps began, for which the positions of the stars and planets had to be measured precisely.

With the improvement of measuring instruments and the more and more precise determination of

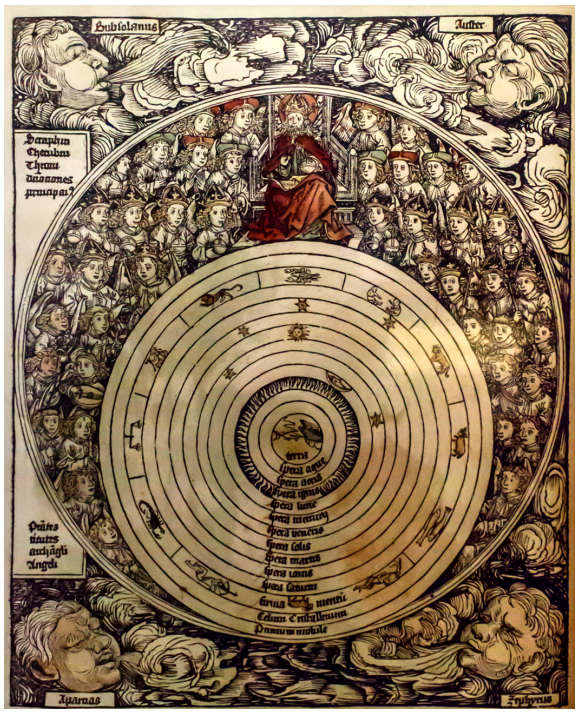

Fig. 10: The geocentric system in Hartmann SCHEDEL's Liber chronicarum mundi (1493).

the position of stars and planets, some errors of geocentric theory came to light, and new questions arose which could not be explained by the complicated models of Aristotle or Ptolemy.

To solve these problems, in the book *De revolutionibus orbium coelestium* of 1543, Nicolaus COPERNICUS (1473-1543), the canon of Polish-German origin in Frauenburg, returned to the old, abandoned and long-forgotten conception of ARISTARCHUS of Samos. After listing the planets, including Earth, COPERNICUS concludes:

> *But at the center of all these planets is the Sun. For who could place the light of this wonderful church in a more suitable place than that from which it can illuminate them all at once? ... Thus, in this composition, we find the sublime harmony of the Universe.*
>
> [BARTA, 1972: 359]

So COPERNICUS removed the Earth from its privileged position, placing it among the ordinary planets, and moved the center of the Universe from Earth to the Sun. This was the "Copernican revolution" because it produced a radical change in the *ideology* of the universe. (Figure 11)

With this assumption he explained how simple and elegant the retrograde motion of the planets is, without the need for the celestial spheres of ARISTOTLE, or the epicycles of PTOLEMY.

But his theory, the heliocentric model, was diametrically opposed to the geocentric one accepted by the Catholic Church. That is why neither the Catholics nor the Protestants newly detached from

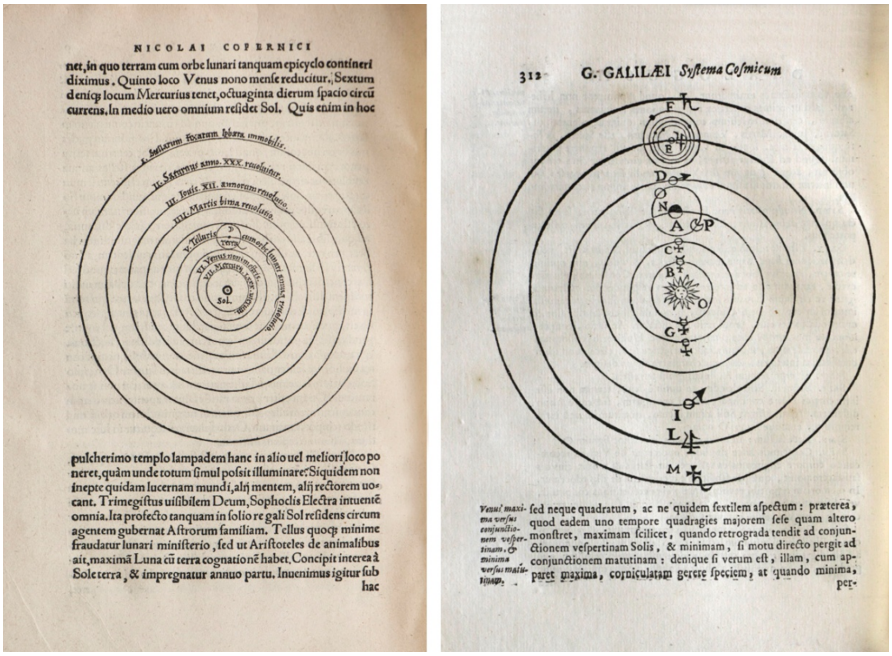

Fig. 11: COPERNICUS' heliocentric planetary system, from his book (1543), respectively from GALIEI's book. The image in the book of GALILEO is richer with four satellites of Jupiter, which GALILEO discovered. (1632)

them accepted the new conception, since the basis of both denominations was the Bible, according to which the Earth stands motionless at the center of the Universe. Curiously, those who launched the most vehement attacks primarily against CORPERNICUS were the Protestants, who were calling for the renewal of the church.

> *Who dares to put Copernicus' authority over the Holy Spirit? Some mentioned a Venetian astrologer who wanted to prove that the Earth is the one that rotates and not the sky, the Sun and the Moon. This madman wants to overthrow all astronomy! The Holy Scriptures say that Joshua had commanded the Sun to stop, not the Earth!*
>
> [LUTHER, 2017: 257-258]

COPERNICUS expected such attacks because he knew the position of the Church on this issue. Therefore, in the preface of his book he presents the heliocentric idea only as a mathematical possibility. This is how the Church did not attach too much importance to the book, which, in fact, was known only to a few astronomers.

2.8 Tycho Brahe's hybrid system

Meanwhile, another Danish astronomer, Tycho BRAHE (1546–1601), also studied the motion of the planets, making very accurate measurements of their positions for 20 years in the first astronomical observatory in Europe built by him (Uraniborg, on Hven Island, now under Swedish tutelage), at a time when the telescope did not yet exist. Following these measurements, he found that the planets did not revolve around the Earth, but around the Sun, and in 1577 he accepted this idea of COPERNICUS. His only differing opinion was about the Earth (Figure 12):

> *I believe without a doubt that the still earth must be placed at the center of the universe, as ancient astronomers and physicists and the Scriptures testify. But I do not share at all the assumptions of Ptolemy and those of antiquity that place the Earth at the center of the orbits of the planets; I am convinced that the celestial movements are arranged in such a way that the Earth is only the center of the motion of the Moon, the Sun, and the eighth sphere — which is farthest away. The other 5 planets revolve around the Sun, as around their ruler and king.*[6]
>
> [SIMONYI 1978: 159]

We cannot know if this was his scientific conviction, or if he did so in order not to be in conflict with the basic principles of theology, that is, with the Church. The truth is that at that time it was not even possible to establish directly by measurements whether the Earth is standing and the Sun is moving around it, or vice versa. There was evidence of the Earth's motion around the Sun, but all was indirect.

Tycho BRAHE's model seemed to resolve the contradiction between astronomers' measurements and the Church's accepted system, bringing peace to the world of astronomy. Astronomers breathed a sigh of relief because they could give up the complicated epicycles of Ptolemy, without contradicting the *Holy Scriptures*. And, in fact, regarding the solar system on Earth, we see it exactly as Tycho BRAHE described it. This is why this model has enjoyed so much success, while also corresponding to all measurements since then.

2.9 Johannes Kepler's heliocentric system

After Tycho BRAHE's patron died in 1588, the new king of Denmark, CHRISTIAN IV, in 1597 dispossessed him of the island where he had his famous observer. Tycho BRAHE went to Hamburg, then to Prague and looked for an assistant to continue his research. He chose Johannes KEPLER (1571–1630), a brilliant young astronomer in mathematics. KEPLER asked him for the measurement data of the planet Mars, and analyzing this data mathematically, he noticed that the planet does not move at a constant speed. After six years of searching and trying out various hypotheses, he found that the planet could not move in a circular trajectory, but rather elliptical, with the Sun in one of its foci.

> *We, to whom the divine goodness has bestowed upon us, by the creature of Tycho Brahe, a more rigorous scrutineer than anyone else, and by whose research has shed light on a deviation of the order of magnitude of 8 'from Ptolemy's calculations, it is fitting to receive and use this divine goodness with a feeling of gratitude. Relying on the evidence for the incorrectness of the assumptions that served as the basis for the calculation, we*

[6] Tycho BRAHE: *Astronomiae instauratae progymnasmata*, 1852.

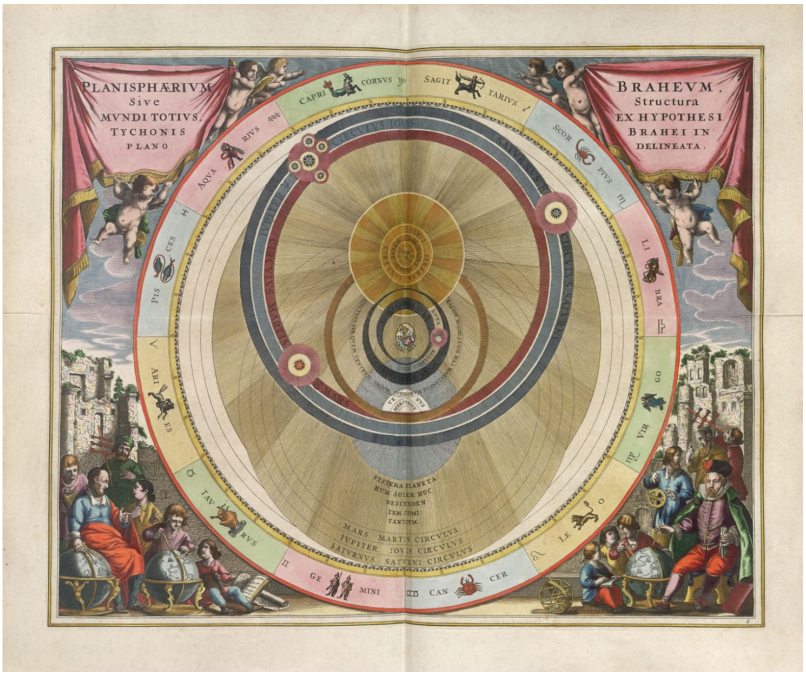

Fig. 12: Tycho BRAHE's geocentric planetary system [CELLARIUS, 1661]

> *will direct our efforts to finally lay the groundwork for the correct form of the celestial movements. These 8 minutes, exclusively, paved the way for the modernization of the entire astronomy.*
>
> [SIMONYI 1978: 160]

It was the first work to abandon circular trajectories, based on the Platonic conceptions of mystical perfection, initially agreed upon by KEPLER himself, in his first book in 1596, *Misterium Cosmographicum*.

KEPLER then applied this idea to the entire Copernican solar system (he was a follower of the heliocentric system), resulting in a heliocentric system that accurately described the motions of all the planets. He published the results in the book *Astronomia Nova*, in 1609. In the book KEPLER did not explain why the planets move according to the three discovered laws of motion, but only described their motion. The explanation came in 1687 from an English physicist, Isaac NEWTON.

3 Dispute of Solar Systems

3.1 Galileo Galilei

The peace brought to astronomy by Tycho BRAHE's model lasted only 50 years. Until the Italian physicist Galileo GALILEI (1564–1642) constructed a telescope[7]. With the help of his telescope he made several crucial discoveries. He discovered that there are mountains on the moon, so the moon is not a "perfect" celestial body. By this, GALILEI proved that there are no two separate worlds (sublunary - life-changing, supralunar - the immutable universe), but there is only one world. Then he discovered the satellites of Jupiter, so it is not true that all celestial bodies revolve around the Earth; that Venus has phases similar to those of the Moon. These discoveries led him to conclude that Nicolaus COPERNICUS was right: the Earth revolves around the Sun! In 1632 he published the book Dialogo, in which he described all these phenomena, concluding that COPERNICUS' theory was not a simple mathematical model, but reality itself.

> *Now let us resume the two movements attributed to the Earth, that is, the annual and the daily, the first being to be understood as being performed by the center of the Earth in large orbit, that is, of a maximum circle described in the ecliptic plane, fixed and immutable, and the second. , being executed by the globe around its own center or its own axis.*
>
> [GALILEI, 1962: 253]

3.2 Prohibition and index

This time, the Church reacted harshly. On June 22, 1633, the Inquisition sentenced GALILEI to life imprisonment (which later became a forced residence for life) and banned all books that taught COPERNICUS 'ideas, indexing them.

The effects of the ban were not long in coming: everywhere, only geocentric theory could be taught in schools. A telling example in this sense is the book by Johannes HONTERUS from Brasov (1498-1549), *Rudimenta Cosmographica*[8]. HONTERUS, humanist encyclopedic spirit, church reformer, cartographer, pedagogue and prominent spiritual leader of the Saxons from Transylvania, was born in Braşov. He studied abroad, and after returning home, reorganized the Saxon church in Transylvania based on the Lutheran principles of the Reformation. He set up a printing house, taught and was the first Protestant pastor of Brasov. In 1541, the German school in Braşov received a new building and new operating regulations, thus becoming the first gymnasium in Transylvania. In 1530, Johannes HONTERUS published *Rudimenta*, a book to popularize knowledge, which contains basic information from the natural sciences, maps, and knowledge of geography and astronomy. Since it was published 14 years before the publication of Copernicus' book, it obviously refers exclusively to the geocentric system (Figure 13).

> *Years, the bend of his six, even Jupiter passes between the stars. Mars, on the other hand, in two years, slowly crosses the zodiac signs. The sun fills it, orbiting it all year round.*
>
> [HONTERUS, 1984: 41]

[7] Its lens is now in the Galilee Museum in Florence.
[8] *Elemente de cosmografie*, Cracovia, 1530. The first edition in Braşov was is 1541.

The book has become a huge success, reaching over 40 editions, especially in Western European countries. In some of the great western cities it was republished almost every year, until 1692, the year of its last appearance. Interestingly, in this multitude of reprints is the fact that even the last ones - published 150 years after COPERNICUS 'book - continued to proclaim the geogentric system, not even alluding to the Copernican heliocentric system.

Fig. 13: The geocentric planetary system in HONTERUS 'book, 1566 edition.

The situation is similar in the case of the great Czech philosopher and pedagogue, Jan Amos KOMESKY (COMENIUS, 1592-1670), who in his book for students *Orbis Sensualium Pictus*[9] from 1658, in the third lesson entitled *Coelum*, depicts the geocentric system (Figure 18a.)

This was possible for two reasons. The first is that COPERNICUS' work was not well known; the second is the prohibition of the church. The indexing of COPERNICUS 'works and the news of Galileo's condemnation prevented the Copernican model from spreading throughout Europe.

Moreover, circles close to the church began to look for scientific evidence that GALILEI and COPERNICUS were wrong and that the Sun revolved around the Earth. At the forefront of these trials were the Jesuits. Jesuit intellectuals, representatives of church science, tried to improve the Ptolemaic geocentric concept so that they could explain the increasingly accurate astronomical measurements, without urging the Earth from the center of the solar system. Thus were born the so-called geo-heliocentric or "hybrid" concepts, in which certain planets no longer revolve around the Earth, but around the Sun, or in some more complicated systems, rotate in elliptical orbits around both[10]. But

[9] The *Visible World*, illustrated textbook, written in 150 lessons for students.

[10] The German physician, mathematician and astrologer Israel HUBNER (established in Sibiu in 1660) imagined such a solar system in 1667, in which Mercury and Venus revolve around the Sun, the Moon around the Earth, and the others - Mars, Jupiter and Saturn - around the Sun and Earth, in ellipsoidal orbits.

at the center of the solar system, and obviously of the Universe, remained the Earth.

However, the most successful model remained the one developed by Tycho BRAHE, who was eventually taken over by most Jesuits because he correctly described the motion of the planets. His vision seemed to correspond entirely to reality, given that at that time there was no way to decide whether the Earth revolved around the Sun, or vice versa.

3.3 Șurdești

Under these conditions, it is not surprising that, at the end of the 18th century, the geocentric system was preached in the village churches. What happened in Șurdești as well. Șurdești village is located on the Cavnic brook valley, surrounded by mountains and forests, located at a distance of 20 km from Baia Mare. The village was first documented in 1411, under the name Swrgyanfalwa. After the settlement was almost completely destroyed by the invasion of the Tartars in 1717, it was rebuilt with the support of the Austro-Hungarian Monarchy, in 1766 a Uniate wooden church was built here (Figure 14).

Fig. 14: Uniate Church in Șurdești (Maramureș County, 2017).

The 54-meter-high tower, built in the 19th century, was until 1966 the tallest wooden tower in Europe. At the same time, a multi-storey porch with arches was added. In 1999, along with seven other wooden churches in Maramureș, it was included on the UNESCO World Heritage List. The interior painting of the church was completed in 1783, which suggests that the appearance of the geocentric solar system also dates from 1783. The painting (fig. 2) shows that around the Earth,

located in the middle orbit the Moon, then the Sun. Further on, Jupiter is seen with the four satellites discovered by Galileo, above, Saturn with its rings, and at the end, the star of the stars. On closer inspection, we notice a planet orbiting the Sun, probably a hybrid planetary model. It's the planet Mars. At an even closer look, we notice two other orbits, very close to the Sun. It seems to represent Mercury and Venus, which also orbit the Sun. In the ancient Egyptian model or that of Martianus CAPELLA, only two planets revolved around the Sun, while three planets orbit here: Mercury, Venus and Mars.

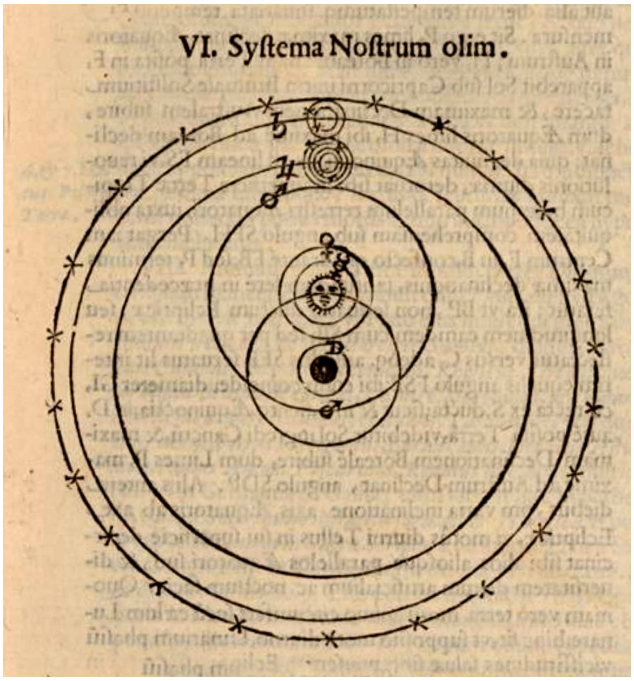

Fig. 15: Riccioli's planetary model, from his own book [RICCIOLI, 1651: 103]

Where did this model come from, who created it? Valentin NAIBOD's book[11] lists the models of solar systems known until then: that of PTOLEMY, that of Tycho BRAHE and that of COPERNICUS. The model from Șurdești is not among them. We also find another book, much later, from 1647, *Selenography*, in which the Danish astronomer Johannes HEVELIUS, in addition to a very detailed description of the Moon, also publishes three drawings with the three great models of the universe, but the one from Șurdești is also lacking here. Looking further, we find another book from 1651, *Almagestum novum*[12], written by the Jesuit priest and astronomer Giovanni Battista RICCIOLI (1598-1671). Here are all the models known to date. In drawing VI on page 103, we can also see the model from Șurdești, according to which three planets revolve around the Sun! This drawing is presented as "our own model", so that of RICCIOLI (Figure 15).

[11] Valentino NAIBODA: *Primarum de coelo et terra institutionum*, Venetiis, 1573.
[12] The title of the book alludes to PTOLEMEU's *Almagesta*.

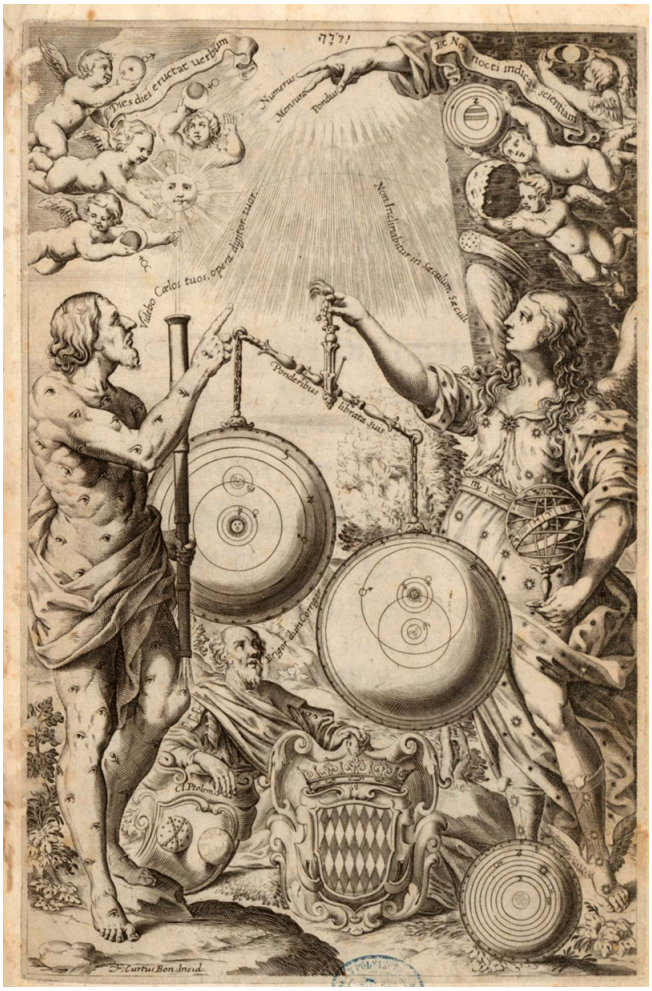

Fig. 16: The first page of RICCIOLI's book, from 1651 [RICCIOLI, 1651]

RICCIOLI actually discovered with the telescope that not only the two planets, Venus and Mercury (claimed by the Egyptians, and Martianus CAPELLA) revolve around the Sun, but also Mars. It was the Jesuit priest and astronomer RICCIOLI, who was commissioned by the Catholic Church to prove that, despite Galileo GALILEI's arguments, the Earth does not move. He found 77 counter-arguments, among which, along with some such as: the inappropriate placement of Hell or aesthetic objections related to harmony and proportionality, we also find some scientific approaches (eg, the discovery of the Coriolis force). The same model of RICCIOLI appears on the title page of the respective book, where the muse of astronomy, Urania, compares the two models: the heliocentric one of COPERNICUS with the geocentric one of RICCIOLI. PTOLEMEU, whose model lies thrown in the right corner, looks resignedly at the result of the comparison (Figure 16).

This model appears in only a few later astronomical books of synthesis, such as *Iter extaticum* (1660) by Atanasi KIRCHER, under the name of the semitychonic system, and in the *Atlas Novus Coelestis* (1742) by Johann Gabriel DOPPELMAIR, and here only as a phase. intermediate for the tychonic system. It does not appear, for example, in Johannes ZACH's *Specula* (1696), where, as in most books, only the three basic models are presented: Ptolemaic, Tychonic, and Copernican (Figure 19).

After all this, all we have to do is ask ourselves: how does the planetary model of an Italian Jesuit end up on the ceiling of the church in Șurdești?

The Jesuits were brought to Transylvania in 1579, immediately after the Religious Reformation, by the Catholic prince BÁTHORI István, to counteract the momentum of the reform. After repeated expulsions and recalls - depending on the religion of the prince of Transylvania - the Jesuits eventually settled in Transylvania. In charge of the Religious Counter-Reformation, the Jesuits quickly realized that the use of force was not enough to convert Protestant believers, but they would have to put both science and education at the service of the church. Thus, they created a very efficient school network in Transylvania: in Cluj, Alba Iulia, Odorheiu Secuiesc, Sibiu, Timișoara, Oradea, Târgu Mureș, Satu Mare and Baia Mare. The Jesuits came to Baia Mare from Cluj, in 1674, founding a Jesuit mission there, which included a monastery and a school, in which they integrated in 1755 the famous Schola Rivulina. The Habsburg Catholic power tried to recover, sometimes even by force, its buildings from the Protestant believers, and at the same time targeted the Orthodox Church. In the time of Archbishop Athanasius ANGHEL, the Transylvanian Orthodox Archdiocese was united with the Catholic Church, the religion of power in Vienna. Thus was born in 1698 the Uniate Church in Transylvania.

The faithful from Baia Mare started the construction of the Greek-Catholic church in 1771. Today, a new, more imposing church is being built in its place. Next to the church, there was a popular Uniate school with four classes, but, starting in 1793, that is 10 years after the painting of the church in Șurdești. Because in the years when the solar system was painted, Uniate s did not yet have a school of their own, it is likely that the Jesuits taught Uniates in their own schools. Under these conditions, it is very likely that the geocentric planetary system in the wooden Uniate church in Șurdești, located only 20 km from Baia Mare, was built under the influence of the Jesuits. It is possible that the work of Giovanni RICCIOLI, known as a great astronomer of the time, was found in the library of the Jesuit school in Baia Mare, and the planetary system was copied from there on the ceiling of the church in Șurdești[13]. We can therefore see how strong the influence of the Catholic Church was in Transylvania, even in the field of astronomy: in 1783, so at the end of the 18th century, geocentric planetary models were still painted on the church ceilings. The situation was similar in Europe.

3.4 Ocland

In view of all this, how was it possible that in Ocland a heliocentric planetary system was painted on the ceiling of the church - even earlier than in Șurdești, in 1771? How could the Copernican model penetrate the Unitarian church in Ocland? Most likely, the painting was commissioned by the then priest of the church, MEHE Mihály, during the renovation of the entire church between 1769-1771. Thus we will reformulate the question: how could the priest of MEZE Mihály find out about the Copernican heliocentric system, and how he became a follower of this theory, so that he ordered the Copernican system to be painted on the most important box on the ceiling, the middle one?

[13] [UZA, 2014]

4 The Penetration of the Copernican System iin Transilvania

Because of the prohibitions and the index on the heliocentric books, we must look for those ways that bypass the Catholic Church.

4.1 Calendars

One of the important contributions of the Renaissance was the invention of printing. Thanks to the typographic multiplication, a new genre of publication appears: the calendar. It was a popular book that has been one of the most widely read and reprinted works in the last 400 years. His audience was comparable only to that of the Bible. Calendars, in addition to calendar data, also contain basic knowledge, including astrology data. Thus a new possibility arose that, by evading church censorship, calendars could propagate new astronomical knowledge. The famous German astronomer Johannes Müller von KÖNIGSBERG (REGIOMONTANUS, 1436-1476), was also the author of calendars. In 1471, he published the first calendar, which obviously contained the geocentric model, given that it had appeared half a century before the book of COPERNICUS. A century later, in 1575, the Cluj writer and typographer HELTAI Gáspár (1520-1574) translated it into Cluj in Hungarian, under the title *Csízió*. Although this calendar is published 45 years after the publication of COPERNICUS' book, it includes the Sun in the planet's range, so it contains the geocentric model, without making any reference to the heliocentric one.

It is almost unbelievable that even in the 1909 edition of the Csízió calendar, the Earth is at the center of the solar system, and the Sun appears as a planet.

> *The sun is the fourth planet under Mars in the fourth sky, 166 times larger than Earth. Its height is three thousand times a thousand, nine hundred times a thousand and sixty-five miles.*
>
> [Csízió, 1986: 32]

At the Szekler National Museum in Sfântu Gheorghe there is a rich collection of calendars, consisting of several hundred copies. From their multitude, it appears that even in those that appeared at the beginning of the 19th century, the Sun is mentioned as the fourth planet. Therefore, the popular calendars did not propagate the heliocentric planetary system in any way, but on the contrary, they delayed its knowledge. The oldest calendar in Transylvania in which the Sun appears positioned in the center of the planetary system, appeared in Cluj, in 1792, under the title *Calendar after the new and old style*[14] by HANCKENS Bálint. He no longer lists the Sun among the planets, but speaks of the Sun and planets, and places it in the center (Figure 17). But this happens 20 years after the tape was made in Ocland. Therefore, the calendars give no explanation for the tape in question, which appeared in Ocland in 1771.

4.2 Schools and universities

Another possible way in which the heliocentric conception could penetrate the consciousness of ordinary people is the educational network. Of course, we should not think of denominational schools, but of public schools, where church bans are not so strict. But at that time, the schools in Transylvania were almost exclusively in the hands of the churches. The situation changed only from

[14] The "new" and "old" styles refer to the Gregorian and Julian calendars, respectively.

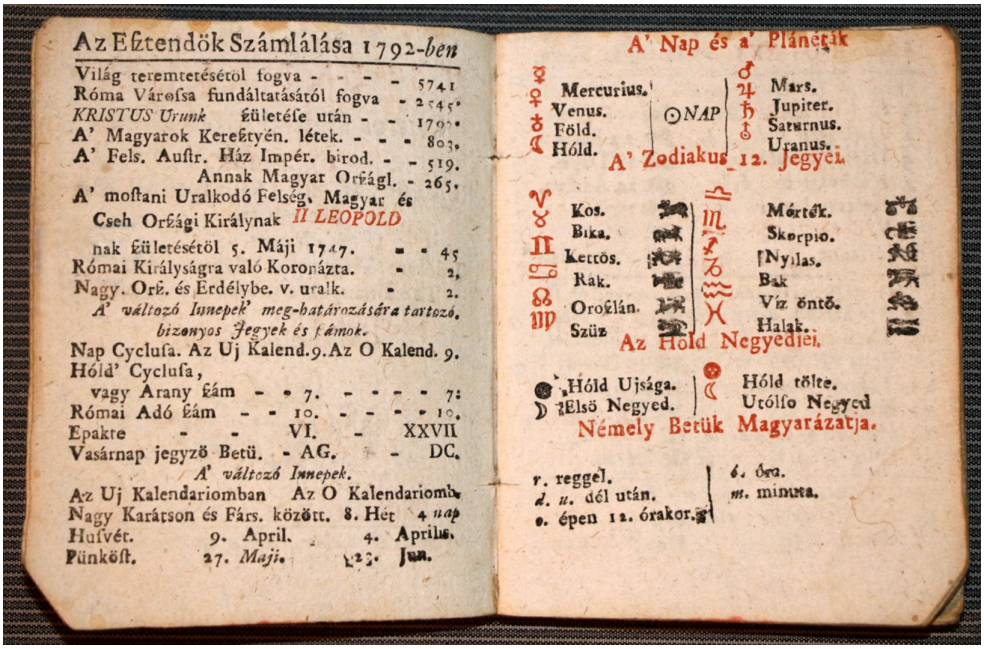

Fig. 17: Bálint HANCKENS's calendar, with the Sun in the middle of the planets (1792).

1777, when Maria Theresa issued the decree *Ratio Educationis*, aimed at organizing a unitary public education system, under state control. But *Ratio Educationis* does not explain the phenomenon in Ocland for two reasons: once, because the decree appeared in 1777, while the painted box from Ocland dates from 1771. Secondly, because of the content of the textbooks. The printing house in Buda enjoys the exclusive right to print textbooks ordered for the benefit of schools in Hungary and associated countries. But this printing house was none other than the printing house of the Jesuit University of Nagyszombat (Trnava, Slovakia), moved to Buda. So the confessional schools remained.

Catholic schools were run by Jesuits, who obviously taught the geocentric conception of the universe. In Protestant schools, the situation was somewhat different. At the end of the seventeenth century, in the Protestant countries, the visceral resistance to the heliocentric conception was somewhat abandoned. Thus, Protestant universities in the West were already spoken of, and sometimes written about, COPERNICUS' heliocentric system. Many Protestant students from Transylvania went to study in the West: the Reformed, more conservative universities in Germany, and the Unitarians, especially the more liberal Dutch universities. After graduating from university, they generally returned home to Transylvania to teach in schools.

APÁCZAI Csere János (1625-1659) was born in Apața (Brașov County). He completed his secondary education in Cluj, then attended the upper gymnasium in Alba Iulia. After that he went to the Netherlands, where he attended several universities. His major work, *Magyar Encyclopaedia*[15], was

[15] *Hungarian Encyclopedia*, Ultrajecti (today Utrecht, Netherlands.), 1653

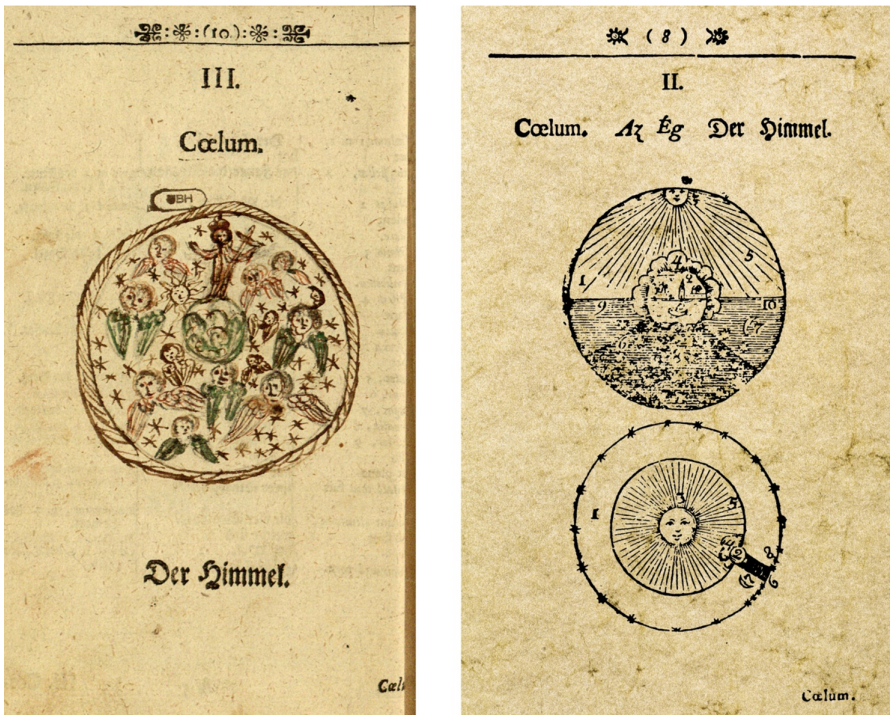

Fig. 18: The solar system in two editions (1698 and 1793) of the book Orbis Sensualium Pictus.

written and published in 1653 in Utrecht. In it, in addition to various other encyclopedic knowledge, he also deals with astronomy, describing the solar system.

> *Just in the middle of it is the Sun, which, spinning fast around its own axis, spins our sky around it, along with all the beasts.*
>
> [APÁCZAI, 1653: 101, XXI, 2]

APÁCZAI was the first to promote the heliocentric conception in Transylvania, and implicitly in Hungary. Moreover, he did it not in the language of science, Latin, unknown to the common people, but in his mother tongue, Hungarian. It is true that more than a century has passed since the publication of COPERNICUS' book, but we must not forget that these were the years of the harshest prohibitions, and the trial of the Inquisition of Galileo, who had died only 10 years before, was still alive in people's memory. Unfortunately, APÁCZAI's too modern vision, but perhaps the envy of the other teachers, limited his teaching. Moreover, he was threatened for his opinions and modern teaching even by the prince of Transylvania, RÁKOCZI György II, a theme elaborated by the writer Géza PÁSKÁNDI:

> *Mr. Apáczai, don't teach anything else! God help me, if you teach me anything else, I will order you to be thrown into Mureș or thrown out of the Tower!*

This revolutionary spirit died of tuberculosis at the age of 34. Even in those decades began the long debate on the two conceptions of the universe, a debate that would last until the end of the eighteenth century.

In this context, we must mention the book of the Czech philosopher and pedagogue Jan Amos KOMENSKÝ (COMENIUS, 1592-1670) who, however, kept pace with scientific development. In the trilingual edition (Latin / Hungarian / German) in Bratislava of the textbook *Orbis Sensualium Pictus* (1793), the illustration was changed to the lesson Coelum (Heaven) (fig. 18 b), and it is already written that:

> *Heaven 1. seems to revolve around the center Earth. 2. but, indeed, the Earth revolves around the Sun.*
>
> [COMENIUS, 1793: 8]

But that's after the Ocland cassette, too.

4.3 Libraries

A third possibility for the propagation of the heliocentric conception - outside the clerical censorship - could be the private initiative, ie the private libraries. It was the idea of the American professor of astronomy Owen GINGERICH to inventory the copies of COPERNICUS' book for the analysis of the propagation of Copernican principles, since, due to church censorship, the Copernican conception could be known almost exclusively from this book. The few books of COPERNICUS that arrived in Transylvania must be sought first of all in the private collections. In the Carpathian Basin, 8 such specimens have been preserved for posterity, 3 of which are in Transylvania.

4.3.1 Evangelical Gymnasium from Brașov

One of them is in Brasov. Michael WEISS (1569-1612) was born in Mediaș, and after elementary school, he learned Hungarian at the Jesuit college in Cluj. He was then a clerk at the court chancellery and a diplomat of several Transylvanian princes. In 1612, he fell victim to the adventurous campaigns of the Transylvanian prince BÁTHORY Gábor. Michael WEISS had a rich library containing many astronomy books, including COPERNICUS' book. In 1608, he donated his books to the library of the evangelical gymnasium in the city of Brașov (the library founded with the gymnasium by Johannes HONTERUS in 1544). COPERNICUS' book can be found in the library's catalog - which begins in 1572 - in its 1608 inventory. After a while, the book no longer appears in the registers. Most likely lost in the fire of 1689, when the entire library burned down. The Ocland priest who commissioned the painted tape in 1771 would never have had the opportunity to see this book, as the book was no longer 82 years old at the time of the painting. And he would not have learned much about planetary systems either, because in the 18th century, in the Saxon schools of Transylvania, despite the effervescent cultural life here, physics was still not taught. The school purchased another copy of COPERNICUS' book, which still exists today. It is recorded that it was bought in 1796, a quarter of a century after the installation of the box in Ocland.

4.3.2 Reformed college from Orăștie, Mihail Halici

In this order of ideas, it is worth mentioning the humanist scholar Mihail HALICI (1643-1712), born in Caransebeș, exactly 100 years after the publication of COPERNICUS' book. He studied at the

reformed academic gymnasium in Aiud, where he had a very good friend, PÁPAI Páriz Ferenc, to whom - on the occasion of obtaining his doctorate in medicine - he dedicated an ode in 10 lines (1674), which is practically the first poem in Romanian literature. written in metrical verses[16].

HALICI had a very rich personal library with many astronomy books[17]. Although the book of COPERNIC was not among them, it had a book by Johannes KEPLER - inherited from ENYEDI Sámuel -, *Epitome astronomiae Copernicanae* (Linz, 1618), which was also a source for heliocentric theory, a book also indexed. by the Catholic Church. Unfortunately, there is no study that follows the trajectory of HALICI's ideas and astronomical beliefs, starting from the Reformed College in Orăștie, where HALICI was also rector for two years, and to which he bequeathed his entire library[18].

4.3.3 Reformed college from Cluj

The other two copies of COPERNICUS' book are in the Library of the Academy of Cluj. They arrived here on the occasion of the nationalization in 1948, when the Romanian state confiscated all the older libraries belonging to some schools or churches. One of the copies shows the stamp of the Reformed College from Cluj from 1871, exactly 100 years after the appearance of the tape from Ocland. But didn't the book get here faster? If we browse the catalogs of the library of the reformed college, the book still appears in the catalog from 1825, so at that time it was already owned by the college. The previous catalog dates from 1767, but the book does not appear in this catalog. So COPERNICUS' book arrived there at a later date in 1767. It was during this period (1769-1771) that the Unitarian church in Ocland was renovated. Therefore, even if the pastor of Ocland had passed through here until the preparation and renovation work had begun, he would not have found COPERNICUS' book.

4.3.4 The Unitarian College from Cluj

Among the notes on the owners of the third copy is the Unitarian church, so the book belonged to the Unitarian college. The Reformation - not long after its appearance - underwent a new reform in Transylvania, and with the help of refugees from Europe (Faustus SOCINUS, Giorgio BIANDRATA, etc.), due to the religious tolerance of Transylvania. Thus was born the Unitarian confession in Transylvania. Interpretations of the Bible became even more liberal, so the Unitarians accepted the new visions more easily. In Cluj, the spiritual capital of Transylvania, in 1557 the Unitarian College was established. The first Unitarian school operated in the former Franciscan monastery. The old building no longer exists, it was demolished a few decades ago, and another building was built in its place. In the 1743 catalog of the college library, COPERNICUS' book is identified by the number "C86." He was there a long time ago: in the 1661 catalog he was in position 18. So long before he painted the box in Ocland. All this leads to the conclusion that, theoretically, the Unitarian pastor of Ocland could be inspired from here, from the library of the Unitarian college, to make the box painted with the Copernican model, from 1771.

But was this book really studied in college or was it just lined up on the shelf, among other bibliophile rarities? An inventory note clarifies this issue somewhat. In the Cluj archives of the Hungarian Unitarian Church, there is a document, *Fasciculus Rerum Scolasticarum*, in which there is a note, according to which, on September 24, 1717[19], the advisor to the governor general, BIRÓ Sámuel

[16] Hexameters and pentameters
[17] HAJÓS József. *Korai Kopernikusz-vonatkozásainkról*, Korunk Nr.7, Cluj, 1973.
[18] The book is now in the University Library of Cluj.
[19] Geography began to be taught in college in 1716.

(1665-1721) donated to the Unitarian College of Cluj a map, on which the universe is depicted according to the Ptolemaic, Tycho BRAHE, and Copernican conceptions. Subsequently, the senior of the school made a new note, dated September 25, 1717, according to which, "Mapa ab ilustrissimo Samuele BIRO, colata coro auditori", ie the map that BIRÓ Sámuel donated to the college was displayed in the auditorium, seen all the time by students. This means that he also teaches classes on this map. The map no longer exists today, but it contained the three important visions of the universe (Figure 19).

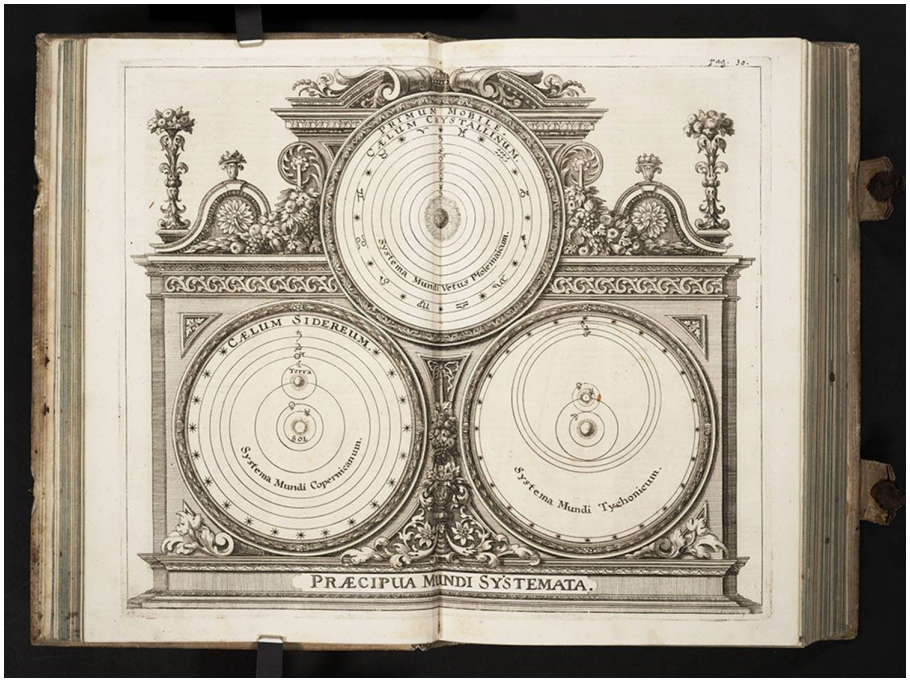

Fig. 19: Johann ZAHN: Praecipua Mundi Systemata [ZAHN, 1696: pag. 30]

We also find out from the archive that MEZEI Mihály was among the students of the college. MEZEI Mihály, the future Unitarian pastor from Ocland, attended the Unitarian College in Cluj in 1735, as evidenced by the fact that he passed alone, "manus propria", in *Seniori Matricula*, on July 16, 1735. MEZEI Mihály not only graduated from college, but became a Unitarian pastor. MEZEI Mihály was ordained on June 16, 1759, at the synod of Aita Mare, as evidenced by the inscription of his name in the minutes of the synod and consistory: "Michael MEZEI pastor Ecclesiae Homorod Karátsonfalviensis Unitariorum, manus propria." Homorodkarácsonyfalva (Christmas) is a quiet village in the Homorod Valley, just outside the village of Ocland. The Unitarian pastor of MEZEI Mihály moved to Ocland in 1769. The village has only one church, dating back to the end of the 13th century. But the oldest written attestation of this church dates back only to 1715, consisting of a visitation note of the Odorheiu Secuiesc Conscription: "The church is made of stone, covered with shingles, the tower, made of stone, covered with shingles." Over time, the condition of the building deteriorated. The newly appointed Unitarian pastor, MEZEI Mihály, began the renovation of the entire church in 1769. This was done within two years. The work was completed in 1771. Then

the floral boxes were mounted on the ceiling of the ship. The work was executed by the carpenter ELEKES András from Ocland, a fact recorded on one of the tapes. Among the numerous boxes with floral motifs we find some with representations of animals, as well as two famous boxes: an eternal calendar for calculating the date of Easter[20], and another with the heliocentric planetary system, "Copernicarum System" (fig. 5). It is very likely that they were commissioned by the pastor of MEZEI Mihály, the one who led the renovation works and, how else, if not based on the knowledge and vision about the world acquired at the Unitarian College in Cluj?

5 Conclusions

The two-century scientific dispute between geocentric and heliocentric models was settled in 1728, when the English astronomer James Bradley[21] (1692-1762) was able to find direct evidence of the Earth's motion. BRADLEY demonstrated by the phenomenon of light aberration that the Earth is the one that is in motion, that is, that this motion occurs around the Sun. Therefore, Aristarchus, Copernicus, and Galileo were right. However, the heliocentric works were finally removed from the index only after 100 years, in 1835.

It is possible that this painted box from Ocland was the first imagistic representation in Transylvania of the heliocentric system (apart from those in the specialized books). It was not an ordinary representation of the time, but a bold, relatively early appearance of the Copernican model of the universe. An indisputable proof in this sense is the image from Șurdești (fig.2), which, although made around the same time, still represents the geocentric model.

But there is other evidence to that effect.

The first book of philosophy in Hungarian appeared a year later, in 1772: Magyar nyelven Filosofia. In it, the Franciscan monk SARTORI Bernát, a native of Oradea, fought as valiantly against the Copernican idea as Martin LUTHER, 250 years ago. . In his book on philosophy, in the part about physics, the third question is whether the Sun or the Earth move?

> *Closing. The movement of the earth, as Copernicus teaches us, seems to oppose on the whole the clear words of Scripture.*
>
> [SARTORI, 1772: 186]

The first book on physics in Hungarian appeared in 1777, *A Természetiekről, Nevvton tanítványainak nyomdoka szerént hat könyv*, in which János MOLNÁR, among others, laid the foundations of the then-specialized Hungarian language in physics. In the book, the author describes the heliocentric system, but does so not because he considers it true, but:

> *To make things easier, we will follow the path of Copernicus and Newton, after which the Earth is also a wandering star.*
>
> [MOLNÁR, 1777: 156]

Most scientists no longer doubted the theories of COPERNICUS, KEPLER or NEWTON. But this scientific position had not yet penetrated the public consciousness, so until the end of the eighteenth century, the Copernican debate had not been decided unanimously. It was not until the beginning

[20] Published also in national geographic
[21] The same astronomer who also discovered the notational motion of the Earth's axis.

of the 19th century that the custom of COPERNICUS' theory being accompanied by the phrase "mathematical hypothesis" disappeared.

Considering all this, the image of the Copernican solar system, painted in 1771 on the ceiling of the Unitarian church in Ocland, seems to be a small "miracle": it is not just a curiosity of the time, but an open assumption, the first Transylvanian attempt to brings the Copernican revolution into the public consciousness. This is the image of the universe that the simple man from Ocland could see painted over his head, every Sunday, when he went to the church in the village.

References

[APÁCZAI, 1653] APÁCZAI Tsere Janos: *Magyar encyíclopaedia*, 1653, Ultrajecti.

[APÁCZAI, 1972] APÁCZAI Fizikai Szemle, Barta György: Kopernikusz hatása az emberi gondolkodásra, 1972/12,

[BARTA, 1972] BARTA György: *Kopernikusz hatása az emberi gondolkodásra*, Fizikai Szemle, 1972/12.

[BIBLIA, 2012] *Biblia sau Sfânta Scriptură*, Redactată de Bartolomeo Valeriu Anina, `http://www.biblia.pentruviata.ro/robible`.

[CELLARIUS, 1661] Andreas CELLARIUS: *Atlas coelestis seu Harmonia macrocosmica*, Amsterdam, 1661

[COMENIUS, 1793] Ioann. Amos COMENII: *Orbis Pictus/A' világ lefestve/Die Welt in Bildern*, 1793, Nyomtattatott Pozsonban.

[COPERNIC, 1543] COPERNIC, Nicolai: *De revolutionibus orbium coelestium*, 1543, Nürnberg.

[CSÍZIÓ, 1986] *Csízió*, Mezőgazdasági Kiadó, 1986, Budapest.

[GALILEI, 1699] GALILEI, Galileo,: *Systema cosmicum*, 1699, Lugduni Batavorum.

[GALILEI, 1962] GALILEI, Galileo: *Dialog despre cele două sisteme principale ale lumii*, Editura Științifică, 1962, București.

[GALILEI, 1983] GALILEI, Galileo, 1983: *Párbeszédek*, Ed. Kriterion, București.

[HONTERUS, 1984] Johannes HONTERUS: *Rudimenta Cosmographica / Elementele cosmografiei*, Editura Dacia, 1984, Cluj

[LUTHER 2017] LUTHER, Martin: *Asztali beszelgetesek (Discuții la masă)*, Helikon Kiadó, 2017, Budapest.

[MOLNÁR, 1777] MOLNÁR János: *A Természetiekről, Nevvton tanítványainak nyomdoka szerént hat könyv (Șase cărți despre natură, pe baza învățăturilor lui Newton)*, 1777, Pozsony és Kassa.

[RICCIOLI, 1651] RICCIOLI, Giovanni Battista: *Almagestum novum*, 1651, Bononiae.

[SARTORI, 1772] P. SARTORI Bernád: *Magyar nyelven Filosofia (Filosofia în limba maghiară)*, 1772, Egerben.

[SIMONYI 1978] SIMONYI Károly 1978: *A fizika kultúrtörténete*, Gondolat Kiadó, 1978, Budapest.

[UZA, 2014] Dan UZA: *Despre modelul cosmologic de la biserica de lemn din Șurdești*, Pași spre infinit/31, Asociația Astronomică „SIRIUS", Bârlad.

[ZAHN, 1696] ZAHN, Johann: *Specula physico-mathematico-historica notabilium ac mirabilium sciendorum*, 1696, Norimbergae.

[ZEMPLÉN, 1961] ZEMPLÉN Jolán: *A magyarországi fizika története 1711-ig*, Ed. Academiei, 1961, Budapesta.

[BODÓ, 2008] BODÓ Márta: Katolikus szerzetesrendek az erdélyi nevelésben (17–19. század), in *Művelődés* 2008/1-4, Kolozsvár

[DANKANITS, 1974] DANKANITS Ádám: *XVI. századi olvasmányok*, Kriterion, 1974, Bukarest.

[DÁNÉ, 1973] DÁNÉ Tibor: Kopernikusz időszerűsége, in *Korunk*, 1973/2, 233-8, Kolozsvár.

[DHANJAL, 2011] DHANJAL, Beryl: *Jelek és jelképek*, Ventus Libro Kiadó, 2011.

[FARKAS, 2009] FARKAS Gábor Farkas: *A magyar Kopernikusz* (conferință), 2009/február 28, Budapest, Polaris Csillagvizsgáló.

[FEHÉR, 2000] FEHÉR Katalin: Első magyar nyelvű illusztrált tankönyveink, in JÁKI László: *A szemléltetés* FOGARASI Annamária: A fizikatanítás a XVII. és XVIII. századi Magyarországon, 2000.

[GÁBOS, 2006] GÁBOS Zoltán: A harmadik erdélyi egyetem fizikusai, in *A Természet Világa* 2006/I. különszáma

[GÁL, 1935] GÁL Benedek: *A kolozsvári unitárius kollégium története (Istoria Colegiului unitarian din Cluj)*, 1935, Kolozsvár

[HAJÓS, 1973] HAJÓS József: Korai Kopernikusz-vonatkozásainkról, in *Korunk*, 1973/7, 1113-6, Kolozsvár

[HEINRICH, 19778] HEINRICH László: *Az első kolozsvári csillagda*, Kriterion, 1978, Bukarest, pag. 8–19.

[HELL] HELL Judit: *Iskolafilozófia a 18. századi Magyarországon*, Bölcsészet- és társadalomtudományi tanulmányok a Miskolci Egyetem Bölcsészettudományi Kar 20 éves jubileumára. pp. 29–36.

[HELTAI, 1986] HELTAI Gáspár: *CSÍZIÓ*, Mezőgazdasági Kiadó, 1986, Budapest.

[KIRCHER, 1660] KIRCHER, Athanasius: *Iter Exstaticum*, 1660, Nürnbeg.

[KOVÁCS, 1989] KOVÁCS I. Gábor: *Kis magyar kalendáriumtörténet 1880-ig*, Akadémiai kiadó, 1989, Budapest.

[MAKÓ, 1762] AKÓ Pál: *Compendiaria physicae institutio*, 1762, Vindobonae.

[NABOTH, 1573] NABOTH, Valentin: *Primarum de coelo et Terra*, 1573, Venetiis.

[PTOLEMAIOSZ, 1515] PTOLEMAIOSZ, Claudio: *Almagestum*, 1515, Basilea.

[REGIUS, 1664] REGIUS, Henricus: *Fundamenta Physices*, 1646, Amsterdam.

[SIPOS, 1991] SIPOS Gábor: *A kolozsvári Református Kollégium Könyvtára a XVII. században*, 1991, Szeged

[SZÉKELY, 2004] SZÉKELY László, 2004: A kopernikuszi fordulat és a kopernikuszi fordulat nyomán kialakuló új fizikai világkép Magyarországon, in PALLÓ Gábor: *A honi Kopernikusz recepciótól a magyar Nóbel-díjakig*, Áron kiadó, Budapest.

[SZÉKELY, 2004a] SZÉKELY László: *A kopernikuszi fordulat (Revoluția copernicană)*, Ed. Áron, 2004, Budapesta

[TORDAI, 1962] TORDAI Zádor: A magyar kartezianizmus történetének vázlata, in *Filozófiai szemle*, 1962, 69-71, Budapest.

[VARGA, 2008] VARGA Noémi: *Magyar nyomtatványok a XV. század végén és a XVI. században*, Tipográfiai Diákkonferencia, 2008 December.

[WIRTH, 1997] WIRTH Lajos: *Makó Pál élete és életműve* 1997, Jászberény.

[ZEMPLÉN, 1958] ZEMPLÉN Jolán: Régi fizikai kéziratok kutatása Erdélyben, *Magyar Tudomány*, 1958/Június, Akadémiai Kiadó, Budapest.

[ZEMPLÉN, 1964] ZEMPLÉN Jolán: *A magyarországi fizika története a XVIII, században*, Akadémiai kiadó, 1964, Budapest

[ZEMPLÉN, 1960/7] ZEMPLÉN Jolán: A kopernikánizmus és annak elterjedése Magyarországon, in *Fizikai Szemle*, 1960/7, 8, Akadémiai Kiadó, Budapest.

BOOK REVIEW

Newton Lee (Ed.): *The Transhumanism Handbook*

Springer Nature Switzerland AG, 2019

Ștefan TRĂUȘAN-MATU

Politehnica University of Bucharest

A reader can find in this handbook important information for understanding some of today's advances in technology and medicine, and especially the related transhumanism ideas, its aims, the philosophical, social, political consequences, which might influence the future of humanity and society, including perils that may occur. The volume contains texts written by more than 70 transhumanists from various domains. While most chapters of the book discuss about the necessary and possible evolution towards transhumanism, there are also included critical positions. In addition to transhumanism, very useful information may be found about artificial intelligence, medicine, and even cryptocurrency.

A revealing definition of transhumanism is given by the editor Newton Lee in the preamble of the book:

> *"Transhumanism offers the most inclusive ideology for all ethnicities and races, the religious and the atheists, conservatives and liberals, the young and the old regardless of socioeconomic status, gender identity, or any other individual qualities. (. . .) Transhumanism is the next logical step in the evolution of humankind, and it is the existential solution to the long-term survival of the human race."* (p. vii).

Therefore, transhumanism is viewed as a desired bright future that will be a kind of golden age where all ideologies, religions, science, political parties, all people will be in harmony, where also health problems and ageing will have a solution. To be sincere, I find this perspective too optimistic. Moreover, while transhumanist ideas and goals are materialized also in a political party (Chapter 5), this is a fact that might raise a signal whether the idea of a perfect society is not similar to ideas that drove to communism and nazism.

The editor Newton Lee has an outstanding record of achievements, including, among others, being the "longest-serving editor in chief in the history of the Association for Computing Machinery for its publication Computers in Entertainment (2003–2018)" and creator of a commercial Artificial Intelligence (AI) tool at AT&T Bell Labs. He is also the chairman of the California Transhumanist Party. Therefore, Lee is a person that has a strong background in Computer Science (CS) and AI, having also B.S. and M.S. degrees in CS and AI with Summa Cum Laude from Virginia Tech and also one of the main supporters of the transhumanism movement, even with the aim of transforming it in an influential political party, which promises to bring abundance (as detailed in the large Chapter 5).

The book has 66 chapters grouped in 8 parts, the first one ("Brave New World of Transhumanism") introducing basic transhumanism ideas and the next 7 dedicated to specific related domains: Artificial Intelligence, Machine Learning, and Superintelligence; Super Longevity and Rejuvenation; Biohacking and Mental Health; Blockchain and Cryptocurrency; Art, Literature, and Films; Society and Ethics; Philosophy and Religion. This structuring reflects the main recurrent themes in the book, which were also mentioned in the preamble: the possibility of achieving artificial general intelligence (AGI, that means AI that will be exactly as human intelligence, and beyond – the so-called "technological singularity", discussed in Section 1.5), and superintelligence; advancements in medicine for extending life and even making real the millenary myth of rejuvenation; the impact of transhumanism on economy, ethics, philanthropy, philosophy, and politics. In many chapters (even in the first page of the first chapter, written by Lee himself) is found also a concern to find transhumanism ideas and themes in religious writings, especially in Christianism. Many examples start from quotes from the Bible, which are interpreted in a posthumanist sense, for example, Lee considers that some episodes refer to superheroes: "Shadrach, Meshach, and Abednego were thrown in the fire; but they walked around freely in the fire, completely unharmed (Daniel 3:1–30). Samson was so strong that he tore the lion apart with his bare hands (Judges 14:5–6)" (p. 24). He continues the idea and writes that the statement of Jesus in Matthew 17:20 about achieving belief can be re-interpreted from a technological, posthumanist perspective.

The first part of the book (and the first chapter) has a title that adds "transhumanism" to the famous "Brave New World" dystopian book of Aldous Huxley [Huxley, 1932/1998], and starts with a motto from Julian Huxley, the brother of Aldous, an evolutionary biologist, eugenist, the first director-general of UNESCO, the founder of the World Wildlife Fund and the first that used "transhumanism" in the sense discussed in the handbook. Reading the chapters of this part is essential if someone wants to have a good image about transhumanism. The first chapter, written by Newton Lee, is a very good journey through some important ideas related to transhumanism. In Section 1.3, for example, is discussed the idea that we all may be considered transhumanists because we use prosthesis, organ transplants, medical advancements. The technological singularity is introduced in Section 1.5; the analysis of the future options for humanity, emphasizing the need of transhumanism is the subject of Section 1.6; philanthropy, democracy, ideology, existential risk, world peace, natural disasters and biohazards, the "Mother Earth", and the "mystery of the Universe" are presented in relation to transhumanism in Sections 9,10,13,16,17,19,20, and 21 of the first chapter.

Section 1.12 is of extremely importance because it contains the Transhumanist Bill of Rights, hand-delivered it to the U.S. Capitol on December 14, 2015, a new version being developed by the U.S. Transhumanist Party in 2016 (`https://transhumanist-party.org/tbr-2/`). This document is obviously created inspired from the United States Bill of Rights and one of its main new ideas is that humans are put on an equal place with "sentient artificial intelligences, cyborgs and other advanced sapient life forms" (p.19). Moreover, a third version was published, which defines "sentient entities" as: "(i) Human beings, including genetically modified humans; (ii) Cyborgs; (iii) Digital intelligences; (iv) Intellectually enhanced, previously non-sapient animals; (v) Any species of plant or animal which has been enhanced to possess the capacity for intelligent thought; and (vi) Other advanced sapient life forms." (`https://transhumanist-party.org/tbr-3/`) These additions seem, de facto, to consider humans as lower quality entities, fact that is the subject of many criticisms, especially from religious positions, fact explaining probably the many discussions in the volume on Christian ideas and quotes from Bible from a posthuman position. Moreover, the future of human life is viewed as driven only by pleasure, transhumanism being said that it "can turn this very life into a never ending amusement park", in opposition with the "deception of life after death", being "not an ideology for poor, hopeless and depressed" (Section 4.1). Eventually, the fact that the Transhumanist Bill of Rights is published by the U.S. Transhumanist Party and that an entire (the largest) chapter of the book is dedicated to it (Chapter 5) shows that there is a political program

towards the "Brave New World of Transhumanism", as prognoses the title of the first part of the book.

The other chapters of the first part include the history of transhumanism, including the current situation (Chapter 2). An evolutionary view, including the NBIC convergence is examined in Chapter 3. Religion, ethics, and other related topics, including a transhumanism manifesto and examples of projects are discussed in Chapter 4.

The second part of the handbook is a very good presentation of artificial intelligence. It contains 10 chapters covering important ideas such as testing AI, machine learning, human-machine symbiosis, superintelligence, beauty of AI artifacts, artificial intimacy, quantum computing, sapient and sentient intelligence, ethics of AI, conversational agents with AI, autonomy, etc.

Together with AI, progress in medicine is a major vector towards transhumanism. Therefore, the next chapters (16-27, Part III) are dedicated to super longevity, rejuvenation, gene therapy, health, the meaning of life and related subjects. The transhumanist perspective of biology and life from these chapters is continued in the next part (Chapters 28-32) with discussions related to the topics of cyborgs in the arts, sciences, and medicine.

The new collaborative, decentralized technologies for security assurance and finance (blockchain and cryptocurrency) are considered as very important for transhumanism as an entire Part V, with three chapters, is dedicated to this subject. I found very interesting this inclusion, but probably not unexpected if viewed from the present-day fashions of using social networks and other related to internet applications, which promote collaboration and attitudes against authorities, which are related to transhumanism ideas.

The last three parts (VI-VIII) of the handbook are dedicated to very important domains of human life: art, literature, and films; society and ethics; philosophy and religion. In the chapters of these parts I found interesting positions, some of them criticizing transhumanism. However, art, literature, and films are discussed mainly in the context of science-fiction and robotization, including the controversial subject of love and intimacies with robots, the latter theme being not unexpected if we consider the idea of the Transhumanist Bill of Rights that humans and AI (robots) should be considered equal. Other subjects that many can find controversial are the Christian transhumanism and Christianity as transhumanism (Chapter 61).

To conclude, the handbook is very dense, it has interesting and useful information about recent achievements in AI, computer science, medicine, about perspectives on science-fiction literature, philosophy, and religion. Many referred facts in the handbook are correct but I found at least two there are incorrect: Julian Huxley was not a Catholic priest (p.51), and it is not true that the essay Religion Without Revelation was reprinted in his book New Bottles for New Wine (p.69). There are many exciting ideas but some of them need require attention and a passing through the personal thought filter.

References

[Huxley, 1932/1998] A. Huxley (1932/1998) *Brave New World*, HarperCollins Publishers.

[Huxley, 1927] J. Huxley (1927) *Religion without revelation*, Harper.

[Huxley, 1957] J. Huxley (1957). *New Bottles for New Wine*, London, UK: Chatto & Windus.