TRANSCENDENCE AS A UNIVERSAL PARADIGM

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Abstract

The idea of transcendence is approached and discussed from a large variety of perspectives. Beginning from its etymological explanation, the concept of transcendence, as it is employed and understood in philosophy, music, theatrical art and - especially - mathematics, is thoroughly and most subtly analyzed. Starting from quite common, easy-to-understand examples, an abstract demonstration - involving essential philosophical notions - is brilliantly developed.

Keywords: *mathematics, transcendence, music, philosophy, human aspiration*

The theme I am here analyzing is a delicate one, indeed. My meditation appears to be more as a series of questions and hypotheses, offerring no definite solutions and certainties, so that I sould not attempt at convincing you but rather at making you meditate a little on the problem. First of all, I want to express my gratitude to the host of this University, Professor Vasile Burlui, President of Apollonia University, who, for several years, has been interested in my intellectual labour - which challenges me not to disappoint my audience. I am also indebted to my colleague, Professor Mina Rusu – the most indicated person to provoke me to a disscusion upon transcendence, as the author of a PhD thesis treating the poetics of the sacred.

OVERBIDDING TRANSCENDENCE

Nowadays, the idea of transcendence has been overchallenged, so that, from a problem initially related exclusively to God, it acquired numerous new meanings, in quite various domains: films, novels, jazz albums, corporations, game companies, poems, sites and blogs on the internet, the name of most varied doctrins and/or philosophical currents – to cite here only the *transcendent meditation*, which agitated the communist bureaucracy of the 80'ies. Faced with such an inflation, the only solution is to take distance and to develop a manner of thinking capable of understanding its very source. Prefix *trans* itself is now largely used in all fields: transport, transmission, transformation, transplant, transparent, to transgress, the English term *translation* itself also includes particle *trans*, transdisciplinarity, a.s.o., a.s.f.

TRANS SUGGESTS ASSCENT; PAY ATTENTION TO CHILDREN

Where does prefix *trans* come from? Obviously, from Latin. It is a prefix rich of significance, meaning *beyond.* It is followed by a Latin verb, *scand-o, um, ere,* meaning what? Meaning *to ascend*, *to mount*, *to climb*. Immediately, this reminds us – in any case, it reminds me – of childhood, when my most ardent passion was to climb the iron gate of our courtyard, fences, trees, pillars, as any child does, once in full possession of its arms and feet. The image of the child delighted by the simple action of climbing up, of mounting in any way, going up, ascending, crawling to reach the top should be always present in our minds if we want to really grasp the hidden meanings of transcendence. We should necessarily realize the extent to which the need for transcendence comes from the depth of the human being, from its entire heredity and long history.

THE NEED OF *GOING BEYOND*, OF *ASCENSION (UPWARDS)*

Returning to prefix *trans* – how can one explain this need of going *beyond*? It expresses the unrest, the dissatisfaction, the ardour, the curiosity of the human being. Man is never satisfied with his life, he always wants more, eager to reach farther, lofty places. The verb derived from it suggests the action of *rising*. There results from here that the decison of acting is motivated by one's anxiety. The disquiet condition expressed by prefix *trans* is always followed by the decision of *acting* for satisfying this impulse and, implicitly, risk taking, once known that climbing a pillar, a fence may be dangerous – one may fall down, get hurt, etc. Why children's knees are always scratched? Apart from risks, some *failures* are always possible. However, people do not give up, they insist on experiencing this endeavour for physical rising, a unique aspiration possible at the level of their understanding and feeling things. Consequently, it is the need to go *beyond* and no other abstract need, completed by such type of *action*, as well as the possible *failures* accompanying it.

LIVING BETWEEN THE NEED OF COMPETITION AND THE NEED OF UNDERSTANDING, OF LEARNING

Why all these impulses? Are they urged by a blind need of competition or by the deep desire of understanding both the world and our own self. This is the great alternative, once known that some human beings transform such actions into a work made for its own sake, with no lofty scope in view, *simply a blind competition for the sake of competition*. Fortunately, another variant is also possible: to embark upon a transcendent action driven by *the irrepresisble need to understand the world and our own self*. This second variant of the alternative creates *the need to learn, to assimilate culture as much diversified as possible, making us capable of climbing upon the shoulders of those who taught us and to see more and farther than they did*.

THE TWO COMPONENTS OF TRANSCENDENCE

Mircea Eliade noticed an essential aspect: the sacred is not only a historical stage in the evolution of the human being, it is an indispensable ingredient of one's spirituality. Such an observation justifies the question: is it possible to extend Eliade's saying to the more encompassing (you will see in the following how embracing it may be) paradigm of transcendence in all its generality, variety and richness? At the same time, the need for equilibrium isevident. A component of this striving for transcendence involves a power outside us, expressed as expectance, hope, prayers addressed to a force higher than us. Nevertheless, this component should be balanced by an action not involving the intervention of a power greater than us, anymore, but exclusively our own forces, our diligent attitude of taking action by ourselves, in the various fields of transcendence.

THE NEED OF TRANSCENDENCE DEFINES US AS BEING HUMANS

According to the definitions from several encyclopaedias, the term *transcendence* appears related to three domains: theology, philosophy and mathematics. As everybody knows, the theological significance of the term refers to Divinity, to God, represented as an entity transcending the universe of our comprehension, equally hiding himself and present all the time. At the same time, transcendence may define a God transcending human comprehension, existing beyond the capacity of the human mind. Also essential is that the notion of *transcendent* can be grasped exclusively together with its pair word, the *immanent*. Therefore, *immanent-transcendent* or (even if they may not be perfectly equivalent), in the terms used by Eliade: *profane-sacred*. In all these pairs of terms, one can grasp both of them, or none. No third alternative is at hand. The main problem – on which I shall insist later on – is: are these binary oppositions frail?

Or are they gradual oppositions? Is shifting from *immanent* to *transcendent*, from *profane* to *sacred* a sudden, frial movement, or is it gradual, smooth? In my opinion, based on the key in which I assimilated the old culture, the second variant would be true. I should rather say that the paradigm of transcendence is more ample than that of Divinity – for example Buddhism provides representations of Nirvana type, namely a transcendent, eternal condition, yet devoid of any divine attribute.

TRANSCENDENT AND TRANSCENDENTAL

In the philosophy of Aristotle, God is beyond the world, bestowing to the universe its first movement from *beyond* where He is. In the opinion of Gilles Deleuze, closer to our times, God is immanent, he dwells in the world. Kant proposes a very interesting duality: *transcendent-transcendental*. *Transcendent*, namely – beyond any possible human knowledge, while *transcendental* refers to the possible knowledge of an object prior to any experience involving it. An extraordinary thing should be here mentioned - later on discernible along the whole history of transcendence – namely that transcendence involves not only its destination but, equally, its origins. On one hand, Kant states that *transcendence* refers to what is beyond any possible human knowledge; on the other, the notion of *transcendental* involves the root of knowledge.

TRANSCENDENCE: TO THE SOURCE OR TO ITS DESTINATION

We, the humans, have continuously enriched our knowledge by our human endowments, being nevertheless fully aware that several issues still remain undisclosed to us, that they are *beyond* us, they refer to an *afterwards*, to the *destination*. However, there also exists a transcendence referring to the origins of knowledge, to things given to us through our heredity, things with which we are born. For example, according to Kant, space and time would be aprioristic categories, present in us prior to any experience lived by us, which is an extremely interesting aspect, to be resumed in the following. Transcendence to destination extends , continues, enriches human experience; transcendence to the origins goes before human experience. In 1940, Aram Frenkian published in Paris (at Librairie Philosophique J. Vrin), a book entitled *Le postulat chez Euclide et chez les modernes*, in which he puts forward the hypothesis of a possible initial knowledge, preceeding any experience, which comes from the roots, but which, along our evolution, was lost and we are now striving to regain it.

DID PERFECT KNOWLEDGE EVER EXIST?

... Or it never existed, and what we use to call perfect knowledge is only the one we strive to attain at some time or another? Famous mathematicians give credit to the first variant. For example, Paul Erdös speaks about *The Book*, with capital *B*, even if all important theorems and the most significant challenge of all mathematicians is to discover theorems from this *Book* with capital *B*. The bet of Galileo Galilei refers to the impossibility of knowledge outside mathematics. Therefore, *The Book* is not an already wrritten one, but one under continuous writing and re-writing, which suggests that it will be never finished.

COMPLETE OR INCOMPLETE KNOWLEDGE

Here is another challenge, which attracted the special interest of Romanian philosophers and mathematicians. For Noica and for Mihai Şora, total knowledge exists – mathematical knowledge possibly belonging to this category. The theorem of Pythagoras needs no completion, nothing to be added. However, there will always exist the so-called knowledge ”with rest”, always incomplete, such as, for example, philosophical knowledge, art, poetry. I do not agree with this, as I believe that, even in the field of mathematics, knowledge is never complete, the proof being that the debates on the axiomatic roots of mathematics never end, mathematicians and logicians arguing on the axioms of the set theory which, in the opinion of the latter ones, should be revisited for not leading to an undecidable hypothesis of the continuum. Without insisting on this , I'd rather say that human knowledge without rest does not exist – which actually explains its fascination.

TRANSCENDENCE IN MATHEMATICS, EULER

As far as I know, the first mention of transcendence in mathematics appears in the 18th century, the initiator of such a topic being Leonhard Euler. Nevertheless, even in the moment I was completing this study, my colleague, Profesor Dragoş Vaida, informed me on a note according to which the first who mentioned transcendence in mathematics was Leibniz: Herbert Breger, "Leibniz Einfuhrung des Transzendenten", in: 300 Jahre "Nova Methodus" von G.W. Leibniz (1684-1984). *Studia Leibnitiana*, Sonderheft XIV, 1986, p. 119-132. The reference to Euler is: Bruce J. Petrie, "Leonhard Euler's use and understanding of mathematical transcendence", *Historia Mathematica* 39 (2012), 280-291. *A first hypothesis on a possible common denominator of transcendence in theology, philosophy and mathematics will be put forward*. Euler does not refer directly (as later on, in the 19th century) to transcendent numbers, but only indirectly, by means of transcendental operations. The non-transcendent arithmetical operations are addition, subtraction, multiplication, division, exponentiation and square root extraction, applied both to whole numbers and to those obtained from them by means of such arithmetical operations. Why are these arithmetical operations non-transcendent? As, for example, all numbers to which they lead represent solutions to some equations, defined as algebraic equations, expressing polynomial structures in which all the above-mentioned arithmetical operations are applied to a finite number of cases (stress being laid on term *finite),*once known that, as no application of a finite number of cases gives results, any more, one enters the domain of transcendence. Therefore, a possible, rapid suggestion at hand is that, in mathematics, the idea of transcendence is essentially related to the idea of infinity. Not any type of infinity. For Euler, the gate permitting access to mathematical transcendence is represented by the differential and integral calculus. Why does Euler state that exponentiation *a to x*, the logarithm, the trigonometrice sinus-cosinus trigonometric foundations are all arithmetical operations, transcendent functions? Because they are immediately associated, in one way or another, with the idea of integral, with expressions in which the integral is present (for example, the logarithm is associated with the integral of *dx/x*). Obviously, this is only a very synthetic discussion on a very complex issue. For Euler, function log(x) + 7 is transcendent, while log(7) + x is algebric.

THE GRADUAL SHIFTING FROM NON-TRANSCENDENT TO TRANSCENDENT

The assertion on the gradual shifting from non-transcendent to transcendent affects rigour, yet favours understanding. There exists in mathematics the case of irrational numbers, where the term *irrational* might suggest transcendence, however, it is immediately completed with the word *algebric,* actually the denial of the transcendent, such as the square root of 2. One may consider the algebric irrational numbers as a bridge, an intermediary between non-transcendent to transcendent – which is not exactly rigorous, yet suggestive. Another observation is that, no matter how deceiving the terminology applied in mathematics would be, we accept the idea of rational numbers, such as, *e.g.*, 2/3, or -3/7, and also of irrational numbers, being tempted to associate such irrational numbers, for example the square root of 2, with something which is beyond the rational.

LIOUVILLE NUMBERS – A FIRST EXAMPLE OF TRANSCENDENCE IN MATHEMATICS

Joseph Liouville is the first who, in 1844, succeeded in providing examples of transcendent numbers. By this important discovery, Liouville introduced a class of real numbers, to be later on defined by his name. A real number *x* is a *Liouville number* if, for any whole number *b* higher or equal to 2 and for any infinite row of whole numbers (*a*1, *a*2, .., *an*, ...) there exists a strictly positive whole number *k*, so that x should be the sum of the series which has as a general term the ratio between *ak* and the exponent power *k* (factorial of *k*, namely the product of all whole numbers from 1 to *k*) of *b*. For *b* = 10 and *ak* = 1 at any *k*, x becomes the *constant of Liouville*. In relation with his numbers, Liouville demonstrates, in the same year: 1844, that they are not algebric. This was the first example of real, non-algebric numbers. Another presentation of Liouville numbers considers the manner in which they are approximated by means of rational numbers: *x* is a Liouville number if, for any natural *n* there exist *p* and *q* whole numbers with *q* higher or equal to 2, so that the absolute value of the difference between *x* and *p/q* is ranging strictly between zero and the ratio between 1 and the exponent power, *n,* of *q*. It is therefore obvious that Liouville numbers are privileged by a close approximation by means of rational numbers.

TRANSCENDENCE AS A PROCESS

The manner in which the rational numbers are busily ″running″ to get close to transcendent numbers show that *transcendence processes* occur even in the infinite approximation row of transcendent numbers. Such a situation suggests that transcendence might be viewed as the result of an asymptotic process in which all stages are developed inside the terrestrial universe (in the opinion of Mircea Eliade, in its profane area), even if the infinite number of these stages prevents their real time examination. Such an approach supports the hypothesis on the absence of a fragile delimitation between the transcendent and the terrestrial zone. The relation between Liouville numbers and other important classes of real numbers has been recently studied by C.S. Calude and L. Staiger (″Liouville numbers, Borel normality and algorithmic randomness″ *CDMTCS-448*, Auckland, December 2013), the observation made being that Liouville numbers occur in some remarkable classes of real numbers, but only as exceptionally rare phenomena.

FRACTAL OBJECTS, A METAPHOR OF TRANSCENDENCE AS A FAIRY TALE

A significant illustration of transcendence as a process is provided by the fractal objects of Benoit Mandelbrot. Starting from the simplest objects of elementary geometry, such as the line segment and the circle, there are analyzed asymptotic processes which may finally lead to fractal objects, *e.g.* the curve of Koch, the mathematical model of the snow flake; similarly with this one, the fractal is and, at the same time, it is not. It is present by the history and manner in which it was generated. However, this is an endless story, as it involves an infinite number of stages, out of which us, the mortals, can live only a finite (even if not limited) number. We acquire the ″taste″ of fractal infinite, ″trace our prey″, actually imagining it as a process expressing something that transcends the sensorial-intuitive universe, once known that the fractal objects are invisible, somehow ″impossible″ (who has ever see a curve with no tangent, in noone of its point?). One may say that we have here the ″robot image″ of transcendence, as far as such a notion is acceptable. Transcendence is and it is not, it is close to us and far from us, it is somewhere in us but, at the same time, it is very distanced. By all these antagonisms, transcendence challenges us to go beyond our limits, while it defines us as creative beings. Asymptotic processes are occurring everywhere, not only in the domain of fractal geometry – mention in this respect might be here made, for example, of the dynamic systems, whose attractors, in many cases fractal structures, prolongue the metaphorical understanding of transcendence.

MATHEMATICAL IRRATIONALITY DOES NOT OPPOSE REASONING

Involved here is a trap as, if judging etymologically, the word *rational*, applied to rational numbers, does not refer firstly to reasoning. In a 100 year-old Latin-Romanian dictionary (elaborated by Stăureanu, ″Scrisul Românesc″ Publishing House of Craiova), 13 different meanings were attributed to term *ratio-rationis,* namely: science; learning; calculations; business regulation; accounting; commercial relations; interest; advantage; consideration; counting; care; reasoning; thinking; motif; regulation; order; method; ratio. Such an extraordinary variety demonstatres that the irrational is not something opposed to reasoning.

OTHER STRANGE ASPECTS OF MATHEMATICAL TRANSCENDENCE

Several other philosophical puzzles involving mathematical transcendence may be mentioned. I insist on the fact that – unfortunately – transcendent numbers are absent, today as well as in my student years – from the curricula of mathematics, in both high school and university. A strange, indeed, phenomenon should be mentioned here. One might expect that transcendent numbers, such as, for example, number *pi*, number *e*, should be – in a way or another – more different from the rational numbers than the algebraic irrational ones. However, if considering the approximation by means of rational numbers, things are wholly different.

One should also observe that the transcendent numbers are more numerous than the algebraic ones, ″more numerous″ meaning, in this context, a metaphorical prolongation of the term, from the finite up to the infinite. Mathematicians express this as: ″Algebraic numbers form a countable set, whereas the transcendent ones form a set of cardinality of the continuum″.

ANY MATHEMATICAL THEORY MAKES USE OF TRANSCENDENCE

One of the most representative mathematicians of the 20th century, I.M. Gelfand, who died a few years ago, at an almost centennial age, made a very important assertion on the role of transcendence in mathematics. Discussing with mathematician Bertram Konstant (see pages 38-39 of Vladimir Retakh, editor: ″I.M. Gelfand″, *Notices of the American Mahematical Society*, vol. 60, no.1, January 2013, p. 24-49), on commenting the contribution of his interlocutor to the introduction of a function of relative partition in a certain Cartan-Weyl theory, Gelfand observed that: ″Any valuable mathematical theory should include at least one of the so-called «transcendent» numbers, capable of expressing its most subtle aspects″, on also adding that: ″According to the Cartan-Weyl theory, such a transcendence element is the partition function introduced by you″.

In my opinion, this is an observation which would deserve extended philosophical debate.

A POSSIBLE COMMON DENOMINATOR OF THE VARIOUS TYPES OF TRANSCENDENCE

I have the impression that infinity is the key for a possible common denominator of transcendence in theology, philosophy and mathematics. On which grounds is such a feeling based? On the fact that, if shifting from the immanent to the transcendent is possible through a finite number of steps, then the respective finite number of steps might represent a possible human experience. Or, the very definition of transcendence places it beyond any possible human experience. It goes without saying that this is not a suggestion, or a most rigurous demonstration. All I want is to make you think on it. As I shall demonstrate in the following, the whole body of knowledge of Antiquity involved a close interweave of myths and science, a cocktail of myths and mathematics, myths and poetry, the end of one and the beginning of the other being quite difficult to establish.

WHAT ABOUT TRANSCENDENCE IN MUSIC?

What should be said about this? In the opinion of Sergiu Celibidache – another personality of Iasi – see his *Pédagogie de la Résonnance* (*Phénoménologie du son*), this would be the *need to reduce to the unit the multiplicity of parameters of a musical work*. He used to see the truth of music beyond emotion, considering that the *essence of music transcends its subjectivity. However, such objectivity of the transcendent truth in music induces musical emotion by its very communication.*

Celibidache used to lay stress on the educational side, aiming at developing, together with his orchestra, an act of education, thus following the ideas of Edmund Husserl. Why did Celibidache refuse to record his musical works for subsequent comercialization? Because he firmly believed that *a listener cannot live a transcendental experience* (these are his terms) outside the concert hall. He believed in Zen and in Buddhism. He laid stress on creativity, being convinced that a concert may create the optimum conditions for what he used to call a transcendental experience (as he used, alternatively, both terms: transcendent and transcendental, I could not establish a general rule). Another example is that of an inspired Romanian stage director: Andrei Şerban, whose creations are based on a similar philosophy, a similar paedagogy, obviously applied to theatrical works.

A disciple of Celibidache – Elisabeth Sombart, the author of *La musique au coeur de l'émerveillement*, translated into Romanian (*Muzica în inima fascinației*, Ed. Spandugino, 2012), and also of *Pour que les sons deviennent musique* (in print), once again enriched with the *phenomenology of sound*, as well as with a *phenomenology of gesture* (Hilde Langer-Ruhl), analyzed minutely the idea of transcendence and of transcendental experience.

LEVINAS: TRANSCENDENCE AS ESCAPISM

In this point, one should necessarily cite philosopher Emmanuel Levinas who, profoundly influenced by Husserl, proposes, in his *Phénoménologie*, the notion of *escape* for *transcendence*, that is: transcendence as evasion (*On escape - De l'évasion*, 1935 – "the relation between the embodied *self* and the intentional *ego*", in relation with the manner in which Heidegger approaches the notion of time and transcendence). Escape from what? From one's own body? Here, he continues the ideas of Heidegger. But, where the need of evasion comes from? Things are much more complicated, so that I will focus on an aspect probably left aside by Levinas. I believe that, in most of the cases, one's need of escape represents the only alternative for a deep understanding of the domain from which one has escaped. As a mathematician, I will discuss examples taken over from mathematics. Why did mathematicians escape from the world of the real numbers? Because they realized that, once remaining inside it, they had no possibility of thoroughly understanding them. If not escaping in a more ample universe, that of the complex numbers, we should not have been able to understand the second grade equations which, even if having integer numbers as coefficients, may have roots not belonging to the real world, any more. The examples may continue.

ESCAPING, AS A NEED TO UNDERSTAND THE WORLD

Why had Einstein to escape from the tridimensional universe? Because he realized that he will never fully understand it, nor the intricate nature of gravitation if he is not in the position of investigating a much larger universe, that of space-time, which would permit grasping of the real nature of gravitation, that of space-time curvature. I could cite thousands of examples of escaping provoked by the need of knowing the domain from which one escapes. A world cannot be really understood if one is not placed inside a larger one, permitting to look at the former from a more distant, outward position. We need to escape our sensorial world exactly for better understanding it. Consequently, a genuine scientific and artistic creativity is attained exactly by this type of escape. We need to leave behind us apparently absurd, illogical, etc., universes.

THE MACROSCOPIC UNIVERSE AND THE NEED TO TRANSCEND IT

Therefore, involved here is not an adventure for the sake of adventure, but an adventure caused by the need to understand, on one hand, the world, our own self, on the other. The whole history shows that, in most cases, understanding of certain processes and phenomena is favored by a vision originating from a larger context than the one in which the respective phenomena and processes occur. In this way, transgressing our empirical, sensorial world, we could discover, one hundred years ago, that what we used to consider as the whole universe was only part of it, the part we are now defining as the *macroscopic universe,* corresponds to the Euclidian universe (in which the spatial relations are those described by Euclid's geometry), and to the Galileo-Newtonian one, if considering the empirical-sensorial manner of understanding the time, forces, movement and energy. To grasp the relativistic world of the huge sizes and speeds we need another vision of the space, the one based on non-Euclid geometries, we need to understand the time, forces, movements and energies different from those characteristic to the mechanics and physics of Galileo and Newton, we have therefore to transgress, to transcend two highly familiar to us types of perceiving the world, as they correspond to the hereditarily transmitted empirico-sensorial perception.

CAN HUMAN LANGUAGE BE TRANSCENDED?

Another extremely important form of transcendence, hardly taken into consideration, is the need of transcendence which pushes us beyond the human language. In the XVIIth century, human language had to face an extreme crisis; Galileo, Newton and Leibniz are the representatives of a culmination through which the scientific language, in its mathematized form, was doomed to acquire an artificial component, based on symbols and formulas different from the usual language, impregnated with "impurities" resulting from its spontaneous and inevitably casual nature, not compatible with the precision and rigour imposed by science, any more. This new difficulty has been successfully overcome by the development of a mixed mathematical language, involving a natural, as well as an artificial, increasingly formalized component. This was also the moment in which not only the natural language, but the human language, viewed as a whole, in all complexity of its natural or artificial, formal or non-formal characteristics, was facing an unprecedented challenge: the need of being transcended.

A PANIC OF HISTORICAL DIMENSION: THE POWERLESSNESS OF THE LANGUAGE

The 20th century witnessed a new crisis, much more serious and, apparently, with no solution at hand: the awareness that, while the human language was well-fitted for understanding the Euclidian and the Galileo-Newtonian world, generally, of the macroscopic universe, being capable of linguistically expressing all relations established in the world of Euclid and equally in that of classical physics, the logics of Aristotle viewing human language as highly suitable, all logical situations finding their equivalent in similar situations of the human language, always prepared to adequately express them – not accidentally most of the grammatical relations have their correspondent in logics -, the situation was wholly different as to the understanding of the quantic world. We were all panic-stricken, we all experienced a historically-sized panic when we had to accept that the human language was not prepared to express the realities of the quantic world.

A MAJOR CHALLENGE: TO TRANSCEND THE UNIVERSE OF EMPIRICAL, SENSORIAL PERCEPTION

Mention should be made here of the profound reflections of Niels Bohr (see the Romanian version of one of his most important works: *The atomic theory and nature deciphering*, translated by Maria Ţiţeica, Bucureşti: Humanitas, 2013), who was not only a great physician, but also a remarkable linguist. The crisis of language in quantum physics was also analyzed by T. Bergstein: *Quantum physics and ordinary language* (Macmillan, Oxford, 1972) and David Favrholdt: "Niels Bohr's view concerning language", *Semiotica* 94 (1/2), 1993. The observation made was that the validity limits of human language are those of the macroscopic universe, in which a clear-cut difference occurs between the subject and the object, in which the cause-effect determinism, the discrete-continuum duality, the logics of Aristotle, based on the principle of identity, of non-contradiction and of the excluded middle are actively involved. The significance, and not only, of some of these restrictions will be analyzed in the following.

TRANSCENDENCE, A FUNDAMENTAL HUMAN NEED

Which is the common element of the above-described limitations, which challenges us to go beyond them, to transcend them, an aspiration which defines us as humans, a need to grasp the world in all its size and complexity? The answer is unbelievably and disarmedly simple: Euclidian geometry, Galileo-Newtonian physics, Aristotle logics, the human language, the cause-effect determinism, the discrete-continuum duality, the macroscopic universe and other restrictions – not mentioned, any more, as they are too technical for the area of the present essay (see, in this respect, my study: ”Starting from the Euclid – Bolyai – Einstein scenario”, *Synthese*, on line version, September 2013) - have in common the fact that they are predominantly agreeing with the empirico-sensorial human perception, they model it and are intuitively oriented by it.

HOW DIFFICULT IS TO LEAVE BEHIND THE EUCLIDIAN VISION!

Mention should be made of the fact that, apart from its Euclidian side, the human language of the non-Euclid geometry world is in crisis. It has difficulties in expressing the situations characterizing the two theores of relativity, where exactly the non-Euclid geometries are valid for defining space relations. A single example will be sufficient in this respect. An important shortcoming of the present day school is that it does not teach the most suggestive and significant aspect of Euclid geometry, even if it has been known as early as the17th century, namely the postulate of the parallel lines is equivalent with the fact that similar, yet non-congruent structures do exist. Consequently, one should mention the occurrence of circles of most varied sizes, all similar to one another, the same situation being observed for all spheres, all cubes, all squares. However, such similarity relations are no longer possible in the non-Euclidian world in the absence of a congruence relation, which makes us realize how difficult – if not even impossible – is to have the representation of a world in which some things (so highly familiar to us that we are not capable of realizing their absence) have disappeared.

ANOTHER CHALLENGE: TO TRANSCEND THE REPRESENTATION OF THE COMMON CALCULATION IDEA

A fundamental exercise for the human mind is that of making calculations, from the elementary one, the arithmetical operations children have to learn in their first school years, up to the most advances ones, developed by mathematics, logics and informatics. Representation of the calculus, as perceived by human experience, was modelled mathematically, the notion defined as *the hypothesis of Church*, then as *the Church-Turing hypothesis*, expressing the conviction that the mathematical model proposed (starting with the third decade of the last century), under various, actually equivalent names (*recurssive function, algorihtm, Turing machine,* etc.) for the empirical calculus operation, considered all its general characteristics, covered all possible modalities in which people can calculate. The Turing machine, introduced by Alan Turing in the mid fourth decade of the last century, prepared and anticipated the electronic, program-based computer of the year 1948.

Nevertheless, in the moment in which Einstein’s relativity was studied in its two variants – in this respect, I would mention my participation, more than one year ago, to an international symposium devoted to *logics and relativity* – it was observed that, only apparently surprisingly, analysis of relativistic logics contains systematically anti-Turing calculation concepts. Going beyond the Turing border – a highly actual aspect nowadays – appears as a challenge we should expect to face each time we transgress, in one way or another, the macroscopic universe. We are still in a speculative phase, when it is quite difficult to imagine an idea of calculus transgressing our terrestrial condition. Yet, in many situations, humans showed that they may act as gods.

THE ORIGIN OF TRANSCENDENCE: MATHEMATICS AND LITERATURE – THE ”DAUGHTERS” OF MYTHS

The literature of Homer and the mathematics of Thales and Pythagoras are, indeed, the daughters of myths, making the transition from myths to history. The symbolisation function is assumed by both Homer and Pythagoras, who took it over from the ancient myths. The need for fiction is manifested in myths, in literature and in mathematics altogether. *Euclid's Elements* situate us, from the very beginning, in a fictional universe, by the manner in which two central characters, *the point* and *the line,* are viewed. Numerous books, dedicated to ancient science, illustrate the transition from myths to science. The same holds true for the hollografic principle; the need to correlate the Anthropos and the Cosmos, the individual and the world, the local and the universal is a constant presence in myths; the need for metaphor, allegory, parable is essential in both myths and religion, expressing the closeness to transcendence. All these manifestations are also reflected in literature, in mathematics, the need for tale is essential in any domain. The holografic principle is a key element in literature, and equally in mathematics. Under which crcumstances is a local structure capable of taking over the functions of the total? The notion of analyticity in the study of mathematical functions, dominating in the 19th century, expresses the manner in which the local behaviour of a function may explain its global behaviour, manifested over its whole definition domain.

NO ONE CAN LIVE WITHOUT TALES

It is extremely suitable to remind here a work which really delighted me, namely the book of Andrei Pleşu, *The parables of Jesus, the truth as a tale* (Humanitas, 2012). Ample space is here devoted to the importance of the epic genre, to tales, in the understanding of truths for whose grasping logical, rational knowledge by itself is not sufficient. Arguments supporting the importance of the story, demonstrating how the tale excels in situations in which the logical argument fails, are provided. Andrei Pleşu states that (p. 17 op. cit.): *The tale has a life, a body of its own, its own flesh and respiration. It offers a gallery of portraits, landscapes, current facts and circumstances, broken soles, hopes, disappointments and euphoric feelings, which are easily neglected, by its very nature, in any conceptual discourse* [...] p. 18: *The discourse is argumentative. The tale is indicative, it does not analyzes a theory, it simply describes a certain situation*. He pleads for the paedagogic function of the tale, which nobody can deny [...] p. 19: *Compared to the logical argument* - states Pleşu – *the story is what image is versus concept*. However, in a certain moment of his plead in favour of the tale and against the logical argument, Pleşu feels that he could have equally analyzed situations in which the logical argument cannot be substituted by the tale. He also implies that no approach in which stress is laid on the competitive aspect of the tale-reasoning relation may be accepted as optimum.

THE NEED OF EQUILIBRIUM BETWEEN TALE AND LOGICAL REASONING

The best solution is to understand, to accept their complementarity. Pleşu mentions Noica, who stated that philosophy lost its epic essence. Philosophy should regain the narrative dimension, which Noica actually achieves in his *Tales about man (1*980), an attempt at redeeming Hegel. If, in a first stage of his demonstration, Pleşu might suggest that logical reasoning should be replaced by the tale, later on he openly admits that the tale does not substitute logical reasoning, it only completes it (p. 21): .. *truth is not manifested exclusively as equations and theorems, as mechanical rules and unflexible rules, as sylogisms and rocky assertions, expressed mainly as ”Russian” questions*. By Russian questions he means the questions asked by Dostoievski – *which is the meaning of life?, why are we living?,* which brings us on the verge of an acute crisis: of the understanding and, ultimately, of the language. In this context, Pleşu is entitledly asserting that he does not attempt at replacing the logical argument with the tale. Obviously, this is impossible, possible is only to re-establish an equilibrium between them. Pleşu knows that the need for metaphor, parable, story is manifesting in all sciences – on this context, he mentions (p. 20-21 loc. cit.) corpuscules and black holes; to support the presence of the parable in science, he cites Hans-Peter Durr, *Auch die Wissenschaft spricht nur în Gleichnissen*. *Die neue Beziehung zwischen Religion und Naturwissenschaften* (Marian Oesterreicher, ed.) Herder, Freiburg-Basel-Wien, 2004. I agree with him.

SCIENCE HAS A VITAL NEED FOR TALE AND METAPHOR

One of the greatest shortcomings of education is that it excluded, or, at least, it neglected the tale, marginalised the epic essence and the metaphor, left aside the parable when teaching various scientific disciplines. In the field of mathematics, this is a tragedy. Let us compare the pleasure of narrating of Gh. Lazăr, in his 200 year-old *Trigonometry*, with the manner in which, in our days, mathematical education eliminated the history, the story, the epics, replacing them with rigid, very difficult to understand schemes.

Let us not absolutize things. The history of science has been a continuous balancing between rigour and meaning, between corectness and significance, between the attention paid to the syntax and to the stress laid on semantics. We should be always aware of their necessary equilibrium, in both science and philosophy. We need the tale, the parable and the metaphor not only for coping with the ”Russian questions” – the term which Pleşu gives to the existentialistic questions - but also with the questions naturally issued in science or in philosophy, be them ”Russian” or ordinary, every day ones.

A MASTER OF THE METAPHOR, TALE AND DRAMA: JAMES CLARK MAXWELL

A few years ago, an extraordinary book was published by Thomas K. Simpson: *Figures of thought. A literary appreciation of Maxwell's Treatise on electricity and magnetism* (Green Lion Press, 2005), devoted to the famous treatise of James Clark Maxwell, written in 1873, which demonstrates the equivalence between electricity and magnetism, the fact that they belong to the same area, that they are united. I do not think whether it has been translated into Romanian, anyway, even now, 150 years after its issuing, it is still not too late to do this. Under such circumstances, for many of us it is still a surprise the fact that it has not been written in the formal language, devoid of life, yet as a tense drama in three acts, whose main characters are Faraday, Ampere, Lagrange. I would dare say more; it is not only a tale, it is a drama, which we all need.

THE WAY TO TRUTH INVOLVES ERRORS

Prior to being acknowledged as accepted truths, almost all questions and dilemas of science have had dramatic evolutions, involving conflicts, errors, failures ... which one should necessarily know for understanding the way in which history advanced. Their transformation from a tale into a drama, into a theatrical performance is not an adornment, it is the only way permitting their proper understanding. In the absence of history, lacking dramatic and conflicting aspects, things cannot be properly understood. I always tell to may students: 90% of the theorems you are now learning have had – prior to acquiring accepted versions – several wrong variants. Students have to understand that error is the most human aspect of scientific knowledge and also that only by repeated false versions one may reach generally accepted truths. If they do not understand this, they can no longer joyfully assimilate them as they are uncapable of tracing the human aspects they conceal.

TO TRANSCEND THE FINAL VARIANT, FOLLOWING THE ROAD THAT LED TO IT

Involved here is the need of transcending the superficial aspect of things, the final result, and also of understanding the route followed for reaching it; if I feel the need for such a transcendent experience, it means that I need the tale, which is essential for transforming our life in a pleasant, joyful adventure. Mention should be made here of the manner in which science resembles literature, as a text may be concomitantly grasped as a scientific and, equally, a literary work. This helps us understand why, in remote times, for long historical periods, culture has been a hybrid structure, balancing between myth and science. The old books provide numerous examples in support of such an assertion.

MYTHS AND THE FIRST SCIENTIFIC WORKS LIVED TOGETHER FOR A LONG TIME PERIOD

It is especially significant to understand how the beginnings of human scientific knowledge made use of myths to a much larger extent than today, which may be explained by the process of gradual shifting from knowledge through myths to scientific knowledge. In this respect, two volumes should be mentioned: Henri Frankfort et al., *The Intellectual Adventure of Ancient Man* (Chicago, 1946) and Salomon Bochner, *The Role of Mathematics in the Rise of Science*. Princeton, New Jersey: Princeton University Press, 1965, 1981. Both books analyze the manner in which the works of Plato and Aristotle contain numerous pages in which myths, mathematics and poetry are always blended, in a transition period markedly influenced by ancient myths, along with the buds of the emerging literature (Homer) and science (Pythagoras), a science based on theorems, not an empirical, Babilonian approach, any more. To understand this transition, one should not leave aside the pre-Greek civilizations, developed in ancient Egypt and Mesopotamia.

Such a course of history helps us understand that shifting from myths to history, from transcendence to immanence was a gradual process. For example, in *The history of the Roman Empire*, by Titus Livius, or in Herodot's *Histories*, how can one distinguish between mythology and history?

MATHEMATICS AND POETRY HAVE COMMON ORIGINS

Here are the reflections of Henri Frankfort (p. 14 in Bochner's above-mentioned book):

Mathematics is a form of poetry which transcends it, by the fact that it asserts a truth, a form of reasoning which goes beyond reasoning, once it makes real the truth it proclaims; a form of action, of ritualic behaviour which, even if still unachieved, should proclaim and elaborate a poetical form of truth. Poetry and mathematics have always marched together.

The book of Frankfort explains the mode in which intellectuality was manifested in ancient Egypt and Mesopotamia, two neighbouring Mediterranean areas in which the buds of the subsequent Western civilization were first flourishing. The gradual transition from empirical science, based exclusively on observation and experiment, to the science postulated on theorema, represents history in itself. Numeorus observations could be made on this topic ...

MYTH LIVED ORALLY, LITERATURE AND ESPECIALLY MATHEMATICS NEEDED WRITING

As asserted on page 16 of Bochner's book, mathematics has the privilege to have represented the first form of rational, organized form. Also important is to know that, in Egypt and Mesopotamia, mathematics flourished about 2,000 years prior to its establishment in Greece, with Thales and Pythagoras. Mathematics needed a written organized form, which was not possible in the case of myths. In Egypt and Mesopotamia, mathematics appeared shortly after writing, while the need for a written literature, assuring the space for subsequent development of written mathematics, was first accomplished in Greece. In his book, Bochner discusses the mathematical reading and writing process, preceeded and prepared by the poetical one.

ARE REALLY THE TALE, THE METAPHOR AND THE PARABLE THE ONLY INSTRUMENTS GRANTING ACCESS TO EXISTENTIALISTIC QUESTIONS?

The answer given by history to this question was a negative one. In the terms of Andrei Pleşu, we could say that very ”Russian questions” were answered by methods quite different and distant from the tale, metaphor and parable. For example, Catholic theologists of the Middle Age applied the axiomatic-deductive reasoning of Euclid for answering questions on the existence, uniqueness and infinity of God. This illustrates, once more, the general need of using the whole set of available methods provided by the human mind, as perceived in the modern world of today, backed up by the huge progress registered in all cognitive disciplines.

COMING BACK TO THE CLIMBING CHILD ...

Let us return to the climbing child, the boy always eager to swarm up trees, fences, pillars, the child who falls down, gets hurt, scratches his knees ..., as he is the starting point of our discourse. How are we expected to educate, to orientate child' ambition and upward aspiration? His passion for elevation is associated with his lack of judgement, which may compromise the direction of his lift. In this point, education should intervene by nourishing child's apetite for physical raising, for climbing, while gradually reorienting it towards most profitable directions. The object of climbing should become more and more interesting, more profound – which is actually the bet of education: to orientate the aspiration for climbing as high as possible but, once again, not for the sake of competition, as things occur in our days – see, for example, the competition on the number of Pleşcoi saussages one may eat – without being suffocated and dying – within 5 minutes.