



Matters of Humanization of Science and Education - Theory of Theoretical Work

Levintov A*

Ph.D. Geography, leader researcher, Moscow City University, Russia

*Corresponding author: Levintov A, Ph.D. Geography, leader researcher, Moscow City University, Russia; E-mail: alevintov44@gmail.com

Abstract

This article is devoted to the features and principles of the humanities as a subject-subject dialogue. New remote methods of conducting scientific discussion and the educational process are proposed. It also deals with theoretical and methodological issues and problems of theoretical research.

Keywords: Search; Research; Humanization of science and education; Goals and values of humanistic science; Theory of theory

Humanistic Science and Humanistic Education

The humanistic science has a number of principal differences from natural sciences. These differences have already been formulated by Francis Bacon (1561–1626). In 1620, he published his *Novum Organum* laying down a program of scientific and technical works for the next several centuries, including our century. Of course, he did not prepare any disciplinary plan, he did not even describe main areas of development of science and technology, but he did something more: "all over again, all by own efforts and everything is ahead". For this, he had to reinterpret and rewrite the entire history of mankind and to turn it from the past into the future. *Novum Organum* revises all previous scientific and philosophical experience. Bacon, being inspired by geographic discoveries and pioneering of new lands, understood that if the outburst of oecumene occurred in the days of Aristotle it would have made Aristotle to review his *Organon*. A common thread running through *Novum Organum* is the statement of the Prophet Daniel: "Many shall run to and fro, and knowledge shall be increased". The ancient separation of nature into physis and nature obtains a tragic tension with F. Bacon: yes, the nature is a workshop of human thought and activity but it will never be known in its integrity and completeness (here F. Bacon forestalled the tragedy of modern environmental problems when we appear unable to foresee and control the consequences of our economic and other practical activities arising in very remote and unexpected areas). F. Bacon offered to stop studying the laws of

nature as the human nature itself is artificial and contrived: "Let people temporarily order themselves to renounce their concepts and let them begin to get used to the things themselves". He could understand that the world reflected in our consciousness is just a distorted image but not the world itself. A man, his senses, mind and consciousness are not the measure of all things. So, F. Bacon disengaged a subject and object of science, separated them and, therefore, he was the first to articulate the scientific approach to the nature: a man and the nature he studies exist independently. He also highlighted the central gnoseological problem of the science first: how to overcome the nature of mind to understand the nature of nature? F. Bacon rejected the formal logics and syllogisms as formal logics operators and started to apply inductive logics, the logics of science. Later we will see the development of this revolutionary idea in Hegel's works. We all very well know the paraphrase of Bacon's famous statement: "Scientia et potentia humana in idem coincidunt" ("knowledge and human power are coincident"). For a long time this paraphrase has been read as "knowledge is power". Communists did not want to share their power with anybody else and were afraid of intellectual attack of scientists so they not only shot, detained in camps and expelled any thought, any knowledge but also modified that formula into "knowledge is force". So, after F. Bacon the science is no more oriented on inductive reasoning, this remains the prerogative of philosophy. An experience becomes the organon of science. The nature as a complete text is

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incognizable on principle and totally undescrivable: the science has to find its object, to focus not on the entire text of nature in general but on individual, specialized aspects and areas.

F. Bacon was immediately followed by R. Descartes, who was rather a philosopher and theologian than a scientist, and Galilei, Newton and Leibniz – those were not philosophers and theologians any more, but just scientists, first "just scientists". F Bacon brought natural and humanistic sciences to the opposite corners of the ring, but that resulted in the natural sciences occupying almost all the ring and stepping stone and doomed the humanistic science to the whiff of charlatanism: Thomas Kuhn wondered in *The Structure of Scientific Revolutions* how the social science together with all other humanities may pretend to be scientific. The ground for his suspicion was a fundamental assumption recognized in natural sciences such as physics that two mutually exclusive theories, systems of knowledge, etc. may not exist, only one is true. I do state for kicks and lack of respect to estimable Th. Kuhn as follows: Humanistic knowledge, theories, principles, recommendations are deemed true if there are other, conflicting knowledge, theories, principles, recommendations, etc. For example, belief in God is true as there also is the belief in absence of God, or in any other God, which belief is no less true than the first one. Any humanistic truth is a version and allows for existence of other truths on par with itself, and this constitutes its particular power and attractiveness. K. Popper clearly described this collision in the indirect (through K. Popper) dispute between S. Freud and J. M. Charcot: JM Charcot convinced K. Popper that his theory and methods were correct because there was a lot of evidences of his patients who had recovered from their diseases due to Charcot's douche and that Freud, Charcot's student, was a mere charlatan. S. Freud, in his turn, convinced K. Popper that his theory and methods were correct because there was a lot of evidences of his patients who had recovered from their diseases due to psychoanalysis and that Charcot, Freud's teacher, was just a retrograde. Plurality and mutual excludability of humanistic knowledge must change the essence of educational system which is still based on natural sciences and exclusive truth of knowledge and theories. The second principal difference of humanistic science from natural science is the approach. The subject-object approach dominates in natural sciences, subject-subject approach – in humanities. A man resists as best he can to be an object of study (as well as the object of observation, training, education, management, honoring, deification, projecting and any other action on himself). A man generally avoids to be an object, i.e. a thing and, therefore, a slave of another man. He scarcely agrees to be a servant of God though he has to recognize this practically every day, to convince himself (not God) in this. Actually, the idea of subjectivization is the basis of my concept of regionalization and growing of regional subjects. This concept sent shockwaves across the Russian

geographic community in the first half of 1990th, up to auto-da-fe arranged in the Geographical Society for me. Up to now, the dominating educational paradigm is certainly based on the natural-science platform and subject-object relations where the subject is a teacher/ tutor/professor and the object is a pupil/student. And this is not compensated with "reflection", "system and mental activity approach" and "choosing a learning path by students". The scheme "I'm a teacher and you are a fool; you are a teacher and I'm a fool" continues to exist. I'm happy to see that at least in the Silver University for elderly people - because this is the Silver University - they try to create and support the atmosphere of the talk about, conversation about, i.e. the atmosphere of subject-subject relations, in the class. It is the relation system that may transform the education into self-education, self-cultivation of humanity through individual efforts of a person, without an external impact. The last principal difference between the humanistic science and the natural science is as follows. The natural science continues to assert its predestination through the search of truth, although nearly 90% of all these studies are directly intended for satisfaction of needs of the military industrial complex and elimination of people and culture. The natural science discredited itself with antihumanism a long time ago. The humanistic science does not serve any benefit and harm (in the long run, the harm and the benefit are not distinguished for a while now); it asks people questions, answering which helps us to know ourselves. An eighth-grade student of the Central Musical School of the Moscow Conservatory, 14-years-old hornist from Shuya, said once after the lesson of geography: "I understood what we are doing here: it is not the geography we study, we study ourselves through the geography".

This is how I see the humanization of science

Refusal of anti-human themes: In 1976, I, a junior research assistant in a small, stagnant research institute working for an embarrassingly small salary and with a family and expensive lodging, was offered the rank of major, colonel's position, salary twice as higher as mine, work in the most prestigious district of Moscow and numerous minor and large privileges, bonuses and benefits: I was offered to work in a laboratory that studied efficiency of use of prisoners. I was up all night, and in the morning I came to KGB department which made the offer and refused. 'It's a great pity,' an old inspector said and looked at me proudly. Academician Andrey Sakharov had to reject all benefits and comforts, take the dangerous path of opposition and dissidence when he saw the anti-human nature of what he was doing. After all, the humanistic science is not about a person and not about people, it is for a person and for people.

Subject-subject (S-S) relations: Science humanization means above all a transition from the subject-object relations to the



subject-subject relations. I found out that in the mid 1980th when I started to formulate my regional theory stating that regionality is determined by a regional subject. Later, as the years passed, I saw through the works conducted the necessity of S-S relations:

- social and environmental monitoring in the Gorno-Altai Region is a dialogue between the public, authorities and innovators
- The Crimea regional program, Shlisselburg municipal program, program of development of Vuoksi valley towns and the Belarussian city Kobrin are not just documents but rather education and formation of people as subjects of their municipal or regional environment.
- the Silver University for retired persons is a platform of subjectivization of people whom the state decided to give up for lost
- the Workshop of Organization and Activity Technologies is not a research report but a group of subjects concerned with development of science and their university
- S-S science differs fundamentally from the dramatic art with the fact that characters and authors of S-S science are real people interacting and communicating with each other. There are no roles, no dictates of a text or a director.

Plurality of truth: The world of absolute truths is anti-human and therefore it has the right to exist in the same manner as the Impeccable. We must know our place in the universe, for so long as we, humans, are able to afford the plurality of truth this will be our salvation from being servants of God. Scientific and artistic discovery of the world should be pleasing to the Creator for their diversity and variety, why should he watch monotonous and monochromic cinema?

Practicability: The humanistic science is always aiming at self-implementation in order not to be turned into a game or put to the archive. Searching for truth is a convenient form of indulgence for parasitic science as such searching may be performed not only for one's whole life but for centuries. Besides, implementation of the most fantastic and impossible things usually causes a particular joy, wonder and inspiration, dull predictability cannot be interesting to anyone and for this reason it will never be implemented.

Ad hoc and the role of researcher: The humanistic science, despite the complexity and intricacy of its organization, may not be technologized in general as any scientific product and result is unique by principle, for this very reason people pursue science: nobody wants to repeat and reproduce existing patterns and forms - let material production, industry and agriculture do that. No matter how they try to robotize, computerize and/or automatize the science, it is impossible to exclude a man from it because only a man has the ad hoc right – the right to a stroke of luck, solving the mystery, concurrence of circumstances. The modern science is

indeed a sophisticated activity requiring bookworms and persistent analysis's with thousand-terabyte-power brains, managers and producers, floor and vial washers, blond beasts - postgraduate students, be nice officers and union leaders – all this for a researcher to have ad hoc.

Humanistic requirements for education: There is a small number of such requirements. In brief, they are as follows:

Education should be based on solving actual problems but result in formation of abstract ideas and concepts. Thales of Miletus (625–545 BC) was solving the task of calculation of the height of the Egyptian pyramids and thus formulated the right triangle similarity theorem, and Protagoras (490–420 BC) referring to this event claimed his famous statement: "Of all things the measure is Man, of the things that are, that they are, and of the things that are not, that they are not". The Uniform Collection of Digital Educational Resources at <http://school-collection.edu.ru> provides 317 triangle similarity tasks and numerous examples on this subject. Poor seventh-graders study this theorem for nearly two weeks, solve dozens of examples and tasks until incomprehension of this issue becomes automatic: correct answers are given smoothly, however, all these exercises have no real function.

Humanities knowledge becomes humanistic only if it proposes and assumes the plurality of other knowledge which are as true as that knowledge itself. The humanistic truth becomes the truth only if there are other, alternative truths. Knowledge is multiple and diverse, and even opposite knowledge does not exclude but complement each other. Descartes may not be disapproved through Newton, and Newton – through Einstein. Richman and Lobachevsky do not reject Euclid, Charcot and Freud declaring each other a charlatan preserved themselves in the science and medicine. Staying within the framework of humanism, we should allow to exist all and any systems of knowledge although we see their imperfection. In this context all religions, churches and sects are anti-human since they serve god or gods but not a person. Atheistic theories are anti-human as well because they claim only they are true and all other theories of God are false or insufficient. The argument of truth shows not the truth but anti-humanity. The book of life problems does not provide any answers: there are numerous solutions for each life problem, which have been already accepted or may be accepted in future. There is no sense to look in the end for an answer, and this makes such book good.

Scale: Humanization of education should be based on learning of the human-scaled world: home culture, family circle, relations with the close ones, and a person may know nothing about sphericity of the Earth as this sphericity is unperceivable and insignificant in our practical activities.

Ontology and world view: Liberal arts education should restore its world view and ontological component. None of them fits in tests with one "correct" answer and two to ten distracters. World view is a system of human views on and ideas about the world



and the place of people there. The world view may be religious, atheistic, mystic, philosophical, scientific, engineering, artistic, professional, etc. A person may have a combination of several world views which just seems inconsistent from the side-lines: one may have scientific, philosophical, materialistic and professional views of the world simultaneously. The world view may be expressed in rules, viewpoints, beliefs, values, affiliation, etc. The world view allows such extremes of subjectivism as the idea of the world that just appeared in the dreams of a subject. We consider ontology as the philosophical character and as the methodological concept like reflection, which is used both in psychology and in philosophy/methodology, and for this reason is very different in these two realities. In philosophy, it is common to consider ontology in comparison with gnoseology and epistemology. In these terms ontology studies the problems of the world outside the limits and boundaries of consciousness, subject, and ego. The methodological concept of ontology is much closer to another narrower sense of philosophical methodology: study of laws that are common for objective and subjective worlds. Such is, for example, the ontology of human nature and culture. Finally, the methodological ontology is considered as a constructional part of thinking which is generated by logics and generates logics. The body of methodological ontology is formed by self-consistent aggregate of concepts. Unlike the worldview, the methodological ontology is generally beyond description: a person either does not have any concepts and so he/she does not have the ontology, or has so much concepts that it is simply impossible to represent them. A thesaurus of concepts is similar to lexicon: we are unable to specify it but it is presented in our written or oral speech, it is accessible for an external observer and communicator.

Comprehension and hermeneutic education: Today's education is not only deaf to comprehension, but with all its weight aims to destroy it, create androids capable of automatic actions in binary situations: "1 – 0", "yes-no", "right-wrong", "friend-or-foe" etc. Liberal arts education is hermeneutic education, education based on comprehension and for the sake of comprehension. In our opinion, comprehension is a primary entelechy with regard to thinking. In the process of communication comprehension follows from a language to a cluster of meanings equivalent to communicators, to operating concepts common for communicators, and these concepts serve as the basis and material for thinking expressed in language, diagrams or in other way.

My Humanistic Creed

In the diagram of concept the creed may replace the "values-theory-principles" triad, but at the same time, unlike this triad, the creed is not only communicated but is also self-reflected. At the same time it is worth bearing in mind that the notion of concept derives from "conception":

There is a lot of humanistic creeds. Here are some of the most impressive (I quote from memory):

Plato: "God specifically created this world to be flawed, so that a man perfected himself fighting it"

Ignatius of Loyola: "If the end is the salvation of a soul, then the end justifies the means."

I. Kant: "Act only according to that maxim whereby you can, at the same time, will that it should become a universal. "Act so as to treat humanity, whether in your own person or that of another, always as an end and never as a means only."

I. Kant: "Two things fill the mind with ever new and increasing admiration and awe, the more often and steadily we reflect upon them: the starry heavens above me and the moral law within me."

W. Goethe: "Man is the nature that discovers itself."

P. Ricœur: "A man is a meeting point."

M. Heidegger: "A man is a being that needs to prove the fact of its existence by thinking."

I. Ilyin: "Do not blame the world and the time you were born into, for the very purpose of your birth is to make it better." The law of total self-justification: "He acted in such a way due to his nature; I acted in the same way due to circumstances." At some point I formulated my own humanistic creed as an extremely strong anthropic principle of cosmogenesis: every man exists in this world being needed by the world, therefore, nobody, even he himself, cannot interrupt his presence in the Universe without the risk of destruction of this Universe. Therefore, all wars, executions and murders increase fragility and instability of the Cosmos, and only love can constructively confront this violence and destructions. Therefore, any man is a participant and creator of the world history, not only heroes, kings and generals, and any man is responsible for the fate of the world and needs to be ready for such responsibility. Therefore, it is shameful and dangerous to patronize a man, as well as instill hatred and indifference towards himself and to the world as to himself: a man must allow suffering pass through himself like a cow passes grass through itself; a man must find his God and join him with love. Therefore, the man behaves like the God and as the last being present in the Universe. But now I would like to formulate my educational humanistic creed: A man is an image of himself everyone aspires to. Otherwise, in education man is the God to his fellow man. Note: this image of course is not a living person, it exists a bit longer than its carrier: in memory of his children, grandchildren, students and other people, as well as in spiritual legacy left by us

Specific features of humanistic science

There are several of them. They are also not pulled out of thin air, but they are defined according to practical experience. Here are the most important of them:

Humanistic studies require scientific producing and promotion:

- In sociocultural environment
- In scientific research and R&D
- In education

The result of humanistic study must not be the attainment of the truth, but a know how: what and how needs to be done for people.

In this sense they are the only commercially reasonable studies

Humanistic studies may focus on several aspects:

- on a man
- on social medium
- on society and other communities of people
- on humanity
- on culture as a result of existence of humanity

Humanistic studies are synthetic and complex rather than analytical and systemic. Analytics is simply a stage, a search of studies. It follows from this specific feature that they are

- multidisciplinary (organization of science)
- interdisciplinary (methodological organization)
- super-disciplinary (philosophical organization)

Fortunately, humanistic studies are poorly scaled, communicated and technologized. They are unique because they are based on the uniqueness of each situation. And in conclusion of this review I'll give you two stories. One of them is connected with covid-19 pandemic, and the other one is connected with theorizing in the field of scientific theory.

Verbalization vs Visualization

The specific feature of our commanding and management practice is making only unambiguous decisions; alternatives are not considered at any stage, neither before, nor after making any decisions. Covid-19 pandemic impelled distancing in the education system turned into making an unambiguous decision: only on-line, and no other alternatives, whereas they exist and they are probably more effective both in terms of results and costs. Here we consider only one of the alternatives. Starting from the XVII century that is from the moment of formation of science (Galilei), the main means of communication in the absence of scientific magazines and conferences was exchange of letters between scientists, fairly stable and intense. In these letters they carried on polemics with each other, resolved issues of priorities and superiority, perfected arguments pro e contra, carried out discussions, which sometimes lasted for many years. Private correspondence was a kind of access to science, which was not easily obtained and not by anyone. Correspondence was, of course, not the only mean of scientific communication. The professors, who combined scientific and teaching activity, found assistants for themselves from among the substrate of the information environment of the university and turned them into new scientists in conditions of constant communication at academic chairs and in laboratories. The most known

correspondence in the history of science is correspondence between Newton and Leibniz. It was this circumstance that allowed our Workshop of Organization and Activity Technologies to switch to remote but not on-line communication mode, and we called our seminar Newtonian. Visualization of on-line lectures and seminars (webinars), which significantly simplifies perception, is obviously to the detriment of verbalization: through our eyesight we get 60-80% of information, but at the same time seeming simplicity of visual perception makes it difficult to separate information flow and single out everything fundamentally important, unclear and new. Alas, we often look at many things, but do not see them and do not rationally perceive them. Participants of the seminar receive an extended text of the report on the current topic with appendices (texts complementing this report) via e-mail. Within a month the participants are allowed to comment this report and appendices thereto by inserting their personalized commentaries into the body of the text or after it, commenting other participants' commentaries, asking questions or answering them, as well as by complementing the report with their reports/speeches. A month of intense discussion via e-mail ends with reflexive accumulation with regards to the process and results of extramural discussion, after which the material is sent to editing and proofreading, and the participants switch to the next topic. Years-long seminar on humanity in education is currently transformed in Newtonian form that is different from the previous one. There is a syllabus for the whole seminar (4 sessions). The participants receive an inception report for the session topic, after which they, individually or in small groups (2-3 people) discuss topics of the session one after another (1-2 hours for discussion), and then they submit main results of their discussions for plenary correspondence (plenary discussion lasts 2-3 hours). 3-4 close and logically connected topics are discussed during one weekend (with reflection in the end). The session may also include watching and discussion of a movie specifically selected for the topic of the session, as well as methodological consulting upon request of the participants. The result of the session is documented, edited and proofread and in the end becomes a section of a collective monograph. These are obviously just two types of remote verbal communication; other types may be developed. The unconditional advantage of both types is the shift from oral to written communication. Unlike and in contrast to methodological tradition, where oral speech, intensified with will stresses and charisma, is considered to be the main form of communication, written thought and communication is more responsible, invites more to thinking and comprehension (“a thought that does not spawn another thought is not a thought”), but they both may successfully be accompanied by schematization. At the same time it is necessary to single out three significant circumstances:

- Grammar of oral speech differs greatly from the one of written speech: by order of words, verb patterns; oral speech necessarily has intonation emphasis; grammar itself is the expression/reflection of logic, and oral speech is as a rule allogical
- written speech (speech, not language) is hard for the majority of people and requires efforts greater than oral blah-blah-blah, it is much closer to thinking than oral speech that is oriented towards chaotic thinking (=thoughts and images messing around)
- “manuscripts do not burn” (but actually also not reviewed and not returned): all archives of the Moscow Methodological Society, which existed from the 1950s till present, consisting of tape recordings of oral speeches are transformed into written speech, and those not transformed irrevocably disappeared and are irretrievably lost: seminars by correspondence are not threatened with disappearance.

The practice of exchange of texts makes people read them instead of a currently common situation of scientific texts being buried in libraries as in common graves of lonely and unread texts. Besides, such practice may grow/crystallize in a new educational technology, since it is a topical generator of inner discourse of the reader and requires written answer that means significantly more intellectual efforts than passive reading or visualization, no matter how graphic and expressive it might be. This brings us back to Plato's dialogues, where thought of one interlocutor spawns a thought of another interlocutor.

Theory of a theory

V.I. Vernadsky: “Scientific hypothesis always goes beyond facts that served as the basis for its generation.”

D.I. Mendeleev: “It is fair to consider the author of a scientific idea to be a person who acknowledged not only philosophical, but also real aspect of the idea, who managed to cover issues in such a way that anyone can see its fairness and thus made the idea a public domain.”

If we take a close look of bibliography, we'll see that with regard to this topic Russia is amazingly and desperately behind the whole world, sometimes half a century behind, as it happened with Karl Popper, sometimes quarter of a century behind, and sometimes ten years behind. We even managed to get behind ourselves: works of G.P. Shchedrovitsky were published only five years after his death. Of course, the methodology of science is not a pulp fiction, but if reading old newspapers is extremely ridiculous, reading old ideas and thoughts is extremely tragic.

This text was written upon request of colleagues. It does not claim to be equal with classical works on methodology of science and is a technical draft required as guidelines for theoretical work by a small circle of researchers.

Attributes of the theory and requirements to the theory

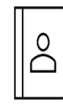
Theory is intended to explain the world completely and to the fullest without exclusions. Not the whole world, obviously, but one of its aspects: the light theory explains the nature of light, the relativity theory explains effects of gravity caused by deformation of space-time continuum, the big bang theory explains cosmogenesis, the theory of evolution explains the origin and extinction of species etc. Etymology of this word is very interesting. Greek word θεωρία is not in any way connected with the word θεός (God) and implies no voice of God and no heavenly singing. Θεωρία means “visible”, theorem means “performance”; in the times of Pericles the word “theory” was used to describe festival ticket offices for the poor, who were given free tickets to theatre (θέατρο) tiers. One of the most important functions of an ancient theatre was actually explanation of events happening in the world. Theory, however, not only describes and explains the world, but also allows its transformation. These are so-called technical theories (theory of machines and mechanisms, rocket theory, aviation theories etc.). “Visibility” of theory ensures only its coming close to essence, truth; however, this is our suggestion, unsubstantiated belief in correctness of the chosen way of looking for the truth. But we need these suggestions and this belief: this consoles our natural autism and this serves as the ground for us to say that we are having progress and are not somewhere at an unknown distance from the truth. The problem is that the world of nature, world of objects only partially conveys something to us (material world); in other respects it is, according to Aristotle, in cognizable by thought and action, on the one hand, and a man a priori cannot know everything, on the other hand (“God works in mysterious ways”, as well as designs):

World of nature (world of objects)

world of humans

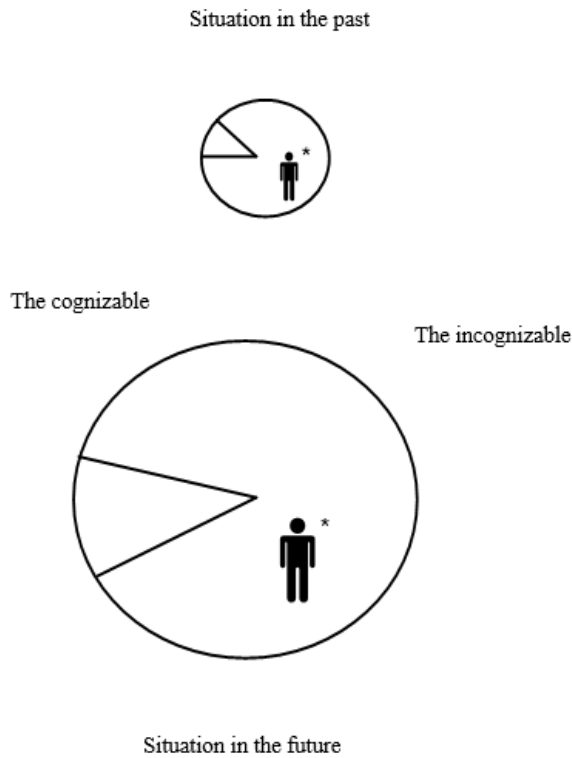


cognizable material world



cognitive abilities of humans

There is a firm belief that despite the world cannot be cognized completely, we constantly asymptotically try to deplete it by cognition. This however is a delusion: the first people knew very little, but practically everything; a man of today knows much more, but the field of his ignorance is much wider than both what he knows and the field of unknown of his remote ancestors:



A human (and it is in line with his destiny and cosmogenesis according to strong anthropic principle) dematerializes, desubjectifies and gives material form to the world with both his knowledge and ignorance all the time, and with every new discovery, with every new cognitive effort he widens the field of the unknown, the unexplored and the incognizable, as well as the field of the known - but to a less extent. In absolute terms the sum of knowledge undoubtedly increases, but another definite fact is that its share in the unknown decreases. With every new piece of knowledge we know less. Exhaustive aspect of theory does not exclude presence of other theories in the same area: Darwin's theory of evolution does not comply with the theory of evolution of Teilhard de Chardin, the wave and corpuscular theories of light merged into the wave-corpuscular theory, there are several theories of anthropogenesis, etc. If natural sciences demonstrate aspiration to hegemony at a certain level of knowledge and to the only theory, and all other theories are considered false, then liberal art sciences consider presence of competing theories acceptable and normal, such as economics, history, psychology, sociology and others. This feature of any theory allowed K. Popper to put forward an important methodological principle: a theory is verified (confirmed) by practice and proved false (disproved) by another theory [1,2]. Theory does not exist in itself, but is the core of a scientific paradigm or a research program, is surrounded by empirics (tests, observations and experiments), tasks, activities, problems, engineering (making theory applicable in practice) [3,4].

Theory, hypothesis, model and other types of idealization

According to Galilei, our consciousness or rather the whole of our entelechy is able to idealize the surrounding world [5].

Idealization irony

An ideal object is, in fact, the only thing we see, gloomily, most often sullenly and intensely peering into the reality. The essence of things is unknown to us not only due to its closed substance, but, above all, thanks to ourselves. We are arranged in such a way, that, unlike animals that see only reality, we are able to idealize, only idealize and, unfortunately, nothing but idealize. Moreover, we are designed for this. And our best, most inspired insights into reality are our thoughts and feelings clothed in the forms of mastery: mastery of thinking, speaking, writing, vivid description, colour expression and vocality [6]. It is in art, philosophy, literature, science that we are closest to the reality, to which only the thinnest, most transparent film of our imperfection remains. The reality is almost achievable - in deep and thorough meditation (as Zen Buddhists teach: squinting your eyes deeply sideways and growing stupid). Sometimes it is given in prophetic insights and visions to the saints - but we, simple men, do not understand neither these prophecies nor these visions and phenomena. Here, in search of the real, we approach God and at the same time - here, a nanometer from the reality, we stop in our impossibility to reach the real and God. At the same time, we are similar to Him in our ability to idealize, and are incomparable to Him in our inaccessibility of reality through the thinnest pleura of the ideal. And, since this comprehension and complete God-likeness is not available to us, it is not worth discussing. It is much more interesting and, perhaps, more productive to reflect on the part of our resemblance with Him which is available, on idealization, on the fact that we, like Him, are capable of idealization - since with this ability we are, perhaps, the only ones in the Universe who oppose the materialization of the Universe, its destruction. The very first, but not naive and primitive idealization, was God himself. Basically, this idealization was the first act of anthropogenesis. Deifying a human (his own ancestors), the human, starting with himself, began to deify, idealize the whole world around, oecumene, endowing the living and the inanimate with spirituality, including the place occupied by him and even his own means (fire, tools, etc.). Paganism, idolatry are not only idealization, they are attempts to isolate and even materialize ideal objects, symbolization of the world, coding-decoding the world. Mathematics became the next stage in human's growing his idealization capabilities. The oldest mathematics had several functions. The first one is counting. At the same time, counting probably began from infinity: the Greek word corresponding to Russian "один" ("one") meant "beating of



waves", the beat of which ("паз") was the unit of infinity. Counting demanded symbolization of the counted. So, for example, small stones became the symbols of the counted cattle, this practice of counting led to abacus. In the Chimu Empire (South America) knots were used instead of stones - here counting with knots led to the creation of a counting tool very similar to Greek abacus. Money - regardless of realization (shells, metal, dried fish, rice grains, small cattle, etc.) - is also a symbol of items which transforms these items into goods. Measure and measurement became another function of mathematics. Thales measured the height of the Pyramids using his own shadow, solving the problem of similarity of triangles. For a long time astronomical, construction and geometrical measurements were not only dominant, but also closely related to each other (Hindu astrologers, Egyptian hierophants, the famous megalith in Ireland, Maya astronomy, Nazca which is insuperable so far, etc. - all these are at the same time mathematical miracles of construction and astronomy and geometry, and also sacral miracles). Quite quickly, in historic proportions, the possibility of description was attributed to mathematics: time (calendars and chronology), space (cartography and geometry), various natural phenomena and processes (physics), etc. Mathematics performed an ontological function, for example, in works of Pythagoras and his students, Plato who thought that a number is a universal and an ideal reflection of the world, who saw the sacral essence of numbers. Finally, Euclid introduced the first ideal object into mathematics (geometry): a geometric point, which allowed him to establish the postulates which became the basis of geometry. The last three ideas about mathematics and its functions have played a critical role in the formation of science and the entire modern world outlook. Now it already seems to us impossible and even suicidal to confute the ontological nature of mathematics and its ability to describe the world: we have gone only this way without even trying to look for another one. We do not even know how far mathematics is dead-end and whether at all it is dead-end. We have taken this Kabbalistic path, and most likely have not taken but were placed on, - at least the absence of reflection of mathematics indicates its imputation to us. This reflection was also absent in Galileo, therefore, his most fundamental assumption is: if the world may be described and ontologized mathematically, if mathematics gave rise to ideal objects, then physics (and, obviously, all other sciences) may have an ideal object, and this seems good to God who does not oppose mathematization of the world. And Galileo built an ideal object for mechanics and transformed physics into science, thus opening opportunities for all other sciences to become sciences. And we flushed into the gate opened by him. And even such a science as history, which is perhaps the most difficult to recognize as a science (in Galilean sense) managed to find it's, though poor and rough, ideal object - Marxist "mode of production". Enthusiasm

which embraced us, who accepted Galilean science methodology, blocked out what Galileo himself saw and understood. In his dialogues about the ideal object he, among other things, several times says that the ideal object is ironical in relation to the reality, that the ideal object, in comparison with the idealized reality, is an awkward and rough toy, crippled and poor creature, rather miserable and mournful than sublime. In these Galileo's warnings I hear very quiet doubts about the ability of mathematics to describe physical phenomena and nature. Despite all the visible beauty of mathematical formulas and mathematical evidence, there still is worry in the depths of our conscience: are we not fooling ourselves and the world with this mathematics? And $E=mc^2$ - is it not a deception, cunning of yet another pseudo truth like non-intersecting parallel lines and 180 degrees in any triangle? Warnings about ideal objects as ironical and, of course, not genuine, come from not only Galileo. We hear them, for example, from Einstein and Lefebvre - hopelessly honest people not addicted to and not able to joke and mystify. The fact that we are sometimes offended by their idealizations seems natural to them - they themselves sometimes seem to be offended by their own brainchild's. Are tensor calculation and Boolean algebra the means to penetrate into the essence of nature? Are we not again on the wrong path of endless approach to the truth (false not in its direction, but in the endlessness of this path)? But if all this is so, now you may perform simple turning, you may return to our likeness to God, since if we are like Him, then He is like us. And, therefore, his methods of idealization are the same as ours, and his ideal objects are inherently ironic, like ours. Since our ability to idealization is such, it is such also in Him, whose likeness we are. If we consider the Bible, or, rather, Pentateuch, more exactly, Bereshit ("Genesis") not as a historical document, but as a project ("In the beginning was the Word", wouldn't you say? First - the project of the creation of the world, then the creation itself, in other words - realization of an ideal product, project). And this means that the repetitive "and God saw that it was good" (Genesis 1.10, 1.12, 1.18, 1.21, 1.25, 1.31) shall be understood not in retrospection, but as a prospective (relative to realization) vision, but in an ironical genus and sense, that the reality may be good, but only after its ironical idealization, that universal happiness built on a tear-drop of a tortured child exists and makes our conscience tremble. So, mathematization is one of the types of idealization, but not the only one.

If we make some reasonable and seemingly reliable assumption, but are not sure of evidentiality of this assumption, it is a hypothesis. Hypothesis is a prosthetic tool, a temporary structure that we need until a substituting theory is built or until it itself obtains a status of theory. If we take a closer look at the majority of theories recognized as such, we may discover that all of them are hypotheses, fundamental assumptions, nothing more. It is commonly believed that a hypothesis differs from a theory

because it is only a fundamental assumption which gives a start-up for theoretical work. Strictly speaking, a hypothesis becomes a theory only upon agreement of the scientific community, which recognizes the conclusiveness of the evidence system at the achieved level of knowledge. A higher theory level does not guarantee its greater truth.

The following is required on the way from a hypothesis to a theory:

- formation of a model and/or an ideal object and/or object scheme and/or another idealization of reality
- Verification of this idealization in an experiment or, if worse comes to worst, by trial and error (experiments are impossible, unethical or extremely rare in some sciences, for example, in history, geography, linguistics and others).
- falsification of the hypothesis, theory or intermediate constructions by other theories (it is the falsification procedure that leads to the fact that, on the one hand, there are several conflicting theories at the same time, and, on the other hand, in every science, especially in strict natural and exact sciences, there is one dominant theory, the others being recognized as heresy and delusions)
- Recognition procedure (according to T. Kuhn, recognition comes as opponents die out).

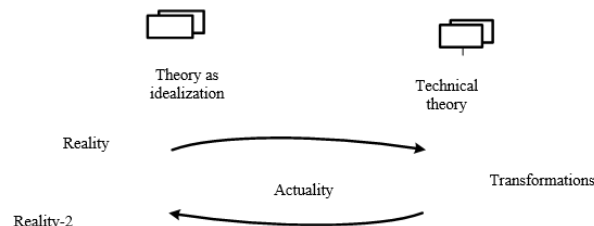
Model is a simplified resemblance of an object, highlighting its principal properties and qualities: globe as resemblance of a planet (most often the Earth) with the crucial properties of sphericity, rotation around its axis and the location of the main elements of the surface of the planet; N. Bohr's model of the nucleus with the principal planetary and energy charge of the main particles (electron, proton, neutron); V. Lefebvre's model of a human with the principal characteristic - consciousness with reflection; etc. The model is necessary a) to perform experiments, including virtual ones, b) for theoretical calculations, c) as a basis and the nucleus of the scientific subject, as well as for structuring the knowledge within the framework of the theory and the scientific paradigm [7,8]. Ideal object is a special form of reality reduction to a supreme extremity: Euclidean geometric point without any dimensionality, Galilean ideal body without any geometrical dimensionality, mass, material and form; "one" as Hellene's unit of eternity ("one" - beating of waves), a "place" as a unit of space for geographers, "event" as a unit of history, etc. An ideal object is a tool for theoretical insights, and, unlike a model, it is not like real objects.

Scheme is an ontological description of an object in a naturalistic subject-object genus. In the pragmatist genus the scheme may be an organizational activity description, not of the object but of the activity. In the general methodological genus the scheme is presented dimensionally in three planes orthogonal to each other: object scheme - organizational and technical scheme - scheme of

goals and means (since the object is set by our goals and means relative to it). The scheme functionally sets the structure and direction of the theoretical and methodological discourse. There are other refined means of theoretical work, which are used much less frequently than those listed above.

When we need theory

In general, the answer is short: in the transition from reality to actuality. Looking at the world you should see something new in it, and then clearly explain and set up this observation - in a theory. According to Galileo, human consciousness is arranged in such a way that we cannot but idealize reality. Some types of idealization (deification of reality, mythologization, giving reality the status of sleep, samsara, etc.) do not require evidence and theorization, but demand interpretations, explanations and a priori faith. Other types of idealizations are associated with knowledge and structures of knowledge (scientific idealizations) or with complex mental speculations (philosophical and theological idealizations - in my opinion, theology is based on the fundamental cognizability of God). These types give rise to theories and, therefore, are related to models, ideal objects, schemes, etc. The first group of idealizations is distinguished from the second one by the fact that it does not need transformation of reality. The second group is closely related to these transformations and, therefore, it exists not on its own and it is not inherently valued, but is necessary for these transformations giving rise to engineering, technology that have passed from the mechanistic sphere of machines to the humanitarian sphere.



Idealizing reality we may deify it, like pagans, we may contemplate it, for example, in meditation, we may senseize, perceive it by building such idealizations as hypotheses and theories. And thus include our idealizations in the world of our activities, in the world of reality, where we need fundamentally different theories to transform this reality - technical theories, which allow us to carry out these transformations, starting to live in our reality and in a new, technogenic-natural reality, which is being increasingly filled by us and becoming a reason for new idealizations and theorization. Thus, we idealize the world twice - according to this scheme, creating and mastering the world of technonature, and expanding the segment of the known in the expanding sphere of the unknown. If we want to participate in the transformation of the world and ourselves, we must do theoretical



work, otherwise we risk becoming apprentices of an enchanter who can launch transformations but cannot manage them.

How Theory Is Built

It is clear that theorization for the sake of theorization is "the glass bead game", a curious thing, catching and interesting, but absolutely useless. According to Galileo and P. Feyerabend theoretical work requires ad hoc - "on occasion": the prince asked Galileo to create an optical device which would allow one to be in the midst of a battle and at the same time stay in a safe place. With the use of lenses Galileo created a device which we call a spyglass today, but once, late in the evening, he accidentally pushed the tripod with the device and saw the sky, which made it possible to move from the spyglass to the telescope, discover lunar mares, "and yet it moves!", that is, not Ptolemy's geocentric world view, but the modern heliocentrism. Here we may observe a fortunate consequence of three ad hoc: the prince's order, Galileo's elbow and his fascination with the starry sky at such an unachievable near distance. What pushes us today to theoretical work? - First of all, information tsunami. We need foundations, gates and sieves, which organize and sift this enormous stream. Moreover, theory acts as an ideological tool: accepting a certain theory, we act: in medicine, psychology, sociology, economics, linguistics, geography, history, management, etc. Affiliation with a theory is a marker in science, lack of affiliation means that you are a homeless scientist, an untouchable. Finally, the development of theories is considered a marker of affiliation to the highest, priestly caste in science at least because no one orders theories (everyone needs a spyglass) and, therefore, no one pays for them, so theorists are the poorest and the most protected scientists. Theoretical work is a kind of an intellectual extreme sports: it is, first of all, uttermost self-determination and throwing oneself outside his own limits - only from there is the world seen in a new way, first hypothetically and then theoretically, visible, not viewable.

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