Man versus Computer: Difference of the Essences. The Problem of the Scientific Creation

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Abstract

In this study it is proposed the critical analysis of the creation of Artificial Intelligence (AI) and of Artificial General Intelligence (AGI). The unity of formal logic and rational dialectics is the methodological basis of the analysis. The main results of the analysis are as follows: (1) the model of man represents the unity of the two material aspects: "physiological body" (controllable aspect) and "psychical body" (controlling aspect); (2) the "psychical body" is the subsystem "subconsciousness + consciousness"; (3) in the comprehensive sense of the word, the thinking is an attribute of the complete system "physiological body + psychical body + environment". (3) in the broad sense of the word, thinking and creativity are an essential feature of the subsystem "subconsciousness + consciousness"; (4) in the narrow (concise) sense of the word, thinking and creativity are the attribute of the instinct of the conservation (preservation, retention, maintenance) of life (i.e., the self-preservation instinct, the survival instinct); the instinct of the conservation of life exists in subconsciousness; (5) the instinct of life conservation is a system of elementary (basic) instincts; thinking is the attribute of the each elementary instinct; (6) the mechanism of thinking and the essence of creation cannot be cognized by men; (7) a computer as a device cannot think and create (in particular, it cannot prove theorems), because a computer does not have the subconsciousness; (8) the modeling of human thinking, Human Intellect, and the creation of AI and AGI are the impossible because the essential properties of the complete system "man + environment" cannot be cognized and modeled; (9) the existence of AI and AGI conflicts with the essence of the thinking; (10) the existence of AI and AGI contradict to formal-logical and rational-dialectical laws.

Keywords: human intellect, artificial intelligence, artificial general intelligence, artificial psychology, computer science, psychology, linguistics, mathematics, P versus NP problem, Millennium Problems (Clay Mathematics Institute), formal logic, dialectics, philosophy, metaphysics.

1. Introduction

As is known, the problem of creation of Artificial Intelligence (AI) and of Artificial General Intelligence (AGI) over a long period of time attracts special attention from the researchers (mathematicians, cyberneticists, programmers, neuroscientists, psychologists, philosophers, etc.).

The results of researches carried out by scientists in recent years show that the way to comprehend and solve the problem has not yet been found (ICAI'16). In my opinion, the explanation of the current state of research is as follows:

(a) researchers neglect the correct methodological basis of the cognition (i.e., the unity of formal logic and of rational dialectics);

(b) the scope of the standard paradigm of science is narrow. This signifies that the statement of the problem and the starting points of the problem must be analyzed within the framework of the correct methodological basis. First of all, one must answer the following key questions: What is the essence of man? What is the essence of thinking? What is the mechanism of thinking? What is the correct thinking? What are mind, intellect, intelligence, mentality, psychics? What is creation, creativity? What is the scientific creation, creativity? If there will be found correct and concrete

answers to these questions, then a new statement of the problem of creating Artificial Intelligence can be proposed. Since only a man can tell what he thinks and how he thinks, one can try to model only human thinking.

1. As it is known, human creativity is an activity directed at the production of something that has qualitatively new, original, inimitable features, and socio-historical uniqueness. Human creativity is the specific and essential feature of man because creativity is always a sign of the existence of the active creator, the subject of creative activity. In my opinion, the source and the driving force of a man's creative activity is a manifestation of the following innate qualities that represent his essence (essential features). First, the essence of man is manifested in his programmed aspiration to progress (programmed striving for progress). (Progress is the development of mankind by "negation of negation"). This aspiration represents the principle of Mankind development and it is expressed as wars, as the use of nature, as the use of people (for example, slavery is a form of the use of people), and as scientific and technical creation. The aspiration to achieve the goal is the source and the driving force of creativity. The goal exists, but it must be found by Humankind. Secondly, the sublime emotions (the feeling of truth and justice, the feeling of harmony and beauty, the feeling of love and admiration) are the basis of human morality, cause and effect, the source and the driving force of creative activity. The ultimate goal of creative activity is the attainment of the greatest feelings: feeling of satisfaction, peace, and freedom.

2. Creation is a deep individual activity. The result of the creation is not a direct and simple consequence of the initial (external and internal) conditions. The creative process is not reduced to labour or logical operations and expresses ultimately the moral aspect of the author's personality. This fact determines the social importance of the results of creation for the progress of human society. The principle of human development (i.e., the principle as property of the system "Mankind") determines the creative activity of man (i.e., the property of the element "man"); the creative activity of man (i.e., the property of the element "man") characterizes the principle of development of Mankind (i.e., the property of the system "Mankind").

3. Creative activity is developed on the basis of inherent (programmed) cognitive abilities. The creative activity of a man is the concretization of the principle of human development. Human creation is the process of human activity adducting to making a qualitatively new material and spiritual values. There are different kinds of creative activity: industrial, political, scientific, technical, artistic activities, etc. The scientific-creative work is related to the activities of scientists for the production of fundamentally new knowledge, for the offering of new hypotheses and construction of theories, for the search and proving of truth. The essence of scientific creation is manifested in scientific discovery: the ascertainment of new, previously unknown facts, properties and laws of the real world. The newness, novelty, and social significance of the results are an important criterion of creativity.

4. Scientific creation is a process of producing cognitive innovations (laws, theories, principles, methods, models, devices, equipment models, technologies) in science. The necessary conditions for carrying the scientific-creative work are as follows: (a) the existence of the well-posed problem; (b) the availability of information accumulated in the given field of science (i.e., professionalism); (c) the combinatorial ability of a researcher to create a wide variety of combinations (including low-probability combinations) of the known elements; (d) the intuitive ability of a researcher to the selection of relevant combinations for a probable solution of the problem; (e) the ability of a researcher to make risky decisions (i.e the cognitive courage of a researcher); (f) the readiness of the researcher to defend his opinion; (g) the stability (resistibility) of the researcher to criticism from the scientific community.

5. Scientific cognition is a cognitive creation, and it is a manifestation of the active nature of the subject of cognition. Scientific creativity is an expression of the innate (individual) qualities of

person, a result of loss of faith in the scientific authorities, the expression of his "Ego". In my opinion, finding one's "Ego" and faith in oneself are impossible without the awareness and recognition of the existence of the Absolute Truth, the Supreme Mind, and God. Awareness and recognition of the existence of the Absolute Truth, the Supreme Mind, and God are the result of consciousness clarification. Clarified, enlightened consciousness is the support for one's "Ego". For example, faith in myself and faith in the existence of the Absolute Truth let me assert within the framework of the correct methodological basis that the works of the classics of sciences (such as theoretical physics and mathematics) contain formal-logical and dialectical errors (T.Z. Kalanov, between 1991 & 2016). The errors characterize the inductive method of cognition (i.e., the cognition by "negation of the negation") and represent the essential and inalienable part of modern sciences.

6. In my opinion, the origin of the scientific errors in the works of classics of sciences can be explained in the following concrete actual way: (a) short-time lucid interval, short-time clarification (strikening, illumination, enlightenment) of consciousness, which leads to scientific discoveries, does not represent long-time and steady clarification (strikening, illumination, enlightenment) of consciousness (but long-time and steady clarification of consciousness is preserved throughout a person's life!); scientific discoveries – as a result of short-time lucid interval, short-time clarification of consciousness – are not absolute truths: such discoveries, as a rule, contain the formal-logical and dialectical mistakes; (b) errors in sciences can be detected only under the critical analysis of the works within the framework of a correct methodological basis; (c) scientists ignore the correct methodological basis of sciences: the unity of formal logic and of rational dialectics; (d) scientists rely on a computer: scientists want to entrust the heavy, difficult, complex, complicated cognitive work to a computer; scientists are trying to turn (transmute) a computer into a creative robot.

But computer does not have the human subconsciousness and consciousness. And man does not know and cannot know what are subconsciousness and consciousness, what is the mechanism of interaction between the subconsciousness and consciousness. Therefore, computer (and a supercomputer) cannot perform the following actions: to create; to operate with concepts and to think; to formulate scientific problems; to generate correct solutions to complex scientific problems; to prove theorems; to critically analyze the theorems and the theories within the correct methodological basis; to detect errors in the sciences. Computer is a computational-informational machine programmed by man. But man will never be able to create an algorithm of thinking and of creation.

There are no scientific works which contain proofs of possibility or impossibility of creation of AI and of AGI. The purpose of this work is to propose the critical analysis of the problem of relation between the creative scientific work of man and work of computer in order for the researchers to be aware of the problem of creation of Artificial Intelligence and of Artificial General Intelligence. The methodological basis of the analysis is the unity of formal logic and of rational dialectics.

2. The methodological basis

As it is known, methodology is a doctrine of the structure, logical organization, methods and facilities of human activity. The scientific methodology is a doctrine of the principles of construction, forms and methods of scientific cognition. The general methodology of scientific cognition is the unity of formal logic and of rational dialectics. The unity of formal logic and of rational dialectics represents the only correct methodological basis of sciences. Using the correct methodological basis is a necessary condition for the correct analysis of scientific works in order to make a distinction between truth and falsehood. However, this fact has been ignored by the majority of scientists until now. Therefore, the main assertions of formal logic and of rational dialectics which are used in my works (T.Z. Kalanov, between 1991 & 2016) ought to be stated here as well.

2.1. The basic principles of formal logic

1. Formal logic is the science of the laws of correct thinking as well as a means of knowing the reality. Correct thinking represents uncontradictory, coherent, consistent, and sequential thinking. The conclusions resulting from correct thinking are true statements which reflect correctly the objective reality in the process of the scientific cognition of the world. The basic formal-logical laws are the following four laws: the law of identity, the law of lack (absence) of contradiction, the law of the excluded middle, the law of sufficient reason.

2. Thinking is the highest form of human cognitive activity which represents the process of reflecting the objective reality in the human consciousness. Human thinking is performed with the help of concepts and it has different forms.

3. The form of thought reflecting and fixing the essential features (sings) of things, objects, and phenomena of reality is called concept. In other words, the concept is the thought that reflects things, objects from viewpoint of the general and essential features (signs). (A thing is an object that can be in relation to anything or have some property).

4. The essential features (sings) of the concept are chosen (are singled out) in objects and phenomena by thought. The essential features (sings) characterize the objects of given kind. Non-essential features (sings) do not characterize the objects of given kind. The characteristic which is used to determine similarity or difference of objects of thought is called essential features (sing). In the most general view, features (sings) of objects can be reduced to properties (for example, large, small, white, black, good, bad, soft, hard, etc.), states (for example, the state of rest, state of motion, energetic state, equilibrium state, etc.), actions (for example, it works, he reads, she performs her duties, etc.), and results of actions (for example, have scored success, have benefited, etc.), etc.

5. The first basic form of thought is a concept. Concepts are formed (created) with the help of logical methods such as analysis and synthesis, abstraction and generalization. Analysis is the mental decomposition (dissection) of the object of thought in terms of the elements, the choice (separation) of either feature (sing), and the consideration of it separately. Analysis does not give knowledge of the object or phenomenon as a whole. Synthesis is the mental integration (association, combination, junction) of the elements of the object or of the phenomenon. Synthesis provides the knowledge of the object or phenomenon as a whole (as a unity of parts, as a system). But this knowledge is not the reliable and complete one. Abstraction is the mental separation, the mental extraction of the certain, essential features (sings) of the object or phenomenon, and the passing over of all the other features (i.e., abandonment of all other features (sings) without consideration). Generalization is the mental transition from the features (sings) of individual, separate, single objects to features (sings) belonging to whole groups (classes) of these objects.

6. All the concepts can be divided into the following separate types: single concepts and general concepts. The concept that relates to the only certain object, separate phenomenon, separate event, is called single (individual) concept. The concept that embraces (covers) a group (class) of similar things, objects is called general concept.

7. Each concept has two aspects: the scope (volume) of the concept and the content of the concept. The scope (volume) of the concept is all the objects and phenomena which can be embraced (covers) by the given concept. The scope (volume) of the general concepts is expressed in the form of a logical class. The concept content is a set of all the essential features (sings) of the objects, phenomena embraced (covered) by the concept.

8. All the concepts can be divided into the following separate types: concrete concepts and abstract concepts. The concrete concept is the concept that relates to groups, classes of objects, phenomena, or to separate objects, phenomena. The abstract concept is the concept of the properties

of objects or phenomena, if these properties are taken as the separate (independent) object of thought and are abstracted from objects.

9. There is a special kind of concepts that is called categories. The categories are the scientific concepts reflecting the most common properties of objects and phenomena, the most common and essential relations and connections in reality. For example, the concepts of “matter”, “movement”, “content”, “form”, “causality”, "freedom", “necessity”, “randomnicity”, “essence”, “phenomenon” are the categories.

10. There are the following relations between the concepts: identity relation; relation of subordination; relation of collateral subordination; relation of partial coincidence; relation of disagreement. (For example, the relation of disagreement exists between contradictory concepts and opposite concepts).

11. The second, more complicated, form of thought is a proposition. The proposition is the logical form of expression of thought. The proposition is the logical content of grammatical sentence. The proposition is a statement about the objects and phenomena of the objective reality. The statement states the existence or absence of certain features (sings) of objects and of phenomena. The proposition has the following two properties: (a) the proposition either asserts or denies (negates); (b) the proposition is either true or false. The proposition is always an assertion or a negation. The proposition is true if it reflects reality correctly; and the proposition is false if it reflects reality incorrectly. Every proposition represents a system of concepts. There are three elements in every proposition: subject, predicate, and connective word (element). The subject of the proposition is that what one states about. The predicate of the proposition is that what one states on the subject. The connective word (element) is an indication of the relation between subject and predicate. In any proposition, the subject and the predicate are concepts connected by a connective word (element). The connective element in any proposition is expressed by the words “is” or “is not”.

12. The third form of thought is an inference. The inference represents the connection of propositions, which makes it possible to derive a new proposition from a given one or more propositions. Those propositions from which one derives the new proposition are called premises, and the new proposition derived from the premises is called conclusion. The relation between the premises and the conclusion is the relation between reason (basis) and consequence (logical corollary): the premises are the reason (basis) from which the conclusion follows as a consequence (logical corollary). Consequently, the inference is based on the law of sufficient reason.

Depending on the number of premises, all the inferences are divided into two groups: immediate inferences and mediated inferences. The immediate inference is the inference in which the conclusion is the consequence of one premise. The mediated inference is the conclusion in which a new proposition is derived from two or more propositions.

13. The mediated inferences can be of two types: deductive and inductive. The mediated deductive inference is called syllogism if a conclusion is derived from two premises. The inference is called inductive inference if the premises indicate features of separate objects or groups of separate objects, and the conclusion is extended to other objects of the same kind. Deduction and induction are in inseparable connection with each other and supplement each other. Mathematics mainly uses the method of deduction.

14. Scientific induction is based on the determination of the causes. Therefore, the problem of the causal connection of phenomena is important for scientific induction. The causal connection of phenomena is that one phenomenon causes another phenomenon, and a change in the first phenomenon entails a change in the second phenomenon too. The phenomenon which necessarily entails another phenomenon is called cause, and the second phenomenon which is entailed by this cause is called effect of this cause. Thus, the connection of cause and effect is a connection of two phenomena, two facts. In order to determine the cause of the studied phenomenon, one should use two basic logical methods of the inductive research: an intercomparison of the circumstances in

which the given phenomenon occurs; a comparison of these circumstances (in which the given phenomenon occurs) with other circumstances (similar in other relations) in which the given phenomenon does not occur.

15. The validity (trueness) of some proposition is determined with the help of proof. The proof is a determination of the validity (trueness) of some propositions by the use of other true propositions from which the validity (trueness) of the given proposition follows. The proofs are based on the logical law of sufficient reason. The proof represents an indication of sufficient reason for whatever proposition. Whatever proof consists of three parts: thesis, arguments, demonstration (manifestation). The proposition is called thesis if one proves validity of this proposition. The propositions which are used for the proof of the thesis are called arguments (i.e., sufficient reason).

The derivation of thesis from arguments is called demonstration (manifestation). In other words, demonstration (manifestation) is the propositions that show why the given thesis is substantiated (grounded) by the given arguments.

2.2. The basic principles of rational dialectics

1. Rational dialectics (i.e., corrected dialectical materialism) is a science of programmed (predetermined) development: it is the science of the most common types of connections and laws of the development of nature, of human society, and of thought. The universal connection exists not only in the material world – in the nature and society – but also in thinking. The connection and interdependence of the forms of thought (for example, concepts) is (in the final analysis) the reflection of the universal connection and interdependence of the phenomena of the objective world in human consciousness. Since concepts are the reflection of objects in human consciousness, they are interconnected, and they cannot be taken in isolation from each other. Concepts must correspond to the natural and social processes, reflecting their contents.

2. The basic laws of dialectics are as follows: the law of unity and struggle of opposites; the law of transition of quantitative changes into qualitative changes; the law of negation of the negation. There are also the most common laws of dialectics, which do not belong to the basic ones. The paired (relative) categories of dialectics – necessity and chance, possibility and reality, form and content, essence and phenomenon, etc. – are the theoretical reflection of non-basic laws of dialectics. All the laws and categories of dialectics represent forms of thought, forms of cognition of the objective world, forms of reflection of the objective world in the human consciousness.

3. As it is known, the cognitive psychical activity of man is performed in the following way (by the scheme):

$$(\text{sensation, perception, representation}) \rightarrow (\text{concept}) \rightarrow (\text{theory}) \rightarrow (\text{practice}).$$

Sensation is a result of the influence (effect) of the outside world on the sense-organs of man; perception is an immediate (direct) sensuous reflection of the reality in the consciousness of man; a representation is an image of an object or phenomenon (which is not perceived at a given instant of time) in the consciousness of man. Thinking is carried out with the help of concepts. A concept is the form of thought reflecting and fixing the essential features (signs) of objects and phenomena of the objective reality. Theory is a system of concepts.

4. The unity of sensuous and rational moments in cognition is that sensuous cognition represents the starting point, the first stage of the cognitive activity. A man, even at the level of logical thinking, continues to rely on (rest upon) sensuously perceivable material in the form of visual images, of various schemes, of symbols, on sensuous form of language.

5. Material activity of people represents practice. Practice is (first of all) a sensuous-objective activity aimed at satisfying human needs. The theoretical activity is derived from practice.

Social practice is a starting and ending point of theory. The unity of theory and of practice is a starting point of epistemology. Practice is a driving force in cognition development.

6. Social practice is a criterion of truth. The criterion of truth can be found neither in the object of cognition nor in the consciousness of the subject. Practice is the experience of all humanity in its historical development. The absoluteness of practice as the criterion of truth is that all knowledge proven by practice is an objective truth. But, at every given stage (step) of theoretical study, practice can not corroborate completely or refute all theoretical propositions – in this sense, practice is relative. Only the unity of formal logic and of practice can corroborate completely or refute all theoretical propositions at every given stage (step) of theoretical study.

7. The law of transition of quantitative changes into qualitative changes is essential to analyze the foundations of mathematics. The essence of this law is as follows: quantitative and qualitative changes represent the dialectical unity (interconnection) of the opposite and interdependent aspects.

Quality is inherent determinacy in the objects and phenomena. Quality is the organic unity of the properties, features (signs), and characteristics, that makes it possible to distinguish the given object or phenomenon from the other ones. In other words, quality is the unity of structure and elements. "There are no qualities, but only objects with qualities" (Friedrich Engels). Quality expresses the specific character of an object or phenomenon in whole. Quality is not only a holistic characteristic but also a relatively stable set of signs (features) which determines the specificity of the given object. Quality is the holistic characteristic of an object or phenomenon; and property is one of the aspects (partial characteristics) of the object or phenomenon. Some properties express the qualitative determinacy of the object; other properties express the quantitative determinacy.

Quantity is the inherent determinacy in the objects and phenomena, which expresses the number of inherent properties of objects and of phenomena, the sum of the component parts of objects and of phenomena, the amount, the degree of intensity, the scale of development, etc. In other words, quantity is the determinacy in objects and phenomena, expressed by a number. For example, man ascertains simultaneously the quantitative expression of object properties such as volume, weight, length, speed, etc. The quantities of volume, weight, length, speed, etc. are the quantitative characteristics of these properties.

8. Quality and quantity are dialectically connected. They represent the unity of opposites. The qualitative determinacy does not exist without the quantitative determinacy, and vice versa. The unity of qualitative and quantitative determinacy is manifested in measure. The measure denotes the existence of the interdependence of the qualitative and quantitative aspects of the object or phenomenon. The measure expresses the limits (boundaries) within which objects and phenomena exist. Each state has its own measure. The violation of the measure leads to a change in the state. The transition from one state to another is a movement. The leading place belongs to the quality in the unity of qualitative and quantitative determinacy. Quality determines the framework of quantitative changes. The qualitative changes can only result from the quantitative changes (i.e. quantitative movement).

9. The law of transition of quantitative changes into qualitative changes is essential for analyzing systems. The important theoretical proposition of system analysis is as follows. The properties of the system determine the properties of the elements; and the properties of the elements characterize the properties of the system. The main problem is that the dependences of the system properties (qualitative and quantitative determinacy) on number of the elements and on the qualitative and quantitative determinacy of the elements is not reliably known. (From this point of view, the Universe (System) cannot be cognized by Mankind (as the element of the System).

10. The law of transition of quantitative changes into qualitative changes is essential to analyze the foundations of mathematics. The question of the fundamental applicability of mathematical methods in all the areas of scientific cognition must be decided on the basis of the law of interdependence of qualitative and quantitative determinacy. The following fundamental

statement results from this law: the operation of abstraction of quantitative determinacy from qualitative determinacy is an inadmissible mental operation.

11. The definitions of the concepts of "knowledge", "cognition", and "cognition system" are based on the definition of the following concepts: "subject", "object", "subject of thinking", and "object of thinking".

"Subject" and "object" are philosophical categories (concepts) denoting two interrelated, interacting aspects (elements) of the system, which are characterized by the following essential features: "activity" and "passivity". The subject (i.e., set of individuals) is a carrier of the feature of "activity", is an active aspect (i.e., the active element of the system), is a source of activity directed (aimed) at the passive aspect (i.e., at the passive element of the system). The object is a carrier of the feature of "passivity", is a passive aspect (i.e., the passive element of the system) to which the activity of the active aspect (i.e., the active element of the system) is directed (aimed).

The subject of thinking (thought) is the subject as a carrier, is a source of mental activity directed (aimed) to the object. The object of thinking (thought) is an object to which the mental activity of the subject is directed (aimed). Since the concepts of "subject of thinking" and "object of thinking" have meaning only in mutual connection, they form a system of concepts.

The concepts of "subject of thinking" and "object of thinking" are the basis for the following definitions.

(a) Cognition is an informational interaction between the subject and the object, the result from which derives the knowledge about the object. The object is expressed in the form of knowledge for the cognizing subject. Therefore, the content of science represents an expression of the given object in the form of knowledge: laws, categories, and other scientific principles generated and developed during the development of human society. From the formal-logical point of view, knowledge is a system of concepts and assertions. From the point of view of the information theory, knowledge is a system of the elements of information. From the epistemological point of view, the knowledge on the object is the essence of the object of cognition, and the object of cognition is a manifestation of the essence of the object.

(b) The scientific cognition of the world is carried out within the framework of the "human system of cognition" consisting of the "subject of cognition", the set of "objects of cognition", the "facilities of cognition", and "knowledge". The category of the "human system of cognition" is a complete system of concepts, determining human knowledge, and human knowledge characterizes this system. (Human knowledge is an objective if it does not depend on the "facilities of cognition" and on the world outlook for the "subject of cognition").

3. The structure of the scientific creation

As it is known, the analysis of the problem of scientific creation, creativity, is impossible without an analysis of the structure of the creative process and the separation (choosing, singling out) of the main stages (steps) of scientific creation. The standard structure includes the following 5 stages (steps): (1) the statement of problem, the formulation of purposes and tasks of the research; (2) the gathering of information and the search of logical methods for solving the problem; (3) the stage of maturation (gestation) of the idea, which is also called the "incubation period", and which is related to the work of the subconsciousness; (4) the appearance of a new idea in the form of guesswork; finding the approach to the solution of the problem with the help of the intuitive insight (strikening, aha reaction) or Enlightenment (inside light); (5) the formulation of the solution found; the substantiation of the found guesswork up to the level of hypothesis; the transformation of the hypothesis into a theory via logical proving and testing of the hypothesis.

In other words, logical, discursive, and intuitive moments in the creative process are interwoven.

The problem of the nature and of the role of intuition in scientific discovery should be emphasized due to the importance and transcendence of intuition.

Intuition – as a specific cognitive process – is the universal inherent feature of all people.

The significance of intuition in the cognitive process is confirmed by numerous observations over people in daily circumstances and in non-standard situations. As it is known, there is a great number of facts in Human culture, which demonstrate the possibility to obtain fundamentally new results by "aha reaction". For example, famous scientists like G. Helmholtz, A. Einstein, H. Poincare, J. Hadamard, and others gave the interesting evidences of the intuitive insights. In concordance with descriptions and the experimental study of intuition, three main features of intuition can be emphasized: (1) suddenness (spontaneity) for solving the problem; (2) unawareness of ways and of means to solve the problem; (3) directness of the prolem's solution comprehension.

In agreement with these features, intuition is defined as follows: intuition is the ability of truth cognition by its direct comprehension, without proof.

The psychological analysis of intuition is based on the study of the relation between the conscious and subconscious (unconscious) mechanisms. The epistemological nature of intuition is clarified in complex transitions of sensuous images into concepts, and in complex transitions of concepts into sensuous images by means of the synthesis of conceptual universality and the given sensuous. A number of contemporary authors see in these transitions an answer to the mysterious nature of intuitive knowledge.

There exist works of psychologists and physiologists in which factors contributing to intuition or non-contributing to the manifestation of intuition are investigated. The factors which are favorable to intuition are as follows: high professional level as a researcher; a deep knowledge of the problem; a strong motivation to solve the problem; the search dominant; the presence of hint about the correct idea, etc. Also, there exist some recommendations for activization of intuition: one ought to temporarily shut oneself down from problems in order to activate the subconscious mechanisms of thinking; one ought to work on several problems in parallel; one ought to believe in success, etc. As it is known from the history of philosophy, Plato, Aristotle, Descartes, and others paid a great attention to the problem of intuition.

Considering the scientific works of these outstanding creative personalities, it is demonstrated the deeply individual nature of creativity, the importance of professionalism, talent, intuition, and moral qualities of the researcher. The scientific cognition is both the discursive and the intuitive process [96, 97]; it is a confluence of necessity and randomness. As it is known, the experience of science development shows that creativity can be activated within certain limits. The creation control signifies influence not only on the individual abilities of the researcher, but also on socio-economic, political, and general-cultural circumstances in order to create favorable conditions for the manifestation of creativity.

4. The essences of man and of animal

The essence of man can be understood only within the framework of the system principle.

As it is known, the system principle reads as follows: the properties of the material system determine the properties of the material elements; the properties of the material elements characterize the properties of the material system.

1. In accordance with the system principle, the following assertions are right (valid): (a) the properties of the Universe (as a system) determine the properties of the Earth (as an element); the properties of the Earth (as an element) characterize the properties of the Universe (as a system); (b) the properties of the Earth (as a system) determine the properties of Mankind (as an element); the properties of Mankind (as an element) characterize the properties of the Earth (as a system); (c) the property of Mankind (as the system consisting of a set of countries) determine the properties of the country (as an element); properties of the country (as an element) characterize the properties of Mankind (as the system consisting of a set of countries); (d) the properties of the country (as a

system) determine the properties of the man (as an element); the properties of the man (as an element) characterize the properties of the country (as a system). Consequently, the properties of the man are determined by the properties of the Universe, the Earth, and Mankind [17, 19, 26-28, 38, 45, 47, 50, 86, 87].

2. In accordance with the rational dialectics (T.Z. Kalanov, between 1991 & 2016), living beings have measure, i.e. the unity of qualitative and quantitative determinacy. Living beings – man, animal, etc. – represent the unity of the two opposite material aspects [45, 47, 50]: physiological body (i.e., the controllable aspect which is a system of organs) and the psychical body (i.e., the controlling aspect which is the following system: the unity of subconsciousness (subliminal consciousness) and consciousness).

Human consciousness represents the unity of two opposite material aspects (T.Z. Kalanov, 2009c, 2010b, 2010e): Mind (Intellect) and Soul. The Soul is the unity of Good and of Evil. Human actions have only one "degree of freedom": freedom to do good or evil. The decomposition of the unity of Mind (Intellect) and of Soul signifies the following fact: the Mind (Intellect) becomes food for the Supreme Mind (Intellect) (which is a material object), and the Soul goes to Paradise or Hell (both of them are material objects) in accordance with the deeds (good-deeds or misdeeds) of man.

From this point of view, the interpretation of the story of Adam and of Eve is as follows. Adam and Eve being in Paradise (Eden) ate the "Apple of the Empty Mind" from the "Tree of Mind". As a result, their Souls were concatenated (united) with "Empty Mind". Since the unity of Mind and of Soul (i.e., the psychical body) cannot exist in Paradise (by definition, the concept of "Paradise" signifies the abode of the Good), Adam and Eve received knowledge from God (i.e., God placed, introduced knowledge (information) into their Empty Minds), and they were precipitated (casted out) from Paradise to the Earth. The overthrow to the Earth signifies the formation of the unity of "psychical body + physiological body". Therefore, the Earth is the abode of the unity of "psychical body + physiological (terrestrial) body"; the Moon is the abode of the unity of "psychical body + Lunar (extraterrestrial) body"; the Mars is the abode of the unity of "psychical body + Martian (extraterrestrial) body"; the Sun is the abode of the unity of "psychical body + Solar (extraterrestrial) body", etc.

3. As it is known, the qualitative determinacy of the systems "Mankind", "man" and "Fauna", "animal" remains an invariable one. This means that the development of these systems represents a quantitative change. The quantitative change is a manifestation of the qualitative determinacy. In other words, the qualitative determinacy of the system is the essence of the system, and the quantitative determinacy of the system is a manifestation of the essence. The qualitative determinacy of the system determines the borders of quantitative changes. The qualitative determinacy of the system is not identical to itself outside the borders of the quantitative determinacy. For example, the birth and death of the physiological body represent borders of the "physiological body + psychical body" system. The "physiological body + psychical body" system can be in different states. The death of the physiological body is the disintegration of the unity of the physiological body and of the psychical body. But the death of the physiological body does not signify the death of the psychical body. The psychical body can exist separately from the physiological body. This means that the psychical body represents the universal essence which does not depend on the properties of the physiological body.

4. The life of a living organism is conditioned by the existence of the following inherent property (qualitative determinacy): the instinct of conservation (preservation, retention) of life (i.e., self-preservation instinct, survival instinct, the instinct of the existence, the instinct of the struggle for existence). The life (existence) of a living organism is a struggle for existence, for the preservation (conservation) of the physiological body's life. The instinct of conservation (preservation, retention) of life represents the system of the following main elementary instincts: the

feeding (food) instinct, the instinct of reproduction, the instinct of activity (which is manifested in the form of "life energy", of the struggle for existence), the defensive instinct, the instinct of adaptability, the instinct of learning and of development. The instinct of life conservation (preservation) exists in the psychical body and manifests itself only in the system of "physiological body + psychical body". In other words, the instinct of preservation (conservation) of life represents a necessary condition for the life of the physiological body. The decomposition of the unity of the physiological and psychical body leads to the blockage of the instinct of preservation (conservation) of life, which exists in the psychical body. This means that a living organism was created as a full (completed) "physiological body + psychical body" system. A living organism was not created by piecemeal.

5. Thinking (thought) is one of the essential properties (attribute) of the instinct of life conservation (preservation, retention). Therefore, thinking (thought) is one of the essential properties (attributes) of each elementary instinct. Blocking the instinct of conservation of life signifies blocking the thinking (thought). The isolated psychical body cannot think. Thus, thinking (thought) is the attribute of the "physiological body + psychical body" system.

6. The food instinct is the need (necessity, wants) of material food (for the physiological body) and the need (necessity, wants) of psychical food (for the psychical body). The psychical food for people represents a product of human psychical activity. The psychical food for people is created and eaten (consumed). Examples of carriers of psychical food for are as follows: games, shows, arts, religion, learning, education, sciences, creative activity, and the results of creative activity. The psychical food for animals represents a product of animal psychical activity. The psychical food for animals is created and eaten (consumed) by animals. Examples of carriers of psychical food for animals are as follows: games and training.

7. Man gets psychical (i.e., immaterial, information-encoded) food from the ambient material space because the ambient material space is the source and the carrier of encoded information. This information has a unified, universal code. The psychical food (encoded information) is absorbed and processed by the subconsciousness and it is entered into the consciousness. The consciousness manifests (i.e., decodes) information in the form of thoughts and ideas. Moreover, the consciousness manifests the encoded information in the scope of concepts that exist in the consciousness. Thoughts and ideas are a human interpretation of the encoded information that exists in the subconscious. Brain implements (executes, exercises, accomplishes) materialization of thoughts, ideas (existing in the consciousness): the brain gives orders (commands, instructions) to organs in the physiological body to express the information as an oral speech and written speech, as music, symbols, concepts, theories, images, etc. These forms are the material carriers (incarnations) of the information. The information in the material forms is a psychical (spiritual) food for human consciousness, and it is eaten (consumed) by people.

The difference between the physiological properties of the bodies (for example, the human body and the animal body, male and female) determines the difference in interpreting the encoded information that exists in the subconscious. In other words, the interpretation of the encoded information that exists in the subconscious depends on the properties of the physiological bodies. One man can guess (calculate logically, heuristically) that another man thinks. But a man cannot guess (or calculate logically, heuristically) that an animal thinks. And animals cannot guess (or calculate logically, heuristically) that a man thinks.

8. The human interpretation of encoded information (existing in the subconsciousness) is carried out by the consciousness on the basis and within the scope of concepts that exist in the consciousness. If the necessary (basic) concepts do not exist in the consciousness, then the interpretation of encoded information cannot be carried out by the consciousness. This means that the possibility, accuracy, and trustworthiness (authenticity, reliability, adequacy, certainty) of the interpretation depend on the system of concepts that exist in the consciousness. The subconscious changes the structure of the consciousness: the subconscious orders concepts, and changes the

structure of the system of concepts. The subconsciousness "widens, expands, extends, broadens" and "illuminates, clarifies, does lucid" the consciousness. The expansion (broadening, widening) and the clarification of the consciousness are a necessary condition for correct interpretation of the encoded information that exists in the subconsciousness. The stepped (step-by-step, stepwise, sequential) expansion (broadening, widening) and enlightenment (clarification) of the consciousness (i.e., inductive development of consciousness) determines an inductive way of cognition of the Absolute Truth (i.e., the Universal Truth, the Universe's Truth, Universe's Moral Principles) and determines the inductive way of development of man and of Humanity (T.Z. Kalanov, 2007d, 2009c, 2010b, 2010e). The way of development of man and of Mankind is heavy way of cognition of the Absolute Truth via struggle for existence. Comprehension of the Absolute Truth (i.e., recognition of the existence and of uniqueness of God via the expansion of consciousness) is the single reason of the existence, the aim, the sense, and meaning of development, and destination (destiny) of man and of Mankind. In other words, the principle of development of Mankind is reduced to the principle of expansion of human consciousness.

Mankind will be absorbed (i.e., converted to another qualitative determinacy) by Supreme Mind, Supreme Intellect (T.Z. Kalanov, 2007d, 2009c, 2010b, 2010e) when Mankind will reach the border of development, border of expansion of consciousness.

Thus, in the comprehensive sense of the word, the thinking is an attribute (i.e., inherent and essential property, an essential feature) of the complete system "physiological body + psychical body + environment". In the broad sense of the word, the thinking is a process of interaction between "subconsciousness" and "consciousness":

$$thinking = subconsciousness \leftrightarrow consciousness.$$

Human thinking is a way (means, method, mechanism) of expansion of human consciousness.

9. Intercomparison of man and of animal is an important step to understanding the essence of man because man and animal have a common aspect: subconsciousness, consciousness, intellect. Man has the human consciousness (intellect), a monkey has monkey consciousness (intellect), a dog has canine consciousness (intellect), a cat has feline consciousness (intellect), a mouse has mouse consciousness (intellect), etc. The thinking is an innate ability of man and of animal to seek, to guess, to find, and to check (i.e., to prove in practice) the solution of the problem. The found solution is materially manifested (expressed) in the actions of man and of animal. One man can guess (calculate logically, heuristically) that another man thinks. But man cannot guess (or calculate logically, heuristically) that animal think. And animal cannot guess (or calculate logically, heuristically) that man think.

a) Man and animal are living (rational) beings, biological objects, biological systems, biological machines, biological robots (in the broad sense of the word). The living being is a material system. This system represents the unity of two material aspects: external (physiological) and internal (psychical) aspects (T.Z. Kalanov, 2007d, 2009c, 2010b, 2010e). The external aspect is the physiological body (physiological machine; form of manifestation of the essence) which consists of the controlling organ (brain and spinal cord) and the controllable organs. The psychical aspect represents the psychical body (psychical machine; psychical aura; unity of consciousness and of subconsciousness; content, essence) which controls the physiological body. Currently, there is no complete understanding of the psychical aspect because there is no understanding of the work of the subconsciousness.

b) The brain of the thinking being is a system consisting of two hemispheres. The hemispheres are composed of zones (functional areas). Connection between the zones forms the structure of the brain. The structure of the brain is a congenital one. But the congenital structure of the brain can be

changed under the strong influence of different (internal and external) factors. This change is due to the control action of the subconsciousness. The extreme situation leads to the mobilization and concentration of physical and spiritual forces of the living being to solve the essential (vital) problem arisen. The physical and spiritual forces are determined by his resources. The living being (as the unity of the physiological and psychical aspects) has the programmed quality: the living being tends to attack, to solve, "to devour" ("to consume") the essential (vital) problem in order to survive and to achieve the feelings of satisfaction and of peace. (The feelings of pleasure, satisfaction, and of peace are also a reward for hard work!). In this case, zones of the brain can be disconnected, moved and combined (united) to solve the essential (vital) problems. The brain is an organ that controls the material manifestation of the information contained in the subconsciousness and the consciousness. Thus, the unity of the psychical and physiological aspects is a necessary condition for the solution of the essential (vital) problems.

c) Creative activity of the thinking being is conditioned by inseparable relation between the subconsciousness, the consciousness, and the physiological body. Strong emotions – the inducement, the motivation, the indomitable desire to achieve the goal, hope, disappointment, the need to satisfy the desire, the aspiration for satisfaction of the desire – are the driving force of the creative activity. The existence of emotions, thinking, correct thinking is a necessary condition for achieving the goal (i.e., for achieving result, satisfaction). Thinking, intellect, and intelligence are means of understanding of the result.

d) Man and animal are the qualitatively and quantitatively different thinking beings. The difference represents the difference of the essences (contents, qualities) and of the manifestations (forms, quantities) of the essences. One man can guess (calculate logically, heuristically) that another man thinks. But man cannot guess (or calculate logically, heuristically) that animal think. And animal cannot guess (or calculate logically, heuristically) that man think. The difference is stipulated by the principle of development of Mankind. The principle of development of Mankind stipulates human thinking. Connection and relation between the human and animal worlds are expressed in the dialectical law of the unity and of struggle of opposites.

Man is the highest rung in the hierarchy of living organisms on the Earth, the subject of socio-historical and cultural activities. A distinctive and essential feature of man is cultural, social, and speech activity, ability to work, ability to think in words, ability to produce tools, ability to use the tools for transformation of the world. Speech (oral and written) activity is a specific kind of communicative human activity, a means of expressing thoughts. Speech and mental activity are interdependent forms of human intellectual activity. Human thinking and expression of result of the thinking are carried out by means of a system of concepts (and a system of logical judgments). The concepts and the logical judgments are forms of thought. The forms and contents of thoughts are determined by innate qualities and human resources, practical, social and intellectual experience of the person. Human thinking represents the unity of sensuous and rational aspects: the unity of sensuous-objective (i.e., practical) thinking and of abstract (i.e., theoretical) thinking. Human activity is a means of expanding human consciousness.

Animal does not have the essential human qualities, does not have practical, social and intellectual experience of man and does not have the cognitive potential of man. Animal can think. But animal cannot think with the help of concepts, and it has no language means to express thoughts. Animal thinking represents the sensuous-objective (i.e. practical) thinking. Therefore, animal cannot learn formal logic and dialectics. One man can guess (calculate logically, heuristically) that another man thinks. But man cannot guess (or calculate logically, heuristically) that animal think. And animal cannot guess (or calculate logically, heuristically) that man think.

Animal cannot solve the human problems because animal has no human essence. This signifies that one cannot teach animal the following human activities: to formulate and to prove the theorem, to analyze critically the works of the scientists, etc. (One can teach a parrot to speak, but it does not signify that talking parrot can operate with concepts and can prove the theorems).

Therefore, animal activity does not lead to the essential expansion of animal consciousness and origination (formation, arising) of the human consciousness.

e) The unity of the subconscious and conscious of aspects of the human psychic setup is a necessary condition for scientific creation. The ardent, fervent, passionate desire to solve the problem, a long (for months and maybe years), a exhausting, a agonizing, a delightful, and a tireless search for solution to the vital (essential) problems lead to the fact that human consciousness is clarified and expanded: the subconsciousness finds a solution based on concepts that exist in the consciousness; the solution is transferred from the subconsciousness to the consciousness (i.e., the solution of the problem is manifested (decoded) in the consciousness. The solution of the problem represents a new system of concepts); man finds peace of mind, self-reliance, and feeling of satisfaction. This solution represents a guess, conjecture [96, 97]. The guessed solution allows to guess and to construct the proof. Thus, creative activity in science is manifested in guessing of the result (statement, theorem, theory) and guessing of the proof of the result (statement, theorem, theory).

f) The solution of the problem can be guessed by man because the subconsciousness has the following essential feature (quality, attribute): (1) to receive, to contain, and to process information in a coded form; (2) to contain the program of development of man and of Humanity; (3) to operate purposefully without concepts; (4) to operate taking into account of the concepts which is contained in the consciousness; (5) to estimate, to evaluate, to assess mentally the structure of the object of thinking (cognition); (6) to break, to sever mentally connections between the connected elements of the object of thinking (cognition); (7) to establish mentally connections between unconnected (unrelated) elements of the object of thinking (cognition); (8) to estimate, to evaluate mentally the adequacy of the mental operations.

The consciousness can decode the information which is contained in the subconsciousness. Mentally-related elements of the object of thinking (cognition) represent a system of concepts and of logical propositions (judgments) in the consciousness. (Concept as a form of thought represents a unity of stability and of instability within certain limits). In other words, consciousness manifests mentally-related elements of the object of thinking (cognition) in the form of a system of concepts and of logical propositions (judgments). This system of concepts is called a solution of the problem. The proof of the problem, theorem is the awareness (realization) of the structure (i.e., connection of elements) of the system of concepts. The proof of the problem (theorem) is carried out in two stages (steps): the first stage (step) is the analysis, i.e., the successive expansion of the system of concepts and logical propositions (judgments) in terms of the elements. It is a movement from the terminal point (result) to the initial (starting) point of the problem (this is necessary condition); the second stage is the movement from the initial (starting) point of the problem to the terminal point (result) of the problem, theorem (this is sufficient condition). The solution of the problem (theorem) is correct (true) if and only if necessary and sufficient conditions are correct.

Thus, the inseparable connection, interdependence and interaction between the subconsciousness and consciousness is a necessary condition for prospecting and finding a solution to the problem and for guessing and proof of solution of the problem (theorem).

The main points of this section are as follows:

(1) thinking is an attribute of the living being as the material system “physiological body + psychical body”; “psychical body” is a material system “subconsciousness + consciousness”;

(2) thinking is one of the essential features (signs) of the instinct of conservation of life (instinct of self-preservative, instinct of survival); the instinct of conservation of life (instinct of self-preservative, instinct of survival) is a system of instincts; a system of instincts exists in the subconsciousness; a system of instincts does not work without the “physiological body”;

(3) the interconnection, the interdependence, the interaction between the subconsciousness and the consciousness is a necessary condition for the existence of thinking; the existence of a complete system of "living being + environment" is a sufficient condition for the existence of thinking;
(4) the essence of thinking (thought) is manifested in the purposeful (rational, expedient, reasonable, appropriate, practical) activities of a living being; the purposeful (rational, expedient, reasonable, appropriate, practical) activities of a living being are aimed (directed) at the conservation (preservation, maintenance) of life (i.e., at the conservation, preservation of the physiological body);
(5) certain living being can solve human (including scientific) problems if and only if a living being has human nature.

5. The essence of scientific creation

As is known, the difficult, mysterious, esoteric way of cognition of scientific truth was described by famous creative scientists – mathematicians (for example, H. Poincare J. Hadamard, G. Polya) and physicists (for example, M. Planck, N. Bohr, A. Einstein) – in many books, articles, and autobiographical sketches. I can describe it by the following typical example from my life.
Over the years, I developed the "hard" style of analysis, based on the use of the correct methodological basis: the unity of formal logic and of rational dialectics. Internal work began with what I had understood intuitively (i.e., I had guessed right) the existence of logical errors in the analyzed scientific works of the classics of theoretical physics. For a long time, Albert Einstein was my first and last serious opponent. The critical study of the works of the classics of theoretical physics was continued several years in nonstop run: during the day, I read the works of the classics (doing an effort to penetrate deeply into the problem), I thought over the problem (trying to restate the problem and to construct proof of the problem on this basis), and I could not sleep at night because I continued to think. The long-time and continuous reflections over the concepts that seemed previously to me to be so clear and precise made them blurry, fuzzy, and shaky ones. This internal work can be compared with the movement through a fog (mist) towards light. In the process of the work, I came up close to the psycho-physiological border, limit of my life: I felt and was aware of the existence of this border (but I did not cross the border: instinct of self-preservation worked!). Being in such an extreme state, I began finally to feel that:
(a) the mist was being dissipated, and a stable and permanent (long-time) lucid interval of consciousness was being occurred, i.e., clear and explicitly palpable understanding was being appeared, thoughts were being ordered, the concepts were becoming accurate, clear, precise ones. (A clear understanding, perceived as a peace and self-reliance is always the result of stable lucid interval (strikening, clarification, antireflection, Enlightenment ad vitam) for keeps, rather than short-time flash of inspiration. The flash of inspiration – short-time and unstable lucid interval – does not lead to the change in the structure of consciousness. And the stable lucid interval (strikening, clarification, antireflection, Enlightenment ad vitam) for keeps always expands consciousness and changes its structure for keeps);
(b) the space around me was full of prompts, ideas. As a result of this experience, my consciousness (mind) was changed: I found a calm, stable self-reliance (independent of the opinions and relations of colleagues), i.e., I found the sensation of support which proceeded from the Supreme Intellect (Mind) surrounding me. Finally, I understood the essence of errors in Einstein's papers and in the papers of other classics of theoretical physics. I wrote series of the critical articles which was published in the peer-rewired journals. Then the classics of physics became my friends!

So I became indifferent to the critical (i.e., incompetent) opinions and high-profile titles of colleagues. Thus, I found steady faith in myself, i.e., I found my "Ego".

Finding of my "Ego" impelled me to consider the part of the passed way of cognition in the deductive point of view. As is known, the inductive method of cognition does not allow reliably predict, explain the future events because the "future events" are not a simple consequence of the

"present events". In the deductive point of view, the past "facts of biography" of the person are a consequence of the future "facts of biography" destined (intended) by the Supreme Intellect (Mind): destination is primary, and the "facts of biography" are secondary. So, I realized that my destiny and my "Ego" are inseparably connected with the existence of the Supreme Intellect (Mind), are determined by the Supreme Intellect (Mind), and relied on the Supreme Intellect (Mind). Reasoning in this way, I subsequently guessed right the theorem of existence of God. I expended several years to prove the theorem. The definition of the concept of "God" given by Isaac Newton in his work, "Mathematical Principles of Natural Philosophy", had an influence on my choice of method of proof. But the essence of the creative process is inscrutable, unfathomable one. Creation is a riddle, a mystery. There is no solution to this mystery!

However, the result of the creative activity can be easily tested (verified) by scientists. Example of the creative solution of the Euclid's V-th postulate is as follows (T.Z. Kalanov, 2011a).
As is well known, the triangle is one of the most important figures in geometry and trigonometry. This figure as a material system can be constructed and studied as follows.
1. The triangle is constructed as is follows. If the sides of the angle are bound up with the rectilinear segment, then the synthesized system (the constructed geometrical figure) $\Delta\, AOB$ is called triangle (Figure 1).

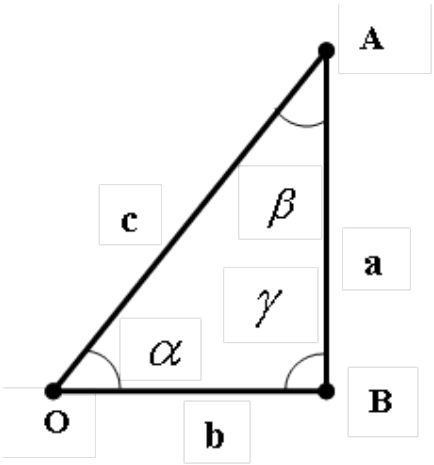


Figure 1. Geometrical figure "right triangle" as a material system. Points are universal joints.

Three points O, A and B are called vertexes of triangle. The rectilinear segments a, b and c bounded (bordered) by vertexes are called legs of triangle $\Delta\, AOB$. Triangle as a material system does not exist if length of any leg is equal to zero. Existence of interior angles α, β, γ of triangle leads to rise of the essential property (feature, parameter) of system: the sum $S = \alpha + \beta + \gamma$. The problem of value of the sum S is the essence of the problem of Euclid's V-th postulate. Value of S can be determined only by means of experimental investigation of properties of triangle as a material system.

2. The experimental device for determination of value S represents the following material design: material triangle $\Delta\, AOB$ which has vertexes O, A, B as joints. The joints give opportunity to change the following characteristics of triangle: values of quantities α, β, γ of angles and lengths of legs a, b, c of the triangle under the condition that $a \neq 0$, $b \neq 0$, $c \neq 0$.

In other words, joints give an opportunity of structural ("internal") movement of triangle

(i.e., transitions from some structural states into others). (By definition, the structural movement of the system is the conservation of the basic properties of the system under various internal and external changes).

Structural movement of triangle is reduced to two elementary movements of its legs: to the "shift along a straight line" and to the "rotation around a point"). Statement of the problem of Euclid's V-th postulate is as follows: it is necessary to show experimentally that $S = 180°$ and this property of a triangle (as a system) does not depend on properties of elements of a triangle. In other words, it is necessary to show that S is the invariant of the structural movement of a triangle.

The result of the experiment is as follows (T.Z. Kalanov, 1995a):

(a) if the quantity α is subject to change, then this change leads to a change quantities β and γ; $0° \le \alpha \le 180°$; $0° \le \beta \le 180°$; $0° \le \gamma \le 180°$;

(b) if $\alpha \to 0°$, then $\beta + \gamma \to 180°$;

(c) if $\alpha \to 180°$, then $\beta + \gamma \to 0°$;

(d) $0° \le (\beta + \gamma) \le 180°$;

(e) area (as a variable) is not the essential feature of triangle;

(f) lengths of legs a, b, c of triangle are not equal to zero. In other words, unlike reasoning of A.M. Legendre, it is not assumed in this experiment that "legs of triangle increase infinitely" (N. Lobachevski).

Therefore, it is possible "to conclude from this that approaching of opposite legs to the third side under decrease of two angles is necessarily finished with transmutation of other angle into two right angles" (N. Lobachevski). This result of the experiment signifies that quantity S represents the sum of the adjacent angles α and $(\beta + \gamma)$. Hence, $S = 180°$. Thus, Euclid's V-th postulate (or the axiom V in the list of Hilbert's axioms) is proven. Consequence is as follows: the list of

Hilbert's axioms is incomplete because it does not contain the definition of concept of triangle; therefore, axiom V is not a logical consequence of axioms I-IV. (In other words, the properties of the triangle can be learned only if the triangle has already been constructed (i.e., if the triangle is defined in the list of axioms). Therefore, the property ($S = 180°$) of the triangle $\Delta\, AOB$ as the system is not a logical consequence of the property of the angle $\angle AOB$).

Thus, the experimental study of the properties of a triangle as a material system gave me an opportunity to prove Euclid's V-th postulate. However, I don't know Who (or what the Essence) led me in this way. What is this Essence?

6. Discussions

In my opinion, the problem of the creation of Artificial Intelligence (AI) and Artificial General Intelligence (AGI) is a problem of modeling Human Intellect (Human Mind, thought). The scientific problems must be researched within the framework of the correct methodological basis: the unity of formal logic and of rational dialectics. The criterion of truth is practice. And practice is a starting point of any correct theory.

1. As is known, the practical (empirical) facts are as follows:

(a) man enters into the comatose state if his consciousness is completely blocked. This signifies that thinking does not work without consciousness;

(b) man (i.e., the physiological body) dies (i.e., breathing and heart functions are ceased) if his subconsciousness is completely blocked (i.e., if the connection between the subconsciousness and the physiological body is disrupted). This signifies that the subconsciousness of the living man always works. Thus, life and a thinking (thought) cannot exist without the subconsciousness and the physiological body;

(c) man becomes a bio-robot (biological robot, in the narrow sense of the word) if its subconsciousness is not completely blocked. This signifies that a thinking works in a narrow,

restricted, limited range. Bio-robots can eat, drink, talk, cry, laugh, work, and carry out simple orders, commands within the framework of the patterns of behavior, which is contained in his consciousness. But bio-robot cannot think critically and create. Thus, the thinking is an essential property (i.e., an essential feature, attribute) of the system "subconsciousness + consciousness". The creative thinking does not exist without the subconsciousness;

(d) research of hypnotic and meditative states proves the existence of a complex structure of the subconsciousness; the structure of the subconsciousness, probably, cannot be cognized;

(e) the consciousness has a complex architecture, and it can be in several states: active, passive, and intermediate states. Each state of consciousness characterizes a certain state of the system "subconsciousness + consciousness" and a certain condition (mode, regime) of interaction between the subconsciousness and the consciousness. The consciousness in the active state operates in selective mode (regime): the consciousness censors and filters the incoming information (if information comes slowly). The consciousness in the passive state (i.e., in a sleepy or a hypnotic state) does not choose, does not select, does not censor, does not filter the incoming information. In this case, the information coming from the outside is acquired without resistance by the consciousness. This circumstance is used in practice of psychological (particularly, psycholinguistic) programming (coding) of the consciousness of the man;

(f) the psychological (psycholinguistic, in particular) programming (psycholinguistic programming (coding)) of the consciousness of man forms new rules (schemes, instructions) of behavior (actions) of man. The new rules (schemes, instructions) are retained (maintained, conserved) in the consciousness and taken into account by the subconsciousness up to a certain moment until a programmer or subconsciousness does not change the rules. Psychological programming of the consciousness of man is an effective means to stimulate mental activity. However, psychological programming of the consciousness of man is not an effective means to stimulate creative activity;

(g) the means of the increase of effectiveness of activities of the creative people is formation of a powerful incentive, formation of a special environment (surroundings) and of existence conditions. The history of sciences and my experience show that the creative activity of man is highly dependent on the specificity of incentive (stimulus). The comfort (comfortable) conditions of life and the pursuit of comfort (comfortable) conditions of life are not a necessary and sufficient condition for the effectiveness of scientific creativity. The comfort (comfortable) conditions of life give rise to the "corporative science": the "science" of conservation of comfort (comfortable) conditions of life of the scientist. The comfort (comfortable) conditions of life do not stimulate the search for scientific truth.

2. As is known from the history of sciences, the search for scientific truth – as the aspiration for a vital-essential aim (goal) – is the true sense (content, meaning) of life and of activity of a creative man. The search for scientific truth is possible if and only if the scientific community raises the truth (but not man!) on the pedestal (podium), if the search for the truth becomes a vital necessity and sense (content, meaning) of the life of a scientist. In this case, the scientific community also gives opportunity to scientists for open criticism of whatever scientific work. The possibility of public discussion and of criticism is an important condition for the existence of sciences, for the development of sciences, and for the increase of effectiveness of activities of the creative scientists. Another important condition is the search for and selection of independent researchers. The independently thinking researchers can go against the current, striving for truth. The scientists of geniuses were and are always the independently thinking researchers.

3. Can a computer think? Can a computer replace the creative man? To answer these questions, one must compare man (in particular, the creative man) with a computer. In concordance with formal logic, the comparison can be made if man and a computer have common certain aspect.

It is clear that the essences of man and a computer are absolutely different. However, the

certain manifestations of the essences can be similar and comparable with each other. Obviously, the ability to process information and perform computations is the common aspect of the manifestations of the essences of man and of a computer.

(a) As is known, "a computer is a general-purpose electronic device that must be programmed to carry out a set of arithmetic or logical operations automatically (without human intervention). Since a sequence of operations can be readily changed, the computer can solve more than one kind of problem. The principle of the modern computer was first described by mathematician and pioneering computer scientist Alan Turing, who set out the idea in his seminal 1936 paper, "On computable numbers".

Conventionally, a computer consists of at least one processing element, typically a central processing unit (CPU), and some form of memory. The processing element carries out arithmetic and logic operations, and a sequencing and control unit can change the order of operations in response to stored information. Peripheral devices allow information to be retrieved from an external source, and the result of operations saved and retrieved.

The defining feature of modern computers which distinguishes them from all other machines is that they can be programmed. That is to say that some type of instructions (the program) can be given to the computer and it will process them. Modern computers based on the von Neumann architecture often have machine code in the form of an imperative programming language.

Computer programming (coding) is a process that leads from an original formulation of a computing problem to executable computer programs. Programming involves activities such as analysis, developing understanding, generating algorithms, verification of requirements of algorithms including their correctness and resources consumption, and implementation (commonly referred to as coding) of algorithms in a target programming language. Source code is written in one or more programming languages. The purpose of programming is to find a sequence of instructions that will automate performing a specific task or solving a given problem. The process of programming thus often requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic.

The synthesis of numerical calculation, predetermined operation and output, along with a way to organize and input instructions in a manner relatively easy for humans to conceive and produce, led to the modern development of computer programming. Computer programmers are those who write computer software. Their jobs usually involve: coding, debugging, documentation, integration, maintenance, requirements analysis, software architecture, software testing, and specification.

A computer will solve problems in exactly the way it is programmed to, without regard to efficiency, alternative solutions, possible shortcuts, or possible errors in the code. Computer programs that learn and adapt are part of the emerging field of artificial intelligence and machine learning" (from Wikipedia);

(b) A programmer and a computer represent the system: "programmer + computer". Mutual connection between the programmer and the computer is that a work of programmer depends on the features (possibilities) and operation of the computer, and the operation (work) of the computer is dependent on the features (possibilities) and operation of the programmer. But elements of the system "programmer + computer" are not equisignificant (equivalent, interchangeable) ones. There is the following dialectical relation between the elements: the "programmer" is a controlling element (aspect), and the "computer" is a controllable element (aspect). An essential feature (i.e., essence) of the system "programmer + computer" is a data-processing property.

(c) "Artificial intelligence (AI) is the intelligence exhibited by machines or software. It is also the name of the academic field of study which studies how to create computers and computer software that are capable of intelligent behavior. Major AI researchers and textbooks define this field as "the study and design of intelligent agents", in which an intelligent agent is a system that perceives its

environment and takes actions that maximize its chances of success. John McCarthy, who coined the term in 1955, defines it as "the science and engineering of making intelligent machines".

AI research is highly technical and specialized, and is deeply divided into subfields that often fail to communicate with each other. Some of the division is due to social and cultural factors: subfields have grown up around particular institutions and the work of individual researchers. AI research is also divided by several technical issues. Some subfields focus on the solution of specific problems. Others focus on one of several possible approaches or on the use of a particular tool or towards the accomplishment of particular applications.

The central problems (or goals) of AI research include reasoning, knowledge, planning, learning, natural language processing (communication), perception and the ability to move and manipulate objects. General intelligence is still among the field's long-term goals. Currently, popular approaches include statistical methods, computational intelligence and traditional symbolic

AI. There are a large number of tools used in AI, including versions of search and mathematical optimization, logic, methods based on probability and economics, and many others.

The AI field is interdisciplinary, in which a number of sciences and professions converge, including computer science, mathematics, psychology, linguistics, philosophy and neuroscience, as well as other specialized fields such as artificial psychology.

The field was founded on the claim that a central property of humans, human intelligence – the sapience of Homo sapiens – "can be so precisely described that a machine can be made to simulate it". This raises philosophical issues about the nature of the mind and the ethics of creating artificial beings endowed with human-like intelligence, issues which have been addressed by myth, fiction and philosophy since antiquity. Artificial intelligence has been the subject of tremendous optimism but has also suffered stunning setbacks. Today it has become an essential part of the technology industry, providing the heavy lifting for many of the most challenging problems in computer science" (Wikipedia).

"There are different approaches to understanding the problem of Artificial Intelligence. Members of the Russian Association of Artificial Intelligence give the following definitions of Artificial Intelligence. Artificial Intelligence is:

(1) the scientific direction which is aimed at solving tasks of hardware or software modeling (simulation) of the intellectual aspects of human activities;

(2) the property of the intellectual systems to perform creative functions which are traditionally considered as the prerogative of man;

(3) the set (complex) of computer sciences which are the basis of information technology. The task of this science is the reconstruction of rational reasoning and actions with the help of computer systems and other artificial devices.

One of the definitions of intelligence, which is common for both man and "machine", can be formulated as follows: intelligence is the ability of the system to create programs (in the first place, heuristic programs) in the course of self-instruction in order to solve the problems of certain class of the complexity

However, there is no single (uniform, standard) response to the following questions: What is the Artificial Intelligence? What is the criterion of "reasonableness" of computers? What are the boundaries of potential (ability) of computers? Does the level of human development will be reached by a machine? Almost every one of the authors, who write about the problem of AI, proceeds from some definition characterizing achievements in a certain (special-scientific) fields of sciences. But there is no general-scientific (philosophical) definition of AI because the problem of the nature and of the status of the human intellect has no been solved in philosophy until now" (Russian Wikipedia).

4. The quotations from Wikipedia show that development of a computer represents a change in quantitative certainty of a computer. But the quantitative determinacy (i.e., the essence) of the computer is not changed in the evolvement. The essence of the computer as an electronic (or biological) device is characterized only by the informational-computational aspect.

Common aspect of man and of computer is a property (ability) to operate with information and to perform calculations. The informational-computational property is a special property. And thinking (thought) is a common property which includes the informational-computational property. Consequently, in accordance with the formal logic, thinking (thought) and calculation are not identical properties (features). The relation of partial coincidence exists between the concepts of "thinking (thought)" and "calculation": (1) the existence of thinking (as common feature, as the essence) is cause of the existence of computational property (as special feature); (2) the existence of computational property (as special feature) does not set conditions for the existence of thinking (as common feature, as the essence).

A programmer as a creative man can create computer programs only for the processes that he understands. A computer cannot carry out the instructions which are not described in detail by the programmer. Therefore, limit of the development of the system "programmer + computer" is determined by the limit of the development of the programmer. The programmer as man will never be able to model the thinking and to create an algorithm for creation because: (a) man cannot cognize the essential properties of the complete system "physiological body + psychical body + environment"; (b) the creative process is not amenable to rational analysis. (In the eminent physiologist Professor N.P. Bechtereva's opinion, intercomparison of brain and computer is a inadmissible mental operation because brain and computer have different qualitative determinacy).

This signifies that the problem of the creation of Artificial Intelligence (AI) and Artificial General Intelligence (AGI) as a problem of computer simulation (modeling) of the human thinking (thought) has no positive solution.

Creating of AI and of AGI is impossible because: (1) the mechanism of operation (action) of the system "subconsciousness + consciousness" (underlying of thinking) cannot be cognized (learned, understood) by man; (2) a computer as a device cannot think because it has no the system the system "subconsciousness + consciousness". Thinking is an inseparable, integral and essential property (feature) of the system "physiological body + psychical body"; (3) modeling of manifestation of the essence (i.e., thinking) of man does not signify modeling of the essence (i.e., thinking) of man because a manifestation of the essence is not identical with the essence; (4) modeling of manifestation of the essence is imitation (simulation) of manifestation of the essence; (5) the imitation (simulation) of manifestation of the essence does not lead to origination (appearance) of essence (i.e., thinking, thought); (6) there is no practical proof (evidence) of the existence of AI and AGI in the world; (7) in order that a computer can solve scientific (i.e., human) problems, a computer must have the qualitative determinacy of man. In other words, a computer and man must be identical to each other, must have identical essential features. Therefore, the problem of creation of AI and AGI is the problem of creation of "man-computer" (i.e., man who is a computer or computer which is man).

Remark 1. My solution of the P versus NP problem is as follows: there really is no human way to generate the creative answer with the help of a computer. Moreover, the works devoted to the P versus NP problem, contain the formal-logical error. The error is that the problems in these works are divided into classes of complexity. But complexity is not an essential feature (sign) of a problem. The feature (sign) of the concept of "complexity" is not the basis (characteristic) of division of the concept of problem. The basis (characteristic) of division of the concept of problem is the following essential feature (sign): "solvability". Therefore, all problems should be divided into two classes: the "class of solvable problems" and the "class of non-solvable problems". If the problem statement (formulation) contains formal-logical errors, then the problem belongs to the

"class of non-solvable problems". (In this case, there is neither a positive nor a negative solution). If the problem statement (formulation) does not contain any formal-logical errors, then the problem belongs to the "class of solvable problems". (In this case, there is either a positive or a negative solution).

Remark 2. My remark on the **Millennium Problems,** major unsolved problems, is as follows. In my opinion, the "seven Millennium Prize Problems selected by the Clay Mathematics Institute to carry a US$1,000,000 prize for the first correct solution" cannot be solved. These problems belong to the "class of non-solvable problems" because they contain the formal-logical and dialectical-materialistic errors. But computer cannot critically analyze (examine) these problems and find errors because computer has no the system "subconsciousness + consciousness", and programmer (who has the system "subconsciousness + consciousness") does not use the correct methodological basis of scientific analysis.

7. Conclusions

Thus, the critical analysis of the problem of creation of Artificial Intelligence and of Artificial General Intelligence within the framework of the correct methodological basis leads to the following results:

1) intercomparison of man and animal is a necessary step to understanding the essence of thinking (thought);

2) thinking (thought) is an attribute of the complete system: "man + environment". The subsystem "man" represents the unity of the following material aspects: "physiological body + psychic body". The subsystem "psychic body" represents the unity of the following material aspects: "subconsciousness + consciousness";

3) thinking (thought) is an essential feature of the instinct of conservation (preservation, retention) of life. The instinct of conservation (preservation, retention) of life represents the system of the main elementary instincts (the feeding (food) instinct, the instinct of reproduction, the instinct of activity, the defensive instinct, the adaptability instinct, the instinct of learning and of development. The instinct of conservation (preservation) of life exists in the psychical body and manifests itself only in the system of "physiological body + psychical body";

4) life is the struggle for existence, the struggle for the conservation (preservation, retention) of the physiological body. Thinking (thought) is manifested in the appropriate (reasonable, rational, sensible) actions aimed at the conservation (preservation, retention) of life and at the creation of conditions for life. The criterion of the existence of thinking (thought) is practice;

5) creation is a process of interaction between the subconsciousness and the consciousness. The existence of the system "subconsciousness + consciousness" is a necessary condition for creativity. The existence of the "physiological body" is essential for manifestation of creativity;

6) the scientific creation is a mysterious, esoteric process of cognition of scientific truth. The creation is manifested as a guess (conjecture) in the consciousness. The creation is not accessible (not understandable, not available) to analysis and understanding because the mechanism of the operation of the subconsciousness and of the system "subconsciousness + consciousness" cannot be understood by man;

7) computer as a device cannot think and create because it has no the system "subconsciousness + consciousness". Modeling (simulation) of manifestation of the essence (i.e., thinking, thought) of man does not signify modeling (simulation) of the essence (i.e., thinking, thought) of man. Modeling (simulation) of thinking (thought) is imitation of thinking (thought). Imitation of thinking (thought) does not lead to the emergence (appearance, origination, existence) of thinking (thought). Therefore, the creation of AI and AGI is impossible;

8) there is no practical proof (evidence) of the existence of AI and of AGI in the world. Also, the correct theoretical proof of the existence of AI and of AGI does not exist and cannot exist in science because the existence of AI and of AGI contradicts to formal logic and rational dialectics.

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Temur Z. Kalanov was born in Tashkent (Uzbekistan), in 1944. In 1968 he graduated from the Department of Engineering Physics at the Tashkent Polytechnic Institute and achieved the degree of M.Sc. in Engineering Physics. In 1968-1971 he was postgraduate at the Institute of Electronics (Academy of Sciences, Tashkent, Uzbekistan) by the speciality of "Physical Electronics, Including Quantum Electronics". In 1971-1981 he worked as Junior Research Scientist of the Theoretical Sector at the Institute of Electronics. In 1979 he defended Ph.D. thesis on "Vibrational relaxation in the gas systems with sources of the vibrationally excited molecules" at the Physical-Technical Institute. In 1981-2004 he was Senior Research Scientist at the Theoretical Sector of the Institute of Electronics. Working at the Institute of Electronics as Senior Research Scientist, he wrote a series of original works. His pioneering works on the critical analysis of the foundations of statistical physics were published in the "Reports of the Academy of Sciences of the Republic of Uzbekistan" and "Reports of the Academy of Sciences of the USSR". In 1993 he presented his doctoral dissertation on the following subject: "The correct quantum-statistical description of ideal systems within the framework of the master equation" (by the speciality of "Theoretical Physics"). Between 1995 and 1999, his pioneering works devoted to the critical analysis of the Larmor-Lorentz-Poincare-Einstein special theory of relativity were published in peer-reviewed journals. Between 2007 and 2009, his pioneering works on the critical analysis of the foundations of classical thermodynamics were published in peer-reviewed journals.

6. In 2007-2009 I constructed the theoretical model of God and proved the existence and uniqueness of God. The results were published in the peer-reviewed journals.

Subsequently, he worked on important problems, like critical analysis of the theory of Big Bang; the foundation of the differential and integral calculus; the foundations of geometry, vector calculus etc. and his relevant articles were published in peer-reviewed journals.

Since 2004, he is independent researcher ("Home of Physical Problems"), working on the following problems: the critical analysis of the foundations of theoretical physics, of mathematics, and of philosophy. He carry out the analysis within the framework of the correct methodological basis: the unity of formal logic and rational dialectics.