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PRACTICAL PHILOSOPHY

MULTI-VALUED LOGICS AS AN ADVANCED BASIS
FOR ARTIFICIAL INTELLIGENCE
(AS AN EXAMPLE OF APPLIED PHILOSOPHY)

Abstract

It is shown that the creation of artificial intelligence systems, gradually approaching human intelligence, cannot be limited by binary logic and the classical interpretation of the category of truth. The nature of human thinking is variable, which requires the use of flexible algorithmic platforms that operate with multivalued logic. It is shown that the existing approaches to the interpretation of the essence of intelligence, going back to the Turing test, are not consistent. More adequate is a criterion built on the ability of the intellect to lie, including creative particulars. It is shown that using multi-valued logic is a promising tool for constructing the algorithmic basis of artificial intelligence. It is shown that the use of just such logic is of interest from the point of view of studying self-organization processes in a telecommunication environment, resulting in the appearance of “spontaneous intelligence”, too. An analogue of such intelligence, for example, is the phenomenon of bureaucracy. It is shown that the question of the essence of the intellect is a prerequisite for the further development of non-trivial logical systems since the functioning of the intellect cannot be reduced to the operations of classical formal logic.

Keywords: artificial intelligence, multivalued logic, informational self-organization, Galois fields, the law of the excluded middle, bureaucracy, transpersonal structures.

Introduction

The further development of artificial intelligence systems, which no one doubts, poses and will pose to the “techies” questions, which previously mainly were within the competence of the social sciences and the humanities. The main one, obviously, is the question of the essence of intelligence as such. Without an answer on this question all discussions about whether this particular system can be considered as artificial intelligence or not become pointless (Suleimenov, Vitulyova, Bakirov, & Gabrielyan, 2020; Vitulyova, Bakirov, Baipakbayeva, & Suleimenov, 2020).

“Gabbay predicts that the day is not far off when the computer scientist will wake up with

the realization that his professional line of work belongs to formal philosophy”. This phrase completes the review article (Karpenko, 2003) written by one of the most prominent specialists in the field of mathematical logic and the philosophy of logic. This judgment, however, is worth adding. More precisely, it should be extended not only to specialists in the field of information, but also in the field of telecommunications technologies, since the line between them is now being erased, which fully meets the principle of convergence of technical sciences, natural science and humanitarian knowledge, which is currently gaining an increasing number of supporters.

Moreover, the rapid development of artificial intelligence systems, among other things, highlights unexpected facets of old problems. In par-

ticular, there is every reason to assert that the social phenomenon that is called bureaucracy is the “artificial intelligence system” that arose in an evolutionary way, at least if the term is interpreted from the standpoint of objective dialectics (Suleimenov, Massalimova, Bakirov, & Gabrielyan, 2018).

The above-mentioned fact can be visually explained by the example given in (Suleimenov et al., 2014), which considered the voting procedure in a certain Council (for example, a dissertation council). The cited report shows that the mutual influence of Council members on each other (for example, a vote “against” a good dissertation can be cast if it is defended by a student of a competitor or foe) leads to the fact that the Council scheme becomes topologically equivalent to the Hopfield neural network. Therefore, if the density of connections of the above-mentioned type becomes sufficiently high, then the decision is made *de facto* not by the totality of Council members but by the analogue of the neural network formed by them. Similar processes of informational self-organization also take place during the development of other managerial (administrative) decisions; as a result, one can argue that very often, the decision is made by some kind of transpersonal information systems, the nature of which so far remains poorly understood.

This example shows that in the question of artificial intelligence systems, the specific element base on which it is technically implemented is secondary. Ordinary calculations in the decimal number system can be carried out on paper, using the old testamentary account with wooden knuckles, using an adding machine or calculator, etc. The basis of the account in any of these cases is information of a higher order (Vitulyova et al., 2020; Karpenko, 2003), which is used by a particular computing device. These are the rules for adding decimal numbers, which technically can be implemented in any way.

In other words, the essence of artificial intelligence systems is determined not by a specific

form of technical implementation. It is determined mainly by the algorithms that form its operational basis. However, the term “algorithm” has a very specific meaning. It is worth talking about the existence of a well-defined hierarchy of information objects, considered in (Suleimenov et al., 2020, Vitulyova et al., 2020; Suleimenov, Gabrielyan, Bakirov, & Vitulyova, 2019). The lowest position in it is occupied by “just information”, say, a message, the amount of information that can be directly measured by Shannon’s formula. The rules for adding binary and/or decimal numbers take a higher level. Indeed, these rules are also purely informational objects. For example, they can be recorded on paper, and the amount of information contained in such records can also be calculated. However, the obtained value of the amount of information will not fully reflect the essence of the matter: with the help of these rules, it is possible, generally speaking, to obtain infinitely large amounts of new information, which is actually carried out in practice when performing calculations according to the mentioned rules.

From this point of view, “intellect” is information structured in a special way and acquired relative independence (Suleimenov et al., 2020, Vitulyova et al., 2020; Suleimenov, Gabrielyan, Bakirov, & Vitulyova, 2019). It can be implemented on an arbitrary element base, in particular, from administrators. The nature of the information carrier is indeed secondary. We emphasize that such an interpretation of bureaucracy, in essence, is fully consistent with the point of view of Weber (1972), who believed that an ideal administrative system should be a software-hardware complex (in modern terms), the actions of officials in which are strictly regulated (which implies the complete exclusion of the “human factor”). It is another matter that there is nothing ideal in nature, and processes of information self-organization were actively going on and continue to go on in administrative systems, which give rise, in particular, to the phenomenon of bureaucracy, due to the emergence of horizontal (para-

sitic) information links between officials (Suleimenov, Panchenko, Gabrielyan, & Pak, 2016; Suleimenov, Gabrielyan, Malenko, Vitulyova, & Nekita, 2021).

Note that the issue under consideration about information self-organization and spontaneous emergence of information objects of higher levels of the hierarchy (in the sense of (Suleimenov et al., 2020, Vitulyova et al., 2020)) is a de facto general scientific interest, more precisely, this issue can be used as the basis for a consistent natural science proof of the principle of global evolutionism.

In particular, the phenomenon of Life, as was noted in (Chernavskii, 2000), can also be considered from a purely informational point of view. The phenomenon of life is inseparable from the processes of preservation and self-reproduction of genetic information.

As it is known well, the most reliable way to preserve information for the longest possible time is not to provide the most durable and resistant to environmental influences information carrier but ensure its multiple replications. In this sense, the most indicative are objects that occupy an intermediate position between living and non-living matter - viruses - the functioning of which is subject to a single task - the preservation of information contained in the biological informational macromolecule, which, in fact, forms the virus.

Therefore, the study of the processes of informational self-organization in media containing macromolecular objects capable of replicating information is of considerable interest, among other things, from the point of view of the still unresolved problem - establishing the mechanisms of evolution that preceded the biological one (Mun et al., 2020)

The processes of information self-organization become very pronounced in telecommunication environments; namely, the question of the emergence of “spontaneous intelligence” in telecommunication networks is currently being raised (Chen & Burgess, 2018).

It is naive to assume that the processes of self-organization in the communication space are something abstract, the subject of speculation of refined intellectuals.

These processes - just as can be seen in the example of bureaucracy - are able to subjugate even political elites, which is partly already seen in the example of the “madness of information flows”, which is one of the facets of the epidemiological crisis of 2020.

Thus, the problem of the essence of intelligence and photo intelligence (i.e. those information systems from which human intelligence has developed in the course of evolution) acquire far more than just technical interest.

As emphasized, inter alia, in (Kalimoldayev et al., 2018), the vector of development of artificial intelligence systems is in many ways able to determine the vector of development of society. Under a pessimistic scenario, AI can become another means of fooling people and subordinating them, and under an optimistic scenario, it can serve as a tool for strengthening the sovereignty of the individual.

This conclusion determines the relevance of the development of mathematical models and logical systems that allow revealing unexpected aspects of collective human activity. As shown in this work, it is the *collective* aspects of thinking that are the key to comprehending the essence of intelligence as such.

Mythological Thinking and the Dual Essence of Human Intelligence

The starting point of the reasoning is the conclusions made in the reports (Vitulyova et al., 2020; Suleimenov et al., 2019; Bakirov, Vitulyova, Zotkin, & Suleimenov, 2021) concerning the existence of a transpersonal level of information processing and transpersonal information objects. Otherwise, the brain of each of the individuals, strictly speaking, is not a completely independent information processing system. It is integrated into systems of higher orders, each of

which is a part (or structural element) of the noosphere, as understood in V. I. Vernadsky's sense.

It is appropriate to emphasize that in recent decades, the attitude towards the ideas of V. I. Vernadsky in the expert community remained ambiguous. Some experts saw behind the theses about the noosphere nothing more than some metaphors, if not an attempt to idealize the development of mankind.

The works cited above (Vitulyova et al., 2020; Suleimenov et al., 2019; Bakirov et al., 2021), however, show that, contrary to such points of view, the noosphere is an objectively existing physical reality, the nature of which is most closely related to the media space or communication environment.

This can be proved without resorting to detailed mathematical calculations (they are presented in (Suleimenov et al., 2022)).

Modern neurophysiology unequivocally says that such informational entities as the intellect, mind and consciousness of a person arise as a result of the exchange of signals between nerve cells - neurons - that are part of the brain.

Moreover, any communication between individuals, *de facto*, also comes down to the exchange of signals between neurons that are part of the brain of the interlocutors. It is generally accepted that individuals exchange information, but really this is a very rough approximation. Information cannot be transmitted without a carrier (physical processes that determine the exchange of signals between neurons act as such).

As follows from the modern theory of neural networks, the quantitative laws of which were established, including in (Suleimenov et al., 2022), their information capabilities depend nonlinearly on the number of neurons. Simplifying, a neural network composed of two identical subnets will be not two but more than two times more efficient than each of these subnets separately (in any case, this statement is true for neural networks with distributed memory (Suleimenov et al., 2022)).

Consequently, at the moment when a common neural network arises as a result of communication between individuals, a certain new quality arises. There is a new "segment" of the common memory; information recording in it is only indirectly related to information that stores the memory of individuals.

This is the transpersonal level of information processing, on which various kinds of transpersonal information objects can be developed.

Paradoxically, examples of this kind of transpersonal information objects are well known. These include, in particular, any of the natural languages that exist on our planet. Indeed, language, as system integrity, is only partially stored in the memory of individuals; it becomes integrity at the transpersonal level of information processing only.

The conclusion about the existence of transpersonal information structures (objects) also allows us to give a consistent interpretation of such concepts as mentality and the collective unconscious (understood in the sense of Jung). From our point of view, the collective unconscious is one of the subsystems of the transpersonal level of information processing. Information objects associated with this subsystem are also well known, for example, archetypes, as well as other manifestations of everything that is connected with the mythological consciousness of people.

It should be more correct to say that the consciousness, intellect and mind of a person actually have a dual nature. They simultaneously contain both a collective and an individual component. At the same time, the collective component of the mind, consciousness (subconscious), etc., represent a kind of projection of transpersonal information structures onto a relatively independent fragment of the noosphere, localized within the brain of an individual.

Thus, points of view on the differences between "machine" and human intelligence connecting with the Turing test should be considered as inconsistent ones. At a minimum, this test

does not take into account the collective component of intelligence, and in addition, it does not allow taking into account the evolution of intelligence, which, as emphasized in (Bakirov et al., 2021), takes place in real time. The conversion of society into a human-machine system due to the rapid development of the telecommunications industry accelerates this process many times over.

Of course, quite a lot of other criteria for the differences between “machine intelligence” and intelligence in the full sense of the word can be proposed, but for practical use, one still needs to make a certain choice.

We proceed from the fact that the fundamental difference between human intelligence and the conventionally “machine” one (in the not quite definite sense in which this term was used and is still being used in discussions on the topic “is a machine capable of thinking”) is the *ability to consciously and purposefully lie*.

We emphasize that this statement does not provide for a mandatory negative connotation; in essence, it is the ability to lie that underlies what is called creativity. Any novel from a purely formal point of view is a lie; the man named Eugene Onegin never lived in the real Saint Petersburg.

Probably, there is no need to prove in detail that the same mechanisms of the functioning of the intellect are responsible for creativity and for the conscious deception of one’s neighbour. The construction of a mathematical model of a real physical process is the same act of creativity as writing a novel or a fairy tale. A certain idealized construct, a product of fantasy, is generated. This model only then correlates with reality, and the interpretation of the term “reality” in this sentence is more than variable. So, in relation to literary creativity, it is customary to talk about artistic truth. A model of a physical phenomenon can be fully functional even when it turns out that its nature has nothing to do with reality at all.

The line between lies and fantasy is very shaky; in fact, it lies only in the ethical plane. A

writer can write about the experiences and actions of fictional characters for good purposes, a corrupt official who covers up his actions with some plausible fabrications - on the contrary. Moreover, the mythological nature of thinking inherent to humans (especially in modern conditions) suggests that “fiction can become truth”.

More precisely, in accordance with modern views, myths (especially the myths of ancient cultural peoples, for example, ancient Greek) should by no means be interpreted as a kind of fiction. The myth was (in many ways still is) a means of reflecting reality. A person streamlined his vision of the surrounding reality through myth, for example, in the era of Classical Greece or Ancient Egypt. The myth regulated his life, gave integrity to society, etc. In fact, the myth performed the functions that religion, science and law later began to perform - all these areas of human activity were initially generated by the mythological picture of the world, which eventually ceased to satisfy the needs of society.

In other words, at a certain stage in the development of society, the myth was practically useful, but this usefulness had nothing to do with the category of Truth in its modern sense. Here it is appropriate to note that, as shown in the works of Mircea Eliade (2021), the mythological way of perceiving reality is also found in the modern era, and much more often than it might seem at first glance.

From the point of view under consideration, this conclusion means that the idea of truth is by no means inherent in human thinking from the very beginning - at least in the modern interpretation of this concept. The human intellect, strictly speaking, operates with completely different constructions, to which “truth” has only an indirect relation. The apparatus of formal logic, which goes back to Aristotle, is a later invention. In particular, it is shown by the studies of Lévy-Bruhl, L. (1963), in which it was concluded that there was no logical thinking in primitive cultures.

From the considered point of view, the myth-

ological picture of the world is an information structure generated by the collective component of consciousness and mind, or rather, it is the refraction in the language that is accessible to the individual, of those information processes that occur at the transpersonal level of information processing.

Not only archetypes but also the Ancient Gods are some reflections of transpersonal information objects, the evolution of which only gradually led to the emergence of the mind, in which the individual component became quite pronounced. At the level of logical thinking, which developed only quite late, it is obviously impossible to perceive such mythological objects, which is inseparable from creativity, and, consequently, from fiction that plays such an important role in all cultures.

It remains to emphasize that the simplest act of creativity is the direct and unpretentious deception of one person by another.

Paradoxically, based on the above conclusions, the question “can a machine think?” should be reformulated – “can a machine deliberately lie?”

This question in the current conditions has a purely applied sound. No one knows whether we can consider the “spontaneous” artificial intelligence generated by the exchange of information in the telecommunications environment to have taken place or whether we can only talk about proto-intelligence so far. Existing views on the evolution of complex systems (their review is given in (Mun et al., 2020)), however, allow us to assert that the line between the spontaneous behaviour of an unintelligent system, which ensures its self-reproduction, and conscious goal-setting (the line between “instinct” and conscious behaviour) is diffuse.

Accordingly, the behaviour of even a proto-intelligence generated by telecommunication environments can run counter to the interests of those who create and operate these environments, which returns to the thesis of (Kalimoldayev et al., 2018). The global information envi-

ronment may well get out of control, and the situation that arose in the communication space under the influence of the epidemiological crisis of 2020-2021 is direct proof of the fact; we emphasize it again.

The global information environment can lie in the ordinary sense (for example, generate and maintain the stability of fakes) not because it cherishes some insidious intentions but because it obeys certain poorly understood patterns that reflect the collective behaviour of complex systems. The above example of bureaucracy as an artificial intelligence system assembled on a “human” element base convinces us that such judgments do not at all look hypothetical.

The bureaucracy obligately lies not because it is necessarily made up of corrupt officials and swindlers (it is possible that there are situations when the administrative apparatus is staffed with honest people), but because the processes occurring at the transpersonal level of information processing differ significantly from those inherent in our - ordinary for perception - level. Here it is appropriate to recall again the essence of myth as a manifestation of information processes occurring at the transpersonal level of information processing.

Problems of mutual understanding, a special case of which is the problem of text interpretation, arise even when it comes to the exchange of information between two systems of the same level of complexity (two interlocutors, even communicating in the same language, for example). With regard to systems related to different levels of information processing, this problem, obviously, can only intensify.

As an illustration, let’s ask a rhetorical question without expecting an answer. It is customary to talk about modernity as an era of post-truth - a world of induced illusions, where the vast majority of the inhabitants have lost not only the criteria of primitively understood truth but even the elementary guidelines “what is good - what is bad”. An important question arises - who created this state of affairs? Some dark forces in the per-

son of “generalized Bill Gates”? Political elites of specific countries claiming world domination? Irresponsible bloggers? Or is it the information environment itself? The vast majority of people are inclined to deny being included in it, although few of their contemporaries are really ready to challenge the dictates of the environment - the vast majority of people, especially in countries where traditions and the influence of family ties are strong, obey him resignedly.

Thus, the thesis about the ability to lie as a criterion for intellectuality is a multifaceted one. It is quite possible that the category of Falsehood is even more difficult for a consistent philosophical interpretation than the category of Truth, but this does not negate the possibility of using it for applied purposes. Moreover, the “mechanisms of deception”, which are already being implemented in systems where pronounced processes of information self-organization are taking place, must also be uncovered in order not to be defenceless in the face of information elements the forerunner of which is the phenomenon of bureaucracy.

Multi-Valued Logic and the Category of Lies

Based on what has been said above, let us return to the thesis called in (Savkin, 2010) the Maltsev-Tarsky thesis. It says that any description of a situation, which, from the point of view of a person, is complete, accurate and formal, can be represented as an algebraic system.

This thesis, as rightly noted in (Palchunov, 2006), has not been proven or refuted by anyone. Based on it, it can be argued, at least in the first approximation, that the question posed above presupposes a certain “formalization of the process of conscious deception” and, moreover, its algebraization.

Paradoxically, it is impossible to teach artificial intelligence to create without laying in it some mechanisms similar to those that allow a person to lie.

Of course, it makes no sense to design a system that will purposefully deceive its developers, but the above theses, at least, clearly show how important for the further development of artificial intelligence systems is the ability to operate with representations that do not fit into the framework of the primitively understood opposition “True – Falsehood”.

Currently, there are a number of logical systems in which the law of the excluded middle is not elevated to the rank of absolute (Caret, 2017; Abe, Nakamatsu, & Silva Filho, 2019). Their development began in the first decades of the twentieth century, under the influence of the success of non-Euclidean geometries. Basic for classical logic is the law of the excluded middle (every statement is either true or false); the works of Lukasiewicz (Bofill, Manyà, Vidal, & Villaret, 2019) and his followers laid the foundation for the creation of logical systems in which this law is not satisfied. Today, many significant results have been obtained in this direction (Bofill et al., 2019; Kulik, 2007; Marcos, 2005), and the question of their use for creating artificial intelligence systems of various varieties are already clearly raised.

This section discusses the issue of creating logical systems that make it possible to use in practice the criterion for distinguishing human intelligence from the conditionally “machine” one, which was mentioned above.

An expanded interpretation of the thesis about the ability of the intellect to lie sounds like this: the intellect of higher levels (for example, the human intellect) is able to operate with ideas that are not related to reality or are only indirectly related to it. Obviously, it is these human abilities (more precisely, the corresponding mechanisms of the functioning of the intellect) that are adjacent to the ability to think abstractly, generate new meanings, fantasize, etc.

Therefore, the next step in the development of logical systems that refuse to absolutize the law of the excluded middle is of interest. This makes one pay close attention, including to an-

cient Indian/Buddhist philosophical concepts, one of the basic theses of such conceptions may be formulated as follows: truth cannot be expressed in words at all; the truth lies outside “Yes” or “No”.

Already in the VI-IV centuries, BC in India, the concept of “chatuskootika” (i.e. “having four peaks”) was developed, operating with four options for judging an object: “it is”, “it is not-is”, “it is and is not-is”, “it is neither is” (Maksimov, 2016). In the future, it was significantly complicated (the doctrines of ajnavada and syadvada, the constructions of Buddhist philosophers), but for the purposes of this work, it will be enough to confine ourselves to analogies with the simplest version.

A judgment of such a type as “an object both exists and does not exist at the same time” and a judgment conjugated to it in the sense of chatuskootika, in a formalized language, it is permissible to describe through the imaginary component of logical variables. Accordingly, with this approach, the list of logical values should be significantly expanded; along with “Yes”, “No”, “Indefinitely” used in logical systems dating back to the logic of Lukasiewicz, the opposition “Yes” - “No” is supplemented by a pair on the imaginary axis, which represents the opposition “imaginary Yes” - “imaginary No”. One of the simplest interpretations of the last pair (along with those directly related to chatuskootika) is, for example, as follows:

- It is true that the primary opposition implies “by default”.
- It is false that the primary opposition implies “by default”.

With regard to the apparatus of dialectical categories, such judgments allow, among other things, an extremely transparent interpretation. An object/entity can be described in terms of a certain opposition, then the imaginary part of the logical variable takes on a positive value, regardless of which of the variants of the basic judgment is true, and vice versa, the object/entity is not described at all through such an opposition

(simplifying, this question has nothing to do with it).

Problems of Artificial Intelligence and the Renaissance of Philosophical Knowledge

The multi-valued logic mentioned above can be fully formalized (Moldakhan, Shaltikova, Egemberdyeva, & Suleimenov, 2020). In particular, this can be done using the apparatus of Galois fields. This apparatus is already finding direct practical application, in particular, in digital signal processing (Moldakhan, Matrassulova, Shaltykova, & Suleimenov, 2021). A detailed consideration of this issue is beyond the scope of this work, but the very fact of the existence of a close relationship between the algorithms of the functioning of artificial intelligence and its philosophical interpretation serves as a strong argument in favour of the thesis of the convergence of natural science and humanitarian knowledge.

Moreover, the question can be put much broader: the example considered makes us look at the subject of practical philosophy differently.

If we start from T. Kuhn’s concept of the structures of scientific revolutions, then we would characterize the current situation in philosophy as pre-revolutionary. Its development in the “normal” (according to T. Kuhn) way ended with postmodern deconstruction, which indicated the futility of its further scholastic development. This does not mean that this scholasticism was unnecessary and meaningless, but it has become obsolete, as it turned out to be unable to find actual answers to the actual challenges of the time, which are becoming more and more formidable.

If we adhere to the tradition coming from Aristotle, who divided the sciences into theoretical and practical, then today it makes sense to talk about the actualization of the problems of practical and even applied philosophy, and not metaphysics as the “first philosophy”, which focused its attention on high abstractions.

This commitment to “pure” knowledge be-

came dominant in philosophy for a long time. In different eras (in the state of “normality” of the intellectual field according to T. Kuhn), the scholasticism of the “first philosophy” flourished and dominated, but in the situation of the scientific revolution, the transition to a new level of development, practical issues became actual. As an example, it is appropriate to note the “New Organon” by F. Bacon with his “idols of the clan, caves, market and theatre”.

K. Marx, in “Theses on Feuerbach”, wrote that philosophers only explained the world in different ways, but the point is to change it. Today it is clear that there is a more fundamental task.

Philosophy, as the presented material shows, can and must change its position in the world, starting to set the vector for the development of specific sciences. Society no longer has the opportunity to dissipate forces and resources for the development of a large number of scientific areas that are weakly interconnected.

It also follows from the materials of this work that completely new problems also arise that require the expansion of the subject field of practical philosophy.

These include, in particular, filling with adequate content all those studies that are somehow related to artificial intelligence. Indeed, the level of modern programming has reached such heights that any formalized problem can be solved. Accordingly, the formulation of the problem comes to the fore, and this is already a field for the activity of practical philosophy. Before creating artificial intelligence systems, strictly speaking, you need to understand what intelligence is as such.

Obviously, under these conditions, the need for a “general” and “special” practical philosophy is growing exponentially. Our confidence in the renaissance of philosophy the existence of a pronounced need for its creative potential and possibilities are based on mentioned above conclusions.

The subject of (general) practical philosophy

are the topical issues of human life and humanity in terms of not only the freedom of his choice but also the morality of such a choice, and morality here also has a direct practical aspect. As noted above, the direction of development of society largely depends on the nature of the further development of artificial intelligence systems. Therefore, the relevant questions should initially be laid in the foundation of specific scientific developments.

Philosophers no longer have the ability to hide behind words; it is necessary to act here and now in everyday life. Obviously, in this way, philosophy returns to its main function: reflecting on the past and present of a person, it has in mind its future.

In our opinion, the “special” practical philosophy (applied philosophy) should also be noted. The main objection to applied philosophy is that philosophy deals with abstractions and laws of the highest level and has no direct access to practice and everyday life.

However, philosophy arose precisely as applied knowledge in Ancient Greece. Socrates was sentenced to death for corrupting the youth; obviously, what he was doing was not abstract but very applied to the citizens of Athens.

An article (Savkin, 2010) identifies the following structure of applied philosophy: methodology, philosophical sciences, philosophical problems, some areas of life - education, politics, religion, practical philosophy or philosophical therapy. Actually, defining the structure and the corresponding areas of application of the applied philosophy of N. S. Savkin defines its subject.

However, it seems to us that applied philosophy is a specific section of practical philosophy, where the applied nature of philosophy gives the ability to practically use its arsenal and possibilities.

Applied philosophy is a focus on the final result, on the implementation of a certain project, even if it is a new scientific theory. This is the essence of applied philosophy.

The stated assertion is based on observed

practice. By moving to project work in interdisciplinary teams, philosophers have found that there is a serious need for their efforts at all stages of work. Very significant, in particular, is participation in the formulation of the idea of the project (its basic meaning). Most often, it is people who have philosophical knowledge or a way of thinking that propose and formulate basic meanings in a correct way. Throughout the project, they maintain the integrity of the team's work, focusing its efforts on achieving the goal, especially when the "techies", who always need explicitly formulated "terms of reference", are faced with fundamental problems.

Given that convergence and projectivity are becoming important characteristics of modern science, the prospects for practical and applied philosophy look solid. And our research on multi-valued logic is a good example of this.

Conclusion

Thus, the further development of artificial intelligence systems is closely related to the problems of many-valued logic.

The multiplicity of such logic, in particular the one proposed in this report, undoubtedly corresponds to the variety of ways of reasoning that an intellect (worthy of such a name) can use. The existence of a variety of non-classical (non-Aristotelian) logics allows us to pose the question namely in this way.

The main argument in favour of the use of multi-valued logics is the criterion of "true" intelligence proposed in this paper - the ability to consciously and purposefully lie, the formalization of which leads to the need to build specific multi-valued logics that allow a variable understanding of the category of Truth.

There is every reason to believe that the ability to operate with truth in just such an interpretation underlies such non-trivial functions of the human intellect as creativity, deceit and fantasy.

It is also shown that the considered example of using multi-valued logic for further improve-

ment of artificial intelligence systems is important from the point of view of interpreting the essence of applied philosophy. It is demonstrated that its significance in the modern world is again significantly increasing, to the point that it makes sense to talk about the predicted renaissance of philosophical knowledge.

References

- Abe, J. M., Nakamatsu, K., & da Silva Filho, J. I. (2019). Three decades of paraconsistent annotated logics: A review paper on some applications. *Procedia Computer Science, 159*, 1175-1181.
- Bakirov, A. S., Vitulyova, Y. S., Zotkin, A. A., & Suleimenov, I. E. (2021). Internet users' behaviour from the standpoint of the neural network theory of society: prerequisites for the meta-education concept formation *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLVI-4/W5-2021*, 83-90. <https://doi.org/10.5194/isprs-archives-XLVI-4-W5-2021-83-2021>
- Bofill, M., Manyà, F., Vidal, A., & Villaret, M. (2019). New complexity results for Łukasiewicz logic. *Soft Computing, 23*(7), 2187-2197.
- Caret, C. (2017). Hybridized paracomplete and paraconsistent logics. *The Australasian Journal of Logic, 14*(1), 281-325.
- Chen, J., & Burgess, P. (2018). The boundaries of legal personhood: How spontaneous intelligence can problematise differences between humans, artificial intelligence, companies and animals. *Artificial Intelligence and Law, 27*, 73-92. <https://doi.org/10.1007/s10506-018-9229-x>
- Chernavskii, D. S. (2000). The origin of life and thinking from the viewpoint of modern physics. *Physics-Usppekhi, 43*(2), 151-176.
- Eliade, M. (2021). *The myth of the eternal re-*

- turn. *Cosmos and history*. Princeton University Press.
- Kalimoldayev, M. N., Pak, I. T., Baipakbayeva, S. T., Mun, G. A., Shalytkova, D. B., & Suleimenov, I. E. (2018). Methodological basis for the development strategy of artificial intelligence systems in the Republic of Kazakhstan. *News of the National Academy of Sciences of the Republic of the Kazakhstan – Series of Geology and Technical Sciences*, 6, 47-54.
- Karpenko, A. S. (2003). *Sovremennye issledovaniya v filosofskoj logike* (Contemporary research in philosophical logic, in Russian). *Voprosy filosofii (Questions of Philosophy, in Russian)*, 9, 54-75.
- Kulik, B. A. (2007). N-tuple algebra-based probabilistic logic. *Journal of Computer and Systems Sciences International*, 46(1), 111-120.
- Lévy-Bruhl, L. (1963). *Le surnaturel et la nature dans la mentalité primitive* (The supernatural and nature in the primitive mentality, in French). Presses universitaires de France.
- Maksimov, Yu. D. (2016). *Logika N. A. Vasil'eva i mnozoznachnye logiki* (Logic of N. A. Vasiliev and multivalued logics, in Russian). *Logicheskie issledovaniya (Logic researches, in Russian)*, 22(1). Retrieved from <https://logicalinvestigations.ru/article/view/46-3?lang=ru>
- Marcos, J. (2005). Nearly every normal modal logic is paranormal. *Logique et Analyse*, 48(189/192), 279-300.
- Moldakhan I., Matrasulova, D. K., Shalytkova, D. B., & Suleimenov, I. E. (2021, August). Some advantages of non-binary Galois fields for digital signal processing. *Indonesian Journal of Electrical Engineering and Computer Science*, 23(2), 871-877
- Moldakhan, I., Shaltikova, D. B., Egemberdyeva, Z. M., & Suleimenov, I. E. (2020, October). Application of ternary logic for digital signal processing. *In IOP Conference Series: Materials Science and Engineering*, IOP Publishing, 946(1), 1-5. <https://doi.org/10.1088/1757-899X/946/1/012002>
- Mun, G. A., Moldakhan, I., Serikbay, A. M., Kaldybekov, D., Suleimenov, I. E., & Park, K. (2020). Hydrophilic interpolymers associates – the key to solving the problem of pre-biological evolution. *International Journal of Biology and Chemistry*, 13(1), 4-13. <https://doi.org/10.26577/ijbch.2020.v13.i1.01>
- Palchunov, D. E. (2006). *Modelirovanie myshleniya i formalizaciya refleksii: Teoretiko-model'naya formalizaciya ontologii i refleksii* (Modeling of thinking and formalization of reflection: Model-theoretic formalization of ontology and reflection, in Russian). *Filosofiya nauki (Philosophy of Science, in Russian)*, 4(31), 86-114.
- Savkin, N. S. (2010). Applied philosophy: Subject, structure, functions. *Humanitarian: Actual Problems of Humanitarian Science and Education*, 1, 2-8.
- Suleimenov, I. E., Gabrielyan, O. A., Bakirov, A. S., & Vitulyova, Ye. S. (2019). Dialectical understanding of information in the context of the artificial intelligence problems. *IOP Conference Series: Materials Science and Engineering*, 630. doi: 10.1088/1757-899X/630/1/012007
- Suleimenov, I. E., Gabrielyan, O. A., Malenko, S. A., Vitulyova, Y. S., & Nekita, A. G. (2021). Algorithmic basis of battle neural networks and crisis phenomena in modern society. *Perishable and Eternal: Mythologies and Social Technologies of Digital Civilization. European Proceedings of Social and Behavioural*

- Sciences*, 120, 247-255. doi: 10.15405/epsbs.2021.12.03.33
- Suleimenov, I. E., Massalimova, A., Bakirov, A. S., & Gabrielyan, O. A. (2018). Neural Networks and the Philosophy of Dialectical Positivism. *MATEC Web Conf.* 214, 02002. <https://doi.org/10.1051/mateconf/201821402002>
- Suleimenov, I. E., Matrassulova, D. K., Moldakhan, I., Vitulyova, Y. S., Kabdushev, S. B., & Bakirov, A. S. (2022). Distributed memory of neural networks and the problem of the intelligence's essence. *Bulletin of Electrical Engineering and Informatics*, 11(1), 247-255. <https://doi.org/10.15405/epsbs.2021.12.03.33>
- Suleimenov, I. E., Vitulyova, Y. S., Bakirov, A. S., & Gabrielyan, O. A. (2020). Artificial intelligence: What is it? *ACM International Conference Proceeding Series*, 22-25. <https://doi.org/10.1145/3397125.3397141>
- Suleimenov, I., Gabrielyan, O., Mun, G., Panchenko, S., Amirzhan, T., & Suleimenova, K. (2014). Voting procedure and neural networks. *International Journal on Communications*, 3, 16-20.
- Suleimenov, I., Panchenko, S., Gabrielyan, O., & Pak, I. (2016). Voting procedures from the perspective of theory of neural networks. *Open Engineering*, 6(1). doi:10.1515/eng-2016-0048
- Vitulyova, Y. S., Bakirov, A. S., Baipakbayeva, S. T., & Suleimenov, I. E. (2020). Interpretation of the category of complex in terms of dialectical positivism. *IOP Conference Series: Materials Science and Engineering*, 946(1), 1-6. doi:10.1088/1757-899X/946/1/012004
- Weber, M. (1972). *Wirtschaft und Gesellschaft. Grundriss der verstehenden Soziologie. 5. revidierte Aufl. Besorgt von Johannes Winckelmann* (Economy and society. Outline of understanding sociology. 5th rev. ed. I. Concerned by Johannes Winckelmann, in German.). Tübingen: J.C.B. Mohr (Paul Siebeck).