

### ARISTOTLE AND INFORMAL LOGIC (TO THE CELEBRATE 2400 ANNIVERSARY OF ARISTOTLE)

*In the article, the correlation between the logical doctrine of Aristotle and modern informal logic is analyzed.*

**Keywords:** Aristotle, Informal logic, Logics.

2016 year UNESCO declared the "year of Aristotle". The proposal to celebrate 2400 anniversary of Stagirite was presented by the National Commission for UNESCO of Greece with the approval of the "International Centre for Research Aristotle" of Aristotle University of Thessaloniki.

Based and formed logic of Aristotle, as a way to protect the truth and expose the sophistry is relevant for more than two millennia. Despite the fact that was and is intensively developing modern logic – creation of Stagirite is an indispensable and increasingly in demand. As well as two thousand years people ago continues to argue, refute, convince, argue, with the use of natural language.

And when through thickness of centuries in front of the leaders of the "movement of informal logic" Ralph Johnson and Anthony Blair got a question: what is the interest in the natural (it is the same), for informal logic, then they in the preface to the "Proceedings of the First International Symposium on informal logic" (Canada, 1980) stated a very simple reason – "the time has come".

Finalized in the first half of the twentieth century, modern logic, is used as a method of studying mental processes, artificial, formalized languages, develops the deductive reasoning (in the sense of calculus) are used exclusively in mathematics and mathematicised branches of the natural sciences.

Such logic owes its appearance to the works of the greatest logicians of the twentieth century: *Frege, Russell, Whitehead, Hilbert, Tarski, and Carnap*. Moreover, her something fully be calling "formal": in the sense, she is not requiring a live discourse, in the sense of not contributing to contemporary man (real individuals) to acquire the skills that will help him in his every day, normal life in the fields of science, business, politics, practice of law etc.

Emergence of informal logic G. Ceyhan (is one of its supporters) explains so: "*Today's students require a "marriage" between theory and practice. They argue that the introduction courses of logic and rhetoric not even in their interest*" [2].

In addition referred earlier Ralph Johnson says bluntly that "being teacher of formal and deductive logic, I realized that it is not the best suited to the analysis of political discourse."

One can cite such statements and other representatives of contemporary informal logic such as *Stephen Toulmin, Gabriel Tarde* and others.

However from the height of the centuries it must be concluded that, indeed – "*a new, in its origins, it is always – well forgotten old*".

That is what they say in their treatises *R. Johnson, E. Blair, S. Toulmin, G. Tarde* and others, we can find in Aristotle's heritage.

A direct proof of this is that themselves the representative's informal logic perceive its origins in Aristotle's logic, particularly in his treatise "*On sophistical refutations*".

This is because one of the central concepts of informal logic is the notion of "*fallacy*". Moreover, as you know – the main task of informal logic is a description and systematization of errors in real discourse, real (in the sense of ordinary discourse) outside the logical calculus.

Namely, in the treatise "*On sophistical refutations*" Aristotle describes, classifies the logical errors (fallacy), paradoxes, reasoning techniques that lead the interlocutor or audience to confusion – with the aim of identifying and overcoming.

It is this theme became obligatory section in training courses on logic since the Middle Ages. Beginning this tradition put in the thirteenth century, a teacher from the University of Oxford, *Edmund Rich* (also known as *Edmund of Abingdon*).

Aristotle's conception of logic as a means of protection against fallacy and errors through the centuries has actively supported *William Minto*.

Analyzing of deductive and inductive logics, he concludes: "*the basis of all these exercises, is the same desire to avoid confusion and prevent the mind from error*" [1]. This, for W. Minto, is the practical character of logic.

Everything has just given evidence suggests that Aristotle's main concern was to create a logic, which would be taught to construct evidence, denials, hypotheses, draw analogies, find and fix errors in their own and other considerations i.e. to shape a culture of thinking, or logical culture. It is thanks to the implementation of this goal logic from its inception – it is a full-fledged section of the spiritual culture of humanity.

To more clearly to understand the communication between the ages by Aristotle and the modern state of natural logic to need seek help from *Clio*, the goddess of history.

A special place among the works of Aristotle takes "*Topics*". Being the earliest product of the logic of "*Topics*", it is an extensive treatise on the probable evidences and of the dialectic as a method of such proofs.

The subject of analysis in this treatise are logical arguments that are in the output is not significant, but only probable knowledge. The subject of analysis in this treatise are logical arguments, which contain in derivation is not significant, but only probable knowledge. Such arguments are premises on a probability value.

Despite the fact that such arguments are constructed in accordance with the rules of logic, but because of the likely nature of the premises, they certainly do not need to lead to true conclusions.

Such arguments Aristotle named unprovable. It should be borne in mind that Aristotle understands the truth as satisfaction of our knowledge of reality

At the same time, provable arguments, in his opinion, are considered only those in which the premises are necessary to the true position. That is the conclusion of such reasoning, in strict compliance with the rules of logic, it will always be true.

Such an understanding of essence of the logical reasoning of Aristotle, primarily because his in his original research on the logic guided entirely on rhetoric and jurisprudence.

By analyzing the rhetoric and jurisprudence, Aristotle set himself the task to reveal the laws governing the dispute. Therefore, his research enthusiasm for research was focused on the laws of thought, having a universal nature.

Compliance with these rules must be present in the types of dispute in which endeavor to reach the truth, namely, in the dialectical debate. Identify these provisions is possible only by abstracting them from the language support of our thoughts.

Prove or analytical reasonings Aristotle dedicates "*Analytica Priora*" and "*Analytica Posteriora*". In "*Analytica Priora*" analyzes Aristotle syllogism, and in "*Analytica Posteriora*" the doctrine of proof.

It is in the "*Analytica Priora*" and "*Analytica Posteriora*" as the main treatises of logic of Stagirite, the logic executed in an independent philosophical discipline, whose main goal, the achievement is not probably truths, but necessary truths.

Understanding the science of logic as the means of obtaining the necessary truth necessarily involves the development of the demarcation criterion of truth and falsehood. This criterion, according to Aristotle, must necessarily have such feature as "evidence."

Hence the "truth" – this is compliance approval or denial of reality, and the "false" – a discrepancy.

Substantiate by way of evidence of the truth or falsehood of any proposition – then refer to those arguments by which the denial of this provision would become impossible, and the determination of its truth would be necessary.

Proof as a kind of justification, according to Aristotle, can be viewed in two ways:

A) *proof in an absolute sense;*  
and

B) *proof in a relative sense.*

If in the process of justification of compliance with the thought of reality, a subject belonging to a subject is disclosed as required, the proof on the person in the absolute sense, which gives the thesis to be proved a sign of authenticity, irrefutable based on logical necessity.

If in the process of justification of conformity of thought actually was not disclosed as a necessary, we have the proof in a relative sense, ie, aimed at obtaining a probable knowledge. Such a proof is called dialectics, having to obtain not truth itself, as the line of thought of reality, and the lack of identification of the contradiction between subject and predicate in the judgment, as well as between the positions representing the side in the argument.

The proof is in the relative sense, the thesis gives a sign of probable knowledge (i.e. the knowledge allowing negation). This determines the nature of the relative evidence as a of the dialectical discourse no employed strict statement of indisputable truths, and methodological research conditions for obtaining probable (plausible) knowledge.

The logical basis of relative evidence, according to Aristotle, there is a way of reasoning from a single, particular to the general, which (method) allows the target, bring the mind to the necessary and universal truths. This way of reasoning in logic is called induction.

If the main task of deduction to elevate the knowledge gained to the level of genuine evidence-based science, intuition sets up our minds to the possibility of acquiring knowledge, to raise the question of the fact of the existence of things and phenomena, the laws of their existence.

During the discourse, we can get not only reliable, but also probable knowledge. Likely knowledge, as a rule, is the result of sophistical arguments. Therefore, to test reliability using procedure of refutation to test this value to true. In this sense, refutation as kind of the argumentation is proof.

Since the focus of the reasoning in the induction, according to Aristotle, is aimed at getting unfinished, incomplete and, in this sense, a possible knowledge, the induction, to a large extent, is a heuristic method of reasoning, which is based not immutable initial start, and a reference to the undiscovered, unknown.

In the analysis of inductive conclusion is required from the outset to dissociate themselves from those interpretations of inductive conclusion, which gather up for centuries of history of science and logic, which largely distort the true nature and purpose of induction.

In the history of logic the induction usually defined as conclusion by which in a conclusion is obtained new, expanded knowledge, compared with premise. Induction proclaimed progressive, revolutionary method of cognition, which is able to replace the Aristotelian, scholastic, dogmatic logic on the logic of discovery.

According to *F. Bacon*, and then *JS Mill's* the induction is able to discover the causes of the things around us, and the world at large.

The monographs and textbooks of the twentieth century the appearance of the induction was associated with the emergence of commodity production, which is determined by the development of the experimental sciences.

Although in reality the induction as a method of reasoning it was already known in the time of Socrates, Democritus, Aristotle.

In textbooks on logic, in reference literature the induction is usually defined as conclusion, in which the transition from a single, specific to the total in the form of axioms, postulates, laws. And thus, the induction reflects the real process of cognition, the genesis of knowledge in general.

Isolation of a single, separate, concrete – this is a generalization. In the real process of cognition the appearance, formation of knowledge takes place completely different way. And, most importantly, beyond logic.

In front of logic are completely different tasks. The main purpose of logic – to investigate the movement, the operation of knowledge that emerged during the cognitive process.

Given the given comments the induction should be understood as a conclusion, in which between the premises and the conclusion there is a ratio of confirmation. This means that, at the conclusion of an inductive inference has the character of a hypothesis. That hypothetical conclusion of an inductive inference leads to the fact that the logical nature of induction presented the concept of probability.

The probability – a characteristic of the degree of the possible occurrence of an event in a particular setting.

Or, in other words, the probability – is favorable ratio for all possible cases. For example, the probability that in tossing a coin will fall "eagle" is 1: 2, and the loss of a particular facet dice – 1: 0.

These examples of probability represent the so-called objective probability. The objective probability is a quantitative measure of the probability of the possibility of occurrence of an event under certain conditions. Since the objective probability may explore means of mathematics, then her called a mathematical probability.

In addition to the objective probability there is subjective. Subjective probability is to be understood as a measure of subjective confidence, which is associated with psychological characteristics of human intuition, common sense.

In modern logic, there is a whole new trend, called probabilistic logic. His goal – to investigate the statements, which may be in addition to the absolute values of "true" and "false" has intermediate values that capture the probabilistic nature of the statements of values, their degree of credibility, the degree of their confirmation.

This allows us to consider the induction near the deduction as one of the effective means of argumentation and, thereby, distinguished from those unskilled mating induction, which took place in the history of logic.

For Aristotle, the nature of induction and deduction, about their relationship and communication was not in the same plane as imagined some commentators and interpreters of his teaching.

Considering the evidence as one of fundamental of logical means of argumentation, Aristotle was occupied by the question of the role of induction in determining the initial beginnings of all the evidence.

Since any evidence based on some initial principles, which are obtained by outputting of the preceding principles, the question naturally arises about the existence of unprovable beginnings.

When comparing the induction and deduction as methods of reasoning, we see that that there is the initial in deduction is a consequence of induction (meaning according to the degree of generality and descriptiveness). Such an understanding of induction and deduction allows you to see the original beginning of the proof, not as something immobile, frozen, as well as the volatile, requiring the completion of the contained plaque of heuristic.

In this regard, Aristotle distinguishes three kinds of unprovable beginnings:

- *Axiom*;
- *Assumptions*;
- *Postulates*.

Each of these initial beginnings performs peculiar only to his function.

Axioms determined opportunity to the true significance.

Assumptions are the bases, which in themselves are provable, but within a particular argument accepted without proof.

Finally, postulates – are positions, the truth of which was adopted by agreement.

Because of this nature of the initial beginnings, we get in reasoning knowledge, which on the form is universal and necessary. That versatility and compulsiveness of decision of conclusion in reasoning is held of form.

However when you consider that a form was associated with of "common", "unchanged", "casual", it can be assumed that in the works of Stagirite was his understanding form. For Aristotle the form coincides with the nature of object from the point of view of ontology and, from the point epistemology, the form serves as the conceptual definition of the essence.

So the notion of form has allowed Aristotle to see it synthesizes beginning, which discover in the meanings similar with all the differences their (thoughts) of objects and contents.

In his logic, Aristotle establishes a hierarchy of forms, where the main form is a judgment. Each judgment contains an affirmation or negation. It is because of the affirmation and negation of the same about this subject generated possible value judgments ("true", "false").

Comparison of different content judgments on the basis of their significances inevitably leads to the relation of logical consequence, a form which has of a syllogism. Because of this form, it becomes possible in the process of withdrawal stable (invariant) from of changeable (variable). In other words, the form as conclusion appears as a logical

constant, which is clearly distinguishable from the logical variables. Aristotle first to introduce a special notation for the logical constants and logical variables. Logical constants it represents the words of natural language ("...common to all...", "...is not common to all...", "...has some...", "...is not inherent to some...") and logical variables denoted by the Greek letters A, B, Γ.

Because of the interaction of logical constants and logical variables, the judgment is characterized by the need of its content and universality its application, that in strict compliance of laws of thought allows produces in the reasoning necessary true conclusion.

Aristotle singled out in its logic of the law of contradiction and the law of the excluded middle as the predominating. Law of identity and sufficient reason implicitly presents in Stagirite reasoning's.

In the literature on logic, tend to indicate that modern logic is clarified Aristotelian laws and proposed logical laws called tautological. Their endless. Those, get some logical chaos.

It should be borne in mind that the laws of identity, contradiction, excluded middle, sufficient reason are methodological principles, regulatory requirements, which are based our arguments, finally, which ensures consistency, consistency and validity of our arguments.

Neglecting these preventions in textbooks on logic, laws of Aristotle are whitening in the form of the following formulas:

|                              |                             |
|------------------------------|-----------------------------|
| The law of identity          | – $A=A$ або $A \square A$ ; |
| The law of contradiction     | – $A \wedge \bar{A}$ ;      |
| The law of excluded middle   | – $A \vee \bar{A}$ ;        |
| The law of sufficient reason | – $A \square A$ ;           |

This entry laws in the form of formulas is very conditional transfers their essence. For example, if we say that the law of the excluded middle – a formula  $A \vee \bar{A}$  – it is, in fact, almost nothing to say. After all, the law of excluded middle – a methodological principle, which has a number of requirements to the process of reasoning and to reduce it to a communication meaningless logical terms (disjunction and negation), which appear in the formula of the law will be far from reality.

For the benefit of whitening laws in the form of formulas, given an opinion that the formulas  $A \square \bar{A}$ ;  $A \vee \bar{A}$ ;  $A \wedge \bar{A}$  – it is always true propositions in the classical logic. In addition, always-true proposition in classical logic called the law. This view can be disproving when writing the law of sufficient reason in the form of a formula. The formula  $A \square B$  it not always true, respectively, and it is not logical law. It can be saying that the failure to present the law of sufficient reason as the formula was a kind of proof that the basic formal-logical laws (or laws of logic) have a very different nature than always-true formulas, and perform an original function in the process of construction and analysis of our reasoning

Recording the laws of logic in the form of formulas and the conviction – that it's a great achievement of modern logic, which, on the one hand, impoverishes the essence and purpose of these laws and on the other – does not account for the true purpose and possibilities of modern logic as an effective tool for research and study of scientific knowledge.

It should be stressed once again that the universally valid formulas or a tautology – this is the schemes of constructing arguments that are abstracted from the content and reasonings, which are not determined significances peculiar reasonings. This feature of the logical laws (i.e. tautologies) allows you to use them to calculate the accuracy of any

reasoning, regardless of its content. Moreover, where the evidence, psychological orientation, intuitive relevance, practicality are bad assistants, comes to the aid formalism, which allows you to test our reasonings and to separate right from wrong reasoning.

Assessing the logic of Aristotle from the height of today, it is quite legitimate to say that it (the logic) is a practical discipline. For Aristotle in the creation of logic as a natural or a practical discipline contributed significantly to the humanitarian and social climate of ancient Greece. The ancient Greeks were excellent practices in logic.

For a free Greek it was prestigious to have developed the skills of analysis, the organization of knowledge, reasoning strategies. This means that the logic of Aristotle had as its primary source of the need of the ancient Greeks in the art of oratory.

As a form of reflection on the rules of mental activity, logic requires a large amount of the output material, argumentative nature.

We know that not every type of discourse provokes logical research. It is in the argument, according to Aristotle, is revealed the applied aspect of the logic as the theoretical discipline. New research on the theory of argumentation shows the role and place of theoretical calculations of logic in argumentative discourse.

In the spirit of Aristotelian logic, the argumentation define as a form of intellectual activity, during which formed the belief in the truth or falsity of any situation, and is determined its assessment and the feasibility of both for the author and for the person or audience.

The argumentation is multidimensional and multi-component creation of human intellectual activity, which rests on the acquisition of logic, philosophy, psychology, linguistics, rhetoric, ethics, culture, intuition, common sense etc. Of all these components, which make up argumentation should allocate logic.

In all sciences, in all spheres of human activity used such concepts and procedures, as truth, acknowledgment, consequently, apodicticity, proof, refutation, interpretation, explanation, verification, but only in the logic determined the nature of these concepts and procedures, only in the logic is analyzing of their features, the structure and rules.

Component, which is the logic in the argumentation, is a rationale. **Rationale – is the transition from a fragment of knowledge of both the original (base) to the following fragment of knowledge as a consequence.**

Determine of rationale as procedure can be as follows: *"rationale – a means of transferring of logic of such characteristics of a reason as the truth, apodicticity, reliability, etc. to substantiating"*.

It should be borne in mind that there is not some universal justification procedure. Justification is realizing through its types of evidence, refutation, explanation, prediction, and interpretation of their multiple modifications. So rationale – it is only an abstraction from its specific listed species. Each kind of rationale gives substantiating appropriate response: proof-veracity, explanation-apodicticity, interpretation-representation.

This base, which is associated with the substantiating – it is not only the knowledge that the truth is not in doubt, but it is also appropriate rules to ensure that the specific form of rationale (proof, explanation, etc.), and conditional on the transfer of the relevant characteristics of a reason on substantiating.

Sometimes in textbooks and monographs the concepts argumentation, reasoning, proof, refutation is considering as identical. However, in fact each of these concepts represents the various processes and procedures. From the just determination, it shows that the rationale cannot be identifying with the argumentation, because it (rationale) is a component that only part of the argumentation, which is responsible for logic.

Proof and refutation of the same cannot be identifying with the argumentation. The fact that the proof and refutation are important parts of the argumentation, but do not exhaust its content. Once again emphasizing the fact that in the course of argumentation not only prove thesis or disprove antithesis, but also form a belief in the truth of thesis or falsity of antithesis.

Consequently, all the new trends of modern logic ideologically date back to Aristotle. This gives reason to talk about Aristotle as our contemporaries, who is invisibly present in all the achievements of today's logic as science.

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### АРИСТОТЕЛЬ ТА НЕФОРМАЛЬНА ЛОГІКА (ДО 2400-ї РІЧНИЦІ АРИСТОТЕЛЯ)

*У статті аналізується кореляція між логічним вченням Аристотеля та сучасною неформальною логікою.*

*Ключові слова: Аристотель, неформальна логіка, логіка.*

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### АРИСТОТЕЛЬ И НЕФОРМАЛЬНАЯ ЛОГИКА (К 2400-летию АРИСТОТЕЛЯ)

*В статье анализируется взаимосвязь между логической доктриной Аристотеля и современной неформальной логикой.*

*Ключевые слова: Аристотель, Неформальная логика, Логика.*