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DIALECTIC AND LOGIC

Before bringing out the relationship between dialectic and logic, we must define as precisely as possible the sense in which we shall use these terms. It is well known that the words "dialectic" and "logic" have taken on very different meanings in the history of philosophical and logical thought. This ambiguity is also characteristic of their use in contemporary publications.

It often happens that discussions arise on the subject amongst philosophers and logicians because of the different senses in which these terms are used. The situation is then the following: people engage in a heated discussion when in reality there is no divergence of principle between them but simply the fact that they give a different signification to the same terms.

Let us first stop to consider the term "dialectic." Without even mentioning the different senses which this word had for Socrates, Plato, Aristotle, the scholastic philosophers of the Middle Ages, Kant or Hegel, contemporary Marxist philosophy uses it with at least three significations, closely related perhaps, but different nevertheless. First of all, dialectic is a group of facts conforming to law and having an objective existence. One speaks then of dialectic of nature or society. Then dialectic is a theoretico-scienti-

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fic method in human thought. In this case it is also a question of objective facts conforming to a law but being known and more or less consciously used in human thought. Finally dialectic is the science of the method and of the objective facts conforming to a law on which the method is based.

When we speak here of dialectic we shall refer to the latter sense of this term, i.e. we shall speak of dialectic as a science.

The use which is made of the term logic is also very varied. We say that the thoughts of such and such a man show little or no logic. Here the word is synonymous with a chain of reasoning essential in thought. But we shall use this word only to signify a science, and more precisely the science of thought, of its forms and of the laws of its movement.

Dialectic and logic are two sciences which have their own history. Both were born and have developed within the womb of philosophy. What is their relationship now, what influence do they exert on the development of scientific thought? To know this, it is necessary to explain in detail not only the sense of these terms but also the real content of the notions which they represent.

Let us begin with the science called logic, which as a science was born and developed as the analysis of conscious thought, of its structure, of its laws of operation. Elements of logical analysis can already be found in the writings of the Indian Buddhists, in Greece amongst the pre-Socratic philosophers of nature, in certain fragments of Democritus, in certain reasonings of the Sophists, in the dialogues of Plato, etc. It is generally considered that the man who systematized and founded logic as a science was Aristotle, who prepared an account and formulated a critical generalization of all previous attempts to explore the realm of thought. His works were the first to gather together and to study systematically those areas of knowledge which appeared later under the aspect of logic, even while in his works no definition that is at all precise can be found of the problematical questions of logic or even the designation of "logic." Later, commentators of Aristotelian philosophy classified under the name of "Aristotelian Logic" those sections of doctrine which referred to the categories and to the laws of thought; i.e. for the most part to the analysis of thought from the point of view of its formal content and to the description

of the structure and the aspects of the demonstration. But Aristotle's logic is not confined to that; he gave a philosophical interpretation of the forms of thought, showed their connection with the being and posed the question of logic as a method of knowledge.

In Aristotle's research, the study of the categories, the forms and the laws of thought are constantly mingled and interwoven with reasoning concerning cosmology, physics, psychology and linguistics. The logical ideas presented in his *Metaphysics* offer an undeniable interest; he analyses there the fundamental aspects of the being of which the reflection is to be found in the categories. Aristotle devoted his attentions to all the basic categories; matter, content, form, possibility, reality, quantity, quality, movement, space, time etc. In the center was the category of "essence" which he studied more profoundly than the others. The analysis of categories quite naturally led Aristotle to examine their relationship, the interchanges which existed between them, their variability.

Aristotle's logic is not a finite whole. It is a grouping of different aspects of the logical analysis of conceptual thought. That is why his various elements were the object of subsequent elaboration, specification and generalization. The Stoics, who were the first to use the same term "logic," developed the theory of deduction, completing the syllogistic method of Aristotle and formalizing it. In fact it was they who founded the logic of statements. The logical thought of the Middle Ages followed the direction thus indicated.

But since modern times it is another aspect of Aristotle's logic which has attracted attention: the movement of thought towards new knowledge, which had not aroused the interest of the scholastic philosophers. Aristotle's logic was based upon a somewhat limited scientific practice and in particular on that of the demonstrations formulated by the nascent mathematics of the time, that of scientific conjectures, debates and discussions. At that period of antiquity only the germs of the natural sciences existed, and they did not develop as an independent branch of science until the 15th and 16th centuries at the moment of the decay of the feudal relationship and the beginning of the bourgeois relationship.

The demands of the development of the natural sciences and in particular their experimental development, confronted with a series of tasks, and in particular with the need to develop a method for the acquisition of new knowledge, and the creation of new scientific ideas and theories. It was for this reason that logic turned to the study of the forms taken by the movement of thought towards the truth.

Scholastic, Aristotelian logic showed itself unsuited to the task. This explains the categorical opposition shown to it by the most important representatives of philosophy in modern times, linked as they were in one way or another to the development of the natural sciences and to the birth of the social sciences.

"The logic," wrote Bacon, "which is used at present serves to maintain and reinforce the errors founded upon ideas generally received rather than to seek for the truth. It is for that reason that it is rather harmful than useful."[1] Descartes expressed similar ideas: "In logic, its syllogisms and the majority of its other precepts enable us to explain to others that which we know, or even, as in the art of Lulli, to reason foolishly upon that which we do not know, instead of teaching it to us."[2] That is why at that period the problem of the creation of a new logic became a pressing one—a logic to meet the requirements and demands of a practice of thought and in particular of a process of theoretical elaboration of experimental data. Every thinker has a different picture of this new non-Aristotelian logic. Bacon sees the future of logic in the development of a theory permitting the passage from experiment to generalization. He criticizes syllogism as a method for creating concepts and for this he judges it barren. The only sure method for creating concepts is experiment and induction. The convincing aspect of Bacon's studies in logic is the accent placed upon the role of experience, experimentation and observation. He made the empirical event the essential and fundamental premise of deduction. In the order of the theory of knowledge his logic is a materialist sensualism. However this logic bears the mark of metaphysics. The causes, the forms of the phenomena

[1] Bacon, *Novum Organum.*

[2] Descartes, *Regulae.* The same thing can be read in Locke: "Syllogism, in the best of cases, is merely the art of conducting a struggle with the aid of what little knowledge we have and without adding anything to it."

discovered by induction are fixed and invariable if they are examined; in the process of deduction itself, the role of analysis, of the dismemberment of nature into distinct, isolated elements is emphasised in a unilateral manner. Bacon underestimated the role of deduction and hypothesis in the process of generalization and reduced the practice to observation and experimentation.

Bacon's teaching enriched logic in two different ways: firstly by a more complete and profound study of the structure and aspects of induction; secondly by posing the problem of the extension of the domain and the tasks of logic and that of the necessity for logic to study the method which governs the acquisition of new knowledge. Bacon considered that logic should not limit itself to studying the structures and aspects of deduction; it had to open to thought an absolutely new route which the philosophers of antiquity had not explored. He considered that his *Organum* was a logic, but a new logic, a new organ, a methodology of the sciences and of scientific discoveries.

Descartes, who had devoted himself to the analysis of the experience of thought in mathematics and mechanics, had a totally different idea of the route which logic should take in its development.

In his view, the task of the reformer of logic consisted not only in ridding it of the useless and even harmful scholastic remains but also of completing it in such a way that it could discover new and certain truths. Descartes posed the question of another method of knowledge, going beyond the limits of that which earlier logic had offered. The observance of the rules of syllogism, the most irreproachable logical deduction cannot guarantee us the truth of our thought. Descartes formulated the rules of a method for the acquisition of new knowledge, destined to replace the innumerable rules proposed by logic. He constructed his method on the basis of the decisive role of intuition and deduction which he had recognised; experience and induction play only an auxiliary role in it.

The philosophy of the 18th century was fully aware of the fact that the term "logic" in reality concealed two scientific disciplines with different objects. Kant was one of the first to state this after first defining the object of generale logic, or as it came to be called later, of formal logic. In his view, since the time of

Aristotle this logic had not taken "a single step backward, if no account were taken of the exclusion of certain useless subtleties and of a clearer formulation, since these improvements result in elegance rather than in any reinforcement of the scientific value. It is remarkable that until now logic has not taken a single pace forward either; obviously it possesses an absolutely closed and finished character."[3]

According to Kant, general logic "is a science which exposes in detail and demonstrates precisely only the formal rules, exclusively, of any thought."[4]

The theses of Kant as regards general logic present two characteristics. On the one hand, Kant is the founder of a priori reasoning and formalism in logic. It is from his time onwards that forms of thought are conceived as pure, absolutely independent of any objective content, born without any link with experience; neither with Aristotle nor even with Descartes or Leibnitz were the forms of thought "liberated" from their objective content; on the contrary they expressed its essence. Kant broke with this tradition and was at the origin of the formalist concept of logical forms.

In addition the concept held by Kant of the object of general logic and of its field of application played a decisive role; in fact, the object of formal logic had not been strictly defined until then, which did not assist either the progress of formal logic or the formation of a new logic. By tracing precisely the frontiers of the object of general logic Kant confronted philosophy with the task of creating a logic on new principles the need for which appeared in the simple fact that the most scrupulous observance of the formal rules of "the coherence of knowledge with itself" could lead equally successfully to truth, to error, or even to absurdity, since general logic did not comprise and could not comprise directions concerning the faculty of judgement.

Kant deduced from this the need to create a logic founded on new principles which would deal particularly with the principles and rules for the a priori application of judgement or thought in general, or with the conditions for the application of the rules

[3] Kant, *Criticism of Pure Reason.*

[4] Kant, *Ibid.*

of logic to the solution of the problems of theoretical thought. This logic, which he called transcendental, does not exclude all the content of knowledge; it studies the rules of the pure thought of the object.

From the 19th century in fact these two logics began to develop independently of one another and even with a certain antagonism. The progress of formal logic was linked on the one hand to the penetration of this logic by mathematical and in particular algebraic method, and on the other to its application to the solution of mathematical problems and in particular of those which concerned the fundamentals of mathematics.

This tendency for rapprochement displayed by formal logic and mathematics had already appeared in the 17th century. Leibnitz was at the origin of this phenomenon; he formulated only certain principles of that section of the logic of mathematics which was later called algebra of logic. He proposed a program which was later carried out. It is essential to retrace concepts, like statements, to a number of basic concepts and statements which are indicated by corresponding signs or symbols. The combination of symbols and the deduction of statements are based upon general rules which as a result of the introduction of symbols, are formulated in a manner similar to the rules of algebraic calculation. The ideas of Leibnitz were too novel for the 17th century whose science was not ready to receive them. The logicians of the 19th century (Boole, Peirce, Schreder, Poretski) rediscovered these ideas without reference to Leibnitz and began their realization. The impetus imparted by the galaxy of brilliant logicians of the 19th century and the demands of the continuous development of mathematics—in particular, the need to solve the problems concerning its fundamentals—had the following result: in the 20th century, formal logic, in its symbolic form, has become one of the most important and most universally accepted scientific disciplines, one of those which exert a stimulating action in the development of scientific knowledge.

The principles of Kant's transcendental logic were then exploited by German philosophy, and in particular by Hegel whose logic was adopted and modified by Marxism; the latter developed a logic which revealed the laws and the forms of movement of theoretico-scientific thought towards the truth.

Logic had thus divided into two absolutely independent parts. By the force of various reasons and of the desire for exclusivity characteristic of the development of knowledge, these two logical systems placed themselves in a situation of competition with one another. Hegel regarded as futile the ideas of Leibnitz which were at the origin of mathematical logic, considering that "the worst that can be said of any discovery is that it is in the realm of the analysis of logical science."[5] He reproached him as follows: "the definitions of deduction are placed here on the same level as combinations of dice or cards, the rational is considered as something dead and strange to the concept."[6]

In addition, mathematical logic gave birth to philosophical ideas according to which the problematic nature of philosophy was irrevocably finished, in particular as regards the interpretation of knowledge. Everything was contained within the domain of an exact, strict and precise calculation. There was even a complete program for the "destruction," to put it bluntly, of philosophy; it was a question of driving it out of the realm of logic, which it was claimed could only be formal and in the strictly mathematical form of its expression. The adversaries belaboured each other with arguments and applied themselves to discovering methods for verbal destruction; but the two directions continued to exist and to develop. There remained only the question of the mutual relationship and influence of these two logics.

But the relationship of one of these logics—of the formal logic in its present aspect—to the other, which is currently called, and not by chance, dialectic logic—has taken another turn; it is now a question of the relationship between dialectic and formal logic, in as much that the development of dialectic has resulted in its becoming a logic.

Indeed, dialectic, from the oldest times, took two distinct forms: it was the art of operating with ideas (Plato) and the appreciation of reality itself, in particular of nature (Heraclites). These two origins of dialectic seem absolutely disparate: either dialectic teaches how to think, how to operate with concepts or else it offers an understanding, an appreciation of the world itself

[5] Hegel, *Logic.*

[6] Hegel, *Logic.*

and of the nature of the objects which are in it. These two systems of knowledge are as opposed to each other as logic to ontology. But the development of philosophic thought gave rise to the idea that they coincided. Dialectic has no other aim than to create and perfect the apparatus of theoretico-scientific thought which leads to objective truth. But it so happens that this apparatus is a system of concepts of which the content is taken from the objective world. Dialectic, whether as appreciation of the nature of things or as the art of operating with ideas, has still the same content, for the laws of the objective world, to the extent to which they are known to us, appear at the same time as laws of thought and these show themselves as the reflection of the laws of the objective world. "In returning," wrote Engels, "to a materialistic point of view, we saw once more in the ideas of men the image of real things, instead of seeing in real things the image of such or such degree of the absolute idea. Dialectic thus led back to the science of the general laws both of the movement of the external world and of the movement of human thought: two series of laws wich are in essence identical and which in their manifestations differ only to the extent that a human head can apply them consciously whereas in nature—and until now in the history of man also to a large extent—they make their way unconsciously..."[7]

The forms and the thoughts studied by logic are nothing other than the form and the laws of the movement of the world of objects, carried along in the common process of work and having entered the field of human activity. And it is precisely in this universality—i.e. in the fact that social man is capable of transforming an object in nature into an object and condition of his activity of life, and that he is not tied like an animal to the strictly biological conditions of life of his species—that may be found the "specificity" of human activity in general and of thought in particular.

At this point the following phrases of Marx must inevitably be quoted, since their import is essential for the solution of the problem posed: "the practical construction of the *world of objects*, the *remodelling* of inorganic nature is the self-affirmation of man

[7] Marx and Engels, *Works*, vol. 21.

as a conscious being... The animal, it is true, also produces... but the animal produces only that which he needs immediately himself or which his young needs; he produces unilaterally whereas man produces universally; he produces only under the pressure of an immediate physical requirement whereas man produces even when he is free of all physical requirements, produces in fact, in the proper sense of the word only when he is free of it; the animal produces only himself, whereas man produces all of nature; the product of the animal is directly linked to his physical organism whereas man is free to choose his product. The animal shapes the material only in accordance with the standards and the needs of the species to which he belongs, whereas man can produce according to the standards of any species and can apply in every case the standard applicable to a particular object..."[8] Man thus proves his universality in general, and in particular that of his thought, to the extent that thought is nothing more than the highly developed aptitude for acting consciously with such or such object according to its form and its own standard, on the basis of an image representing this object with objective exactitude.

The laws and the forms of thought systematized by logic are only the laws and the forms of the world, of nature and of society understood by man, the laws and the forms of the world reflected in his consciousness.

The difference between "ontological" and "logical" legality consists soley in this: in nature and also most frequently in society as well, these laws are followed unconsciously and appear as an external necessity which makes a path through the chaos of apparent chance, whereas thinking man is able to act consciously in accordance with these laws i.e. freely.

From the point of view of materialism in general, the recognized dialectic of the development of nature and society is immediately the logic of thought concordant with reality. Of course here it is a question only of the thought of the reality which is the objectively exact reflection of it, verified and verifiable by human practice.

Materialist dialectic serves as a logical method for the move-

[8] Marx and Engels, *Works*.

ment of thought towards objective truth since it guides thought according to the laws of the object itself. The effectiveness and success of the method depend on the legality on which it is based and on the exactitude and completeness of the reflection of it which it provides. In addition, dialectic shows itself as a method of logical thought not only for any particular man of learning who shares the views of dialectic materialism but for contemporary science as a whole. The men of learning themselves, who subjectively reject dialectic, are obliged (by the force of the objective content of the concepts and theories of science) to follow the laws and categories of dialectic; it is impossible otherwise to accomplish fruitful scientific work.

The force of dialectic, as also of logic, lies in their ability to relate the objectivity of the content of the concepts and theories of science with their variability or instability. In addition, dialectic proves that without further development it is impossible to reach objective truth. Contemporary science has an imperative need for a logic which reveals the legality of knowledge as a *process* of comprehension of the object by thought.

Materialist dialectic as logic has developed a series of categories which govern contemporary sciences and theoretical thought. Taking this as a starting point, we see in the foreground the categories of subject and object. The process of knowledge is the result of the action of subject and object upon each other. The active source of this reciprocal action is the subject: it acts upon the object and transforms it to its image and likeness, i.e. in accordance with its social needs. The objects of the material world exist independently of man, but the latter cannot remain passive towards them; he considers them as the object of his practical activity. It is this which governs scientific knowledge which, aiming to achieve a practical transformation of the object, tends to bring out its objective nature. We find ourselves confronted here with the fundamental contradiction in the process of knowledge, the contradiction between subject and object. The subject, creator and possessor of knowledge, must arrive at results which in their content, do not depend upon man himself. This seems paradoxical, but it is so. In order to master the object practically and theoretically, man intervenes actively with his tools and instruments in the sequence of the objective process; he makes the object to some

extent subjective. But the more the object is subjective in this way, the more objective is the knowledge which we have of it, the more complete and profound is our understanding of the characteristics of this object, which do not depend on any subject.

Contemporary science, and in particular the natural sciences, provide evidence of the increased activity of the subject in knowledge. Equipped with instruments and apparatus it invades the object studied and thus increasingly subjectivizes it. The quantum mechanism can serve us here as an example; it shows that when studying the phenomena of the micro-world, the researcher uses macroscopic instruments which affect the elementary particles and at the same time are affected themselves. This process is interpreted by scientists who do not understand the dialectic of subject and object as a loss of the possibility of knowing the objective characteristics and laws which it is sought to discover. It is in this regard that reference is made to a fusion of subject and object, to a disappearance of all differences existing between them.

For dialectic materialism this does not present an insurmountable difficulty. In the process of the reciprocal practical action of subject and object, the process of transfer from subjective to objective and from objective to subjective is constant. The ideas and theories of man crystallize and transform themselves into objective reality existing independently of the consciousness of the subject. In addition man takes to himself the objects of objective reality, humanizes them and uses them as extensions or reinforcements of his natural organs.

To arrive at the objective truth in knowledge is the necessary condition for the practical appropriation of the object by the subject. In knowledge, the subject and the object coincide theoretically and the object passes into the content of the person who knows it. The increase in activity of the subject, its entry into the course of the objective process is the necessary condition for a complete and total reflection of the object in knowledge, of the object as it exists independently of the consciousness of men.

In order to understand the laws of the movement of scientific knowledge towards objective truth, materialist dialectic uses its categories, categories such as emotional and rational, abstract and concrete, logical and historical, absolute and relative, probable and certain, and so on. Each of these pairs of categories in dialectic

represents a particular aspect of the complex and contradictory process of contemporary scientific knowledge.

Thus dialectic logic appears as the science of truth, of the process which makes the content of knowledge coincide with the object, of the categories in which thought coincides, aligns itself with the reality of objects. In other words, all the logical categories which represent in their sequence and in their transitions the theory of dialectic logic, are the universal definitions of reality as it appears in objectively true thought, verified and verifiable by human practice, since the definitions of true thought are the definitions of the reality which can lead to an exact comprehension. The logical categories are the forms of agreement, of coincidence (of identity) of thought with reality.

Of course, the relationships between thought and reality are not meant here in the sense of a dead and abstract reality, simply "the same thing," but as an absolutely typical case of the identity of opposites. That is why the logical/dialectic categories appear simultaneously as forms of transfer (conversion) of reality to thought or to knowledge, i.e. as degrees of knowledge, of the reflection of the world in the consciousness and as degrees of conversion of knowledge into reality, as degrees of practical realization and verification of knowledge by practice. It is for this reason and in virtue of this characteristic that dialectic or dialectic logic—the two terms are equivalent—at once appears as a theory of knowledge also (a gnoseology).

Dialectic is not a canon, an authenticating instance of the knowledge achieved, but an organum, a means and a method for increasing real knowledge by the critical analysis of concrete, factual material, a method (means) for the concrete analysis of the real object or the real facts.

Lenin considered that the categories of logic, in their systematic unity, should "be deducible" from the history of knowledge and of human activity, and that consequently "in logic, the history of thought *must* in general coincide with the laws of thought;"[9] just as, inversely, the unity of development of categories in the theory of logic should be directed, in general, towards

[9] Lenin, *Complete Works*, vol. 29.

"the general progress of all human knowledge (of science) in general."

Of course, this does not at all mean that logical theory must slavishly follow the unity which appears in the simple and uncritical description of the history of the various sciences and discoveries, for the relationships between the "logical" and "historical" unity of the development of categories (not only of "logic," but of any other science) are in their turn dialectic, contradictory.

Thus the development of logic led to its division into two autonomous parts, independent of each other. In addition, one of these two parts, because of its content, coincides with dialectic, which functions as a method of the movement of thought towards objective truth, i.e. it is a logic. When therefore the question is raised of the relationship of dialectic and logic, it is in fact sufficient to resolve the following problem: that of the relationship of dialectic and formal logic, for the other, non-formal logic is in fact dialectic itself.

A tendency exists to represent dialectic and contemporary formal logic as two incompatible systems, two mutually exclusive systems. To admit dialectic is to reject formal logic and vice-versa. This would be the case if it were a question of two scientific systems having the same object and constructing theories of which one would be the negation of the other; for example, should dialectic, as opposed to formal logic, admit that from the premises, all men are mortal, Socrates is a man, the conclusion must be reached that Socrates is immortal. But dialectic does not possess a system of calculation of statements, proper to itself, nor of calculation of predicates etc. In general, this is not its field of research and it possesses no special knowledge on this question. Dialectic and formal logic touch upon different aspects of theoretico-scientific thought, and, since the word has become to some extent fashionable, they are complementary. Dialectic supplies a system of categories operating profitably in the process of the movement of thought towards new results, whereas formal logic is an apparatus making it possible to draw from a given theoretical or empirical item of knowledge with a given degree of probability all the possible consequences.

One may wonder then what to think of the observations put

forward by the founders of marxism-leninism, which show the opposition of dialectic and formal logic. Were they incorrect? Like all other declarations in science, they are correct for a precise and limited sector concerning a strictly defined area, beyond which they lose their sense and their content of truth. Yes, the founders of marxism-leninism found an opposition between the dialectic logic which they were developing and formal logic. They pointed out that formal logic, as a method of knowledge, is very limited and by comparison with dialectic is on a lower level. It is for this reason that Engels wrote: "Formal logic itself represents above all a method for seeking new results, for passing from the known to the unknown; the same thing, but in a much higher sense is offered by dialectic; in addition, the latter, by tearing open the narrow horizon of formal logic, contains the germ of a wider concept of the world."[10]

Formal logic and dialectic, as methods of knowing reality, occupy in relation to each other the same positions as elementary and advanced mathematics.

The same idea is developed by Lenin, in particular in his article "More about Unions," when he writes that formal logic "adopts formal definitions, letting itself be guided by what is most customary, or by what falls most frequently within its range of vision, and limiting itself to that."[11]

The founders of Marxism-Leninism showed the limits of formal logic as a philosophical theory of thought. A large number of philosophers who studied it were idealists in their solution of the fundamental problem of philosophy; they separated thought from the material world, the forms of thought from their content (e.g. Kant and the kantians), and took as a basis an idealist conception of truth and its criteria. Up to the time of Marx and Engels, the champions of formal logic were metaphysicians who studied the forms of thought one after another, outside their movement in the process of development of knowledge. Dialectic logic as a philosophical theory of thought is in opposition to formal logic and is in fact its negation.

The ideas of Engels and Lenin concerning the place of formal

[10] Engels, *Anti-Dühring*.

[11] Lenin, *Complete Works*, vol. 42.

logic in the study of thought have considerable importance. Dialectic logic does not deny the value of formal logic. After the appearance of dialectic logic, formal logic loses its prime importance as a theory of thought. To maintain in the 19th. and 20th. centuries the positions of formal logic as regards philosophical method is to return to metaphysics and to enter into contradiction with the contemporary level of scientific knowledge.

As Engels notes, formal logic as a philosophical method of knowledge is suitable only for domestic use; it is of no value if one attempts to use it to explain the phenomena studied by contemporary science. But formal logic retains all its value as a study of deductive know-how, of the laws and forms of judgement by deduction on the basis of judgements formulated previously; it represents a part of the scientific study of demonstration, of its forms, its structure and its relationships to judgements. The nihilist attitude towards formal logic and its problematic domain is not proper to marxism which traced out the frontiers of its domain but in no way rejected it.

Contemporary formal logic, in the symbolic form of its expression, is not a "bad" or "inferior" logic; like any other science it has its object and its method. It is one area of scientific knowledge and studies one particular aspect of thought. In this respect it is in no way different from other specific sciences. It is transformed into "bad" logic if it pretends to play the role of general methodology of contemporary knowledge. Formal logic properly understood is one of the most effective means for studying the structure of thought; the apparatus which it has developed is used by a wide range of sciences.

The experience of the development of contemporary scientific thought has shown that the two logical systems, dialectic and formal logic, achieve fruitful results in the acquisition of new knowledge. Science needs strict rules of deduction and systems of categories in order to provide a firm basis for the fertility of the imagination and for the creative activity of thought when it takes in new objects from reality.