

What is Dialectic?

Some remarks on Popper's criticism

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Karl Popper famously opposed Marxism in general and its philosophical core – the Marxist dialectic – in particular. As a progressive thinker, Popper saw in dialectic a source of dogmatism damaging to philosophy and political theory. Popper had summarized his views on dialectic in an article that was first delivered in 1937 and subsequently republished as a chapter of his book (2002, pp. 419-451), where he accuses Marxist dialecticians of not tolerating criticism.

Ironically, Popper's view that all Marxist dialecticians dogmatically dismiss any criticism of dialectic by claiming that their opponents do not understand dialectic makes his position no less dogmatic. Indeed, any attempt to criticise Popper's views on dialectics would be seen only as an additional example of responses by "dogmatic dialecticians", making his theory essentially immune. This completely prevents dialecticians from being able to criticise Popper's views. This is exactly the opposite of what the great philosopher wanted. Therefore, for the sake of "anti-dogmatic science" it is desirable and even necessary to defend dialectic.

In this work I address several central points about Popper's criticism of Marxist (materialist) dialectic. In particular, I (a) analyse Popper's definition of dialectic as the dialectic triad (thesis, anti-thesis, synthesis) and contrast it with a notion of dialectic as a much more complex concept which occurs in dialectical materialism today, where the triad represents only one of the aspects; (b) compare dialectic with the trial and error method; (c) discuss the place of dialectic amongst valid scientific methods: Does dialectic accept logical contradictions; (e) discuss lessons dialecticians should learn from Popper's criticism.

I will test my arguments as to their constructiveness and will demonstrate explicitly the nature of my disagreement with Popper - thereby trying to avoid the "dogmatic dialecticians" response as much as possible.

Progressive, anti-dogmatic science is critical – criticism is its very life.
Karl Popper

I. Introduction: Popper and dialectic today

Today, the validity of many Popper's ideas and claims are somewhat controversial. However, they are more relevant than ever. Rethinking Popper means reassessing his ideas in the present day context. During the last decade of his life, Popper had a chance to enjoy an apparent refutation of the communist ideology. The collapse of the Soviet Union was met with euphoria and was accompanied by an expectation that the world will become a better place. Yet, today we realize that global political and social dynamics is

much more complicated. Ideologies are exploited by political regimes: and so the Stalinist terror and collapse of the Soviet block cannot be accepted as refutations of the communist dream any more than the crimes of the Inquisition can be accepted as a refutation of the existence of God. Today we also understand that the idea of democracy was and is exploited. The US intervention and support for the overthrow of the elected socialist coalition of Salvador Allende in Chile in 1973 and its replacement by the military dictatorship of General Pinochet is no different, in its essence, from the 1969 Soviet invasion of Czechoslovakia and suppression of Alexander Dubček's liberal reforms. The paranoid fear of alternative world views, and the fight for influence, power and resources were a real force behind both these actions and the colour of the ideological umbrella did not really matter after all.

Notwithstanding the above, the idea of communism was associated with Stalinism and totalitarianism in general and therefore discredited; and dialectical materialism was discredited together with it. It should be stressed, that nothing in dialectical materialism, as a philosophical system, implies communism. However, the notion of dialectic has been politicised to such an extent that now defending dialectic is associated with being an enemy of freedom and democracy. The roots of this sad unfair predicament lie already in Popper's 1937 article.

The purpose of this work is by addressing the Popper's original 1937 critique to reassess the notion and the place of the dialectical approach in today's philosophy. My aim is neither to launch a personal attack on Popper now, thirteen years after his death, nor to discuss the state of the dialectical approach during his life. My aim is, rather, reassess our view of dialectic and its suitability as a valid philosophical and scientific approach today.

I am convinced, that the rehabilitation of dialectic is a very important task. Modern science – science of complex adaptive systems, non-linear phenomena, self-organisation, etc. needs an adequate philosophical framework and methodology, which is still absent today. And dialectical materialism deserves attention as a serious potential candidate for such a framework. It was developed, especially in the Soviet tradition, as an incredibly systematic philosophical system. This system certainly deserves very deep unbiased analysis. Thus, it would be interesting to analyse the connections between modern dialectical approach and relevant on-going studies on *emergence*, *process ontology*, etc.

It would be too ambitious in this article to address the question of the general applicability of the dialectical approach to all processes in the world in this article. Here I focus on the applicability of the methodological aspects of the dialectical approach to philosophy of science.

II. Dialectic and dogmatism

Popper accused Marxists of dogmatism. Ironically, Popper's remark of how Marxist dialecticians dismiss any criticism of dialectic by claiming that their opponents do not understand dialectic makes his position no less dogmatic. If, for example, one was

claiming that a particular argument of Popper is incorrect, because it does not take into account such and such aspects of dialectic, Popper would accuse one in dogmatism. This completely prevents dialecticians from being able to criticise Popper's views. Indeed, how can one defend a view if not by trying to demonstrate where the opponents argument is flawed. Any such attempt would be dismissed on the grounds of dogmatism. Very uncritical, is it? This is exactly the opposite of Popper's critical attitude.

Although, I of course agree that there might be dialecticians with a dogmatic view, and do not wish to defend them, I would like to stress that Popper's remark, which criticises them, cannot be directed to dialectic *per se*. Thus, that aspect of Popper's criticism is not constructive. It does not add anything to the content of the argument. A similar situation would arise if Popper, for example, attacked the theory of relativity by dismissing the postulate of invariance of the speed of light. Most physicists would not accept his claim and perhaps a number of them would accuse Popper of not understanding relativity. Does it make the theory of relativity dogmatic? Surely not.

It should also be mentioned that there are Marxists who have adopted an anti-dogmatic position, like the modern theoretician of Marxism, Bertell Ollman (2003)

Dialectics is not a rock-ribbed triad of thesis-antithesis-synthesis that serves as an all-purpose explanation; nor does it provide a formula that enables us to prove or predict anything; nor is it the motor force of history. The dialectic, as such, explains nothing, proves nothing, predicts nothing and causes nothing to happen. Rather, dialectics is a way of thinking that brings into focus the full range of changes and interactions that occur in the world.

III. Dialectic and dialectic triad

Popper gives the following definition of dialectic (Popper, 2002, p. 421):

Dialectic ... is a theory which maintains that something – for instance, human thought – develops in a way characterised by the so-called dialectic triad: thesis, anti-thesis, synthesis.

This is, however, by no means the definition of dialectic as materialist dialecticians see it today.

Dialectics is the method of reasoning which aims to understand things concretely in all their movement, change and interconnection, with their opposite and contradictory sides in unity.

[on-line Encyclopaedia of Marxism]

Following Engels (1946) the modern materialist dialectic is associated with the following laws :

Laws of Dialectic

- The law of interpenetration of opposites (unity and struggle of opposites)
- The law of the transformation of quantity into quality and vice versa
- The law of negation of the negation

What Popper refers to appears to be the last law – the *law of the negation of the negation*. Popper, therefore, identifies dialectic only with one of its aspects, leaving all others aside. This fact is very important since the universal applicability of this law is subject to controversy amongst dialecticians from different schools, especially in the Soviet tradition of Dialectical Materialism - “Diamat” - (Orlov, 1991, pp. 326-7).

The aim of dialectic is to study things in their own being and movement via the connection of opposites. Materialist dialectic is a study of *connections*, it is able to grasp complex types of connections, e.g. *interplay of opposites*, and the most complex type of connections – *development* (*Introduction to Philosophy, 1989, p. 106*). Thus, materialist dialectic is a theory about *development*, and development is a central concept of dialectic.

Studying development in its general terms becomes more and more important and relevant today, when theories of complex systems and processes in biology, social and physical sciences, e.g. synergetics, have gained general recognition. The topic of development is directly relevant to the argument between emergence and reductionism in philosophy of science. Thus, the concept of dialectics as a theory of development is crucial in the next section, where we compare dialectic and the trial and error method. It is essential to point out that the examples in the following sections are not given to support the view that all processes of development in nature are dialectical, as Engels argued in [Anti-Dühring](#) and in *Dialectics of Nature*. This question, though fundamental in dialectical methodology, remains beyond the scope of the present article. What these examples ought show, though, is that the development of our scientific ideas and hypotheses about the physical phenomena described in these examples can only make sense if analysed through the eyes of dialectic.

IV. Trial and Error Method (T&E) versus Dialectic (D).

Popper presents the trial and error method (T&E) as a universal way in which human thought in general and scientific development in particular occurs, and compares it with dialectic (D). According to Popper, dialectical approaches, though applicable in some situations, do not hold in general, so although dialectics satisfactorily describes some developments, it is not consistent with others; and he supports his claim by four scenarios.

a) When the Thesis and the Antithesis do not lead to a Synthesis. Instead, one of them is simply eliminated.

b) Many independent theses can be offered, therefore T&E has wider application than D which does not account for that.

c) The Thesis does not produce the Antithesis. Rather our critical attitude produces the Antithesis, and sometimes the Antithesis is not produced at all.

d) In the case when the Synthesis is produced, it is not simply a construction built merely of material supplied by Thesis and Antithesis and preserving the best parts of both. It will contain some entirely new idea.

The dialectical interpretation, even where it may be applicable, will hardly ever help to develop thought by its suggestion that a synthesis should be constructed out of the ideas contained in a thesis and an antithesis.

(Popper, 2002, p.424)

I would like to start from the last point, d), since it is the most crucial one. As we have already seen in Section II, development is an essential part of the dialectical approach with all attributes associated to it: Including completely new content that emerges as a result of a development. Thus, Popper completely misinterprets dialectic and accuses it of *not being exactly what it is*. Dialectical interpretation does promote development precisely because Synthesis is not just a construction from the material supplied by Thesis and Antithesis.

For the same very reason, the situations described in a), b) and c) do *not* promote development. They describe changes which are not associated with development. Nothing new emerges – all was contained already in the thesis or the antithesis¹. Thus, I reach conclusions radically different to Popper's. Trial and Error method and dialectical approach do not compete; for those aspects of the Trial and Error method which are not shared by Dialectic cannot account for development.

V. Dialectic versus Formal Logic

Now we arrive at a crucial point - Popper's core argument against the dialectical method in science. According to Popper, dialectic accepts contradictions, it violates the “law of (exclusion) of contradiction”. And since accepting contradictions will ruin science, dialectic is dangerous. Contradictions for Popper are logical contradictions, therefore dialectic is opposed to *formal logic*. It should be noted that the topic of the relationship between formal logic and dialectic was often addressed in the Soviet Diamat literature [for example, there is a section devoted to the issue in Introduction to Philosophy (1989,

¹ Zuzana Parusnikova has pointed out, that refutation of, say, a thesis does not eliminate it or erase it, so to speak. The very fact of it being refuted leaves an imprint on our background knowledge. Although, this point deserves farther consideration it is not clear at this stage whether it accounts for emergence of a qualitatively new.

p.151) titled “Dialectic and logical contradictions”] as well as in Western Marxist writings (Ollman, 2003, p. 11).

The main objection against Popper's conclusion was systematized and put forward by Maurice Cornforth (1977, chapter III). Here I summarise the key claims:

a) Dialectic does not suggest that the laws of formal logic can be broken or set aside.

b) Dialectic is not opposed to logic: rather, it is opposed to metaphysics².

c) Negation (antithesis) is not in logical contradiction with the thesis, because dialectic treats things in their interconnections-the idea can be best expressed in Cornforth's own words (1977, p. 86):

Of course, if you ignore the ways things are connected-if you ignore, say, those connections of things which lead to an existing state of affairs generating its own “negation” - you will reach wrong conclusions. That unfortunate result will not then be due to your respect for formal logic, but to your disrespect for real connections.

In this article we specialize in philosophy of science, and therefore contradictions mentioned above should be regarded as contradictions between rival scientific hypotheses.

Formal logic studies and classifies statements and propositions. In particular, it distinguishes between those proposition that are true and those that are false. However, the formal logic itself is empty of content. When it deals, say, with two propositions A and $\neg A$, it asserts that they both cannot be true. But formal logic is hitherto best developed for *non-vague* sentences and propositions (which it can supply with unambiguous semantic content), whereas everyday propositions, and also scientific hypotheses, are normally too vague to fit into this type. Indeed, the topic of *vagueness* was extensively studied [see, for example Keefe and Smith (1997)]. Keefe and Smith write (1997, p.2)

Suppose Tek is borderline tall. It seems that the unclarity about whether he is tall is not merely epistemic. For a start, no amount of further information about his exact height (and the heights of others) could help us decide whether he is tall. Plausibly, there is no fact of the matter here about which we are ignorant: rather, it is indeterminate whether Tek is tall. And arguably this indeterminacy amounts to the sentence “Tek is tall” being neither true nor false, which violates the classical principle of bivalence. The law of excluded middle similarly comes into question: “either Tek is tall or he is not” seems untrue.

As a result, logical incompatibility of propositions, corresponding to rival scientific hypotheses, has to be set outside of formal logic.

² Here the term 'metaphysics' is used in its traditional Marxists meaning.

The fallacy in Popper's approach consists of loading two propositions/scientific hypotheses with a certain content *a priori*, thereby asserting that the two are logically exclusive, and thus arriving at a conclusion that any attempt to reconcile between the two in the form of synthesis will accept logical contradiction. This idea perhaps was best summarized by Ollman's (2003)

The common sense notion of contradiction is that it applies to ideas about things and not to things themselves, that it is a logical relation between propositions ("If I claim 'X,' I can't at the same time claim 'not X' "), and not a real relation existing in the world.

In other words, formal logic deals with notions or aspects of things abstracted from the real things themselves.

Thus, when we consider a hypothesis, even a most simple one, about the *real* world its very content depends on our inquiry, on other hypotheses, on the history of our views on the problem and so on³. Its content is, in as sense, a product of the process of the inquiry itself. And thus it is a (“metaphysical”) mistake to think of hypotheses – or indeed any proposition - in isolation from each other and from the process of our inquiry. When Popper thinks of things (scientific hypotheses) and their properties in isolation from each other, it leads to a formal counter-posing of “is” and “is not”. We can illustrate it with Popper's own simple example

(Thesis) The sun is shining now
(Anti-thesis) The sun is not shining now

At first sight, these two proposition are evidently contradictory. However, this is an illusion – we are misled by formal linguistic counter-posing of “is” and “is not”. This is exactly the trap we should not fall into. Let us conduct a simple Gedankenexperiment. We will phone our friend around the world and (after apologizing to some of them for waking them up) ask to look out of the window and tell us whether the sun is shining now or not. Very soon we will discover that the Sun *is* shining in Madrid, Florence, Cairo, Kiev, but it *is* also *not* shining in Tokyo, Sidney, London, Amsterdam, etc.

Thus, we will realize that for us as observers at the surface of the Earth the meaning of attributing the property of shining to the Sun has a spacial/geographical and temporal aspects. We can go out to space where we will discover that our everyday sense of Sun's shining has a subjective aspect – Sun shining when and where it is shining *for us*. We will find out that objectively Sun started to shine, i.e. emit radiation into the outer space, and hopefully will do so in the foreseeable future.

This toy example is trivial, but it makes the point. We started from two simple hypotheses about sunshine, but in the process of our inquiry we acquired a lot of new

3 It is well know that the socio-cultural-historical aspects of the scientific progress were extensively elaborated by Thomas Kuhn in his famous work. I do not go into the disagreement between Kuhn and Popper here in order not to draw away our attention from the main point. For the purpose of our discussion it is enough to say that a particular hypotheses must not be abstracted/detached from the real object or the process, and should not be schematized, thereby filling it with a priori content.

content. We learned that sunshine can be interpreted as a property attributed to the Sun alone (independent of its observation) or as a characteristic of an observer's experience, it differs at various points of space and time, i.e. it has spatio-temporal characteristics – the Sun might shine at (x_1, t_1) , but not shine at (x_2, t_2) . These conclusions are full of a new content that was not in the original propositions before. We might say that our knowledge has developed into a new stage.

Thus, the original propositions are not in logical contradiction at all. One might wonder, though, how I will cope with the following example

(Thesis) The sun is shining in Cambridge, England at 1:30 pm on Wednesday, 17/10/07, above the Market Square

(Anti-thesis) The sun is not shining in Cambridge, England, at 1:30 pm on Wednesday, 17/10/07, above the Market Square

These two surely are mutually exclusive. Of course they are! But if we conduct a similar inquiry here then we will just refute either one or the other. Formal logic will be saved. However, no new content will be produced – we will just assert which one is true. We knew all along that the Sun cannot both shine and not shine in the particular place at a particular time. The above example supports an interesting assertion that real scientific progress depends on *vagueness* and that formal logic is scientifically unimportant in this sense.

One might be satisfied by the above example, but I feel it necessary to discuss the following, still quite simple, yet more “scientific” example [see Cornforth (p. 96)]. Let us imagine the following hypothetical situation. We are chemists, and in our laboratory we have a test-tube with newly discovered substance, called “oxygen”, about which we do not know anything yet. We are going to test a scientific hypothesis that *oxygen is a gas*. This is our thesis. We immediately arrive at its negative version, namely *oxygen is not a liquid*. We subject oxygen to various tests and soon discover that under certain conditions it does become a liquid. This conclusion that *oxygen can be a liquid* is our antithesis or negation. The result of our study will be that *oxygen is a gas under certain normal conditions of temperature and pressure*. This is the synthesis or negation of the negation – oxygen can be a gas after all. Thus

(Thesis) Oxygen is a gas
(Anti-thesis) Oxygen is a liquid

are in logical contradiction if one ignores oxygen as something that can be in process of change, considers concepts of gas and liquid in isolation, ignore their interconnection. This example demonstrates how scientists reduce vagueness and sharpen scientific concepts by reconciling thesis and antithesis.

Now we are ready to see that the T&E scheme imposed on the development of scientific theories by Popper is much too restrictive. So restrictive, that in fact, using only trial-and-error method science could not make any progress at all. The core problem is that the scientific conceptual framework imposes logical incompatibility of certain hypotheses. Thus, for example, in the framework of our classical experience our intuition about the world imposed rigid restrictions on properties classical objects can possess. In particular, the incompatibility of the corpuscular and the wave nature of an object: any classical object can be either a wave or a particle. (The discussion about the corpuscular and wave nature of light has a long history and became, so to speak, a classical example in philosophy of science). Let us try for a moment to reason without the baggage of that classical framework. The two (potential) aspects of an object's being (properties), namely "an object is a wave" and "an object is a particle" are not yet incompatible. One has to abstract them from the real object to make them logically incompatible, i.e. identify "being a particle" with "not being a wave". Following Popper's T&E method would mean that every time a scientist considers the two rival hypotheses about the nature of light and is going to test them in the laboratory, she would refute one of them, depending on the nature of the experiment.

The history of quantum physics has proved this approach to be radically wrong. Instead, physicists arrived at the novel concept of *wave-particle duality*. The additional powerful example is the *superposition principle* in quantum mechanics, i.e. when to the same quantum object can be attributed a state of being, for example, in two different locations at once. If physicists followed Popper's T&E scheme, they would never escape from the loop of logical incompatibility of the different, apparently contradictory aspects, and would never make any progress towards one of the most incredible scientific theories in the history of mankind. This example differs from the one given in the previous paragraph in that it demonstrated how scientists create new concepts.

Thus, inherent contradictions are seen by dialectical materialism as the main source of development. *But they are not logical contradictions*. They are contradictions in the operational sense. They are contrastive sides or aspects of one real object or thing⁴, but not contrary (i.e. mutually exclusive) in the logical sense.

I would like to finish my discussion of the relation between formal logic and dialectic by the following, and to my view very important, remark. Sometimes in the literature [e.g. see Novack (1969), Stavinsky (2003)] dialectic is presented as a kind of a *new logic*, as a counter to the conventional formal logic, and a term *dialectical logic* is even used to describe this new type logic. I strongly oppose this view exactly for the reasons given in this section. The term *dialectal logic* leads exactly to the sort of confusion that is presented in Popper's treatment of the problem. It implies or at least creates the impression that formal logic should be replaced by dialectic. As I have argued here, formal logic and dialectic belong to the different domains and must not be treated as potential replacements of each other. Maurice Cornforth very correctly points out that

⁴ It is important to mention that these contradictions are not of the *predicative nature* either. Formally, several contradictory properties can be trivially attributed to an object due to the predicative tension, e.g. milk is white and is (at room temperature) wet, and the property of being white is not the property of being wet. This is, obviously, not what dialectic means by 'opposites'.

'the laws of formal logic are of **absolute** validity, **any** form of statement which sets them aside becomes thereby incoherent and inconsistent' (p.86).

VI. Summary

The aim of this work was neither to present a (brief) review or study of modern dialectic nor to discuss the applicability of the dialectical approach to all development processes in Nature⁵. The aim of this work was to reassess the relevance of Popper's criticism of the applicability of the dialectical approach to the development of scientific theories and scientific thought. I have presented and discussed the main points of Popper's criticism of dialectic and have concluded that it is unsound. I argued that Popper has significantly contributed to the link that was unfortunately created between dialectical materialism as a philosophical-scientific system and communist ideology. The latter found itself misused by several totalitarian regimes. Popper politicized dialectic helping to build prejudices against it. In the interest of anti-dogmatic science these prejudice should be dissolved. Thus, this work is an attempt to rehabilitate dialectic by addressing Popper's original criticism.

And finally, I would like to mention the main lessons that dialecticians should learn from Popper's criticism in the light of my previous discussion. It is important that theoreticians of dialectical materialism will do more to *depoliticise* it. In particular, they ought to convey that its application to the society and history, i.e. *historical materialism*, should not make any exact social predictions. In addition, the dialectical approach certainly suffers from its apparent applicability to “everything”, the problem that raised the most serious objections from Popper. Indeed, it should be clarified how dialectic classifies and differentiates different processes and types of connections in the world.

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References

Collier, A. (2004) *Marx*, Oxford: Oneworld.

Cornforth, M. (1977) *The Open Philosophy and the Open Society*, London: Lawrence and Wishart.

⁵ The latter idea originates primarily from Engels and was never implied by Marx himself (Collier, p. 125).

Engels, F. (1946) Dialectic's of Nature, London: Lawrence and Wishart; on-line copy <http://www.marxists.org/archive/marx/works/1883/don/index.htm>.

Introduction to Philosophy, Textbook for HEI, Part Two: Theory and Methodology: Problems, Concepts and Principles, Москва, Политиздат, 1989 (in Russian).

Keefe, J. and Smith, P., eds. (1997) *Vagueness: a reader*, A Bradford Book, The MIT Press.

Novack, G. (1969) *An Introduction to the Logic of Marxism*, Pathfinder; 5th edition.

Ollman, B. (2003) *Dance of the Dialectic: Steps in Marx's Method*, University of Illinois Press.

Orlov, V.V. (1991) *Foundations of Philosophy, Part One: Dialectical Materialism*, Пермь: Издат. Томского У-та, Пермское отделение, 1991 (in Russian).

Popper, K. (2002) *Conjectures and Refutations: The Growth of Scientific Knowledge*, London: Routledge Classics.

Stavinsky, I. (2003) *Philosophical Researchers*, Moscow;
<http://uweb.superlink.net/~dialect/Logictheory.html>.