Science and the Social Revolution

Alfredo M. Bonanno

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To govern life through science can have no other result than the brutalization of mankind. Bakunin

Science today

To face the problem of science in a perspective of social revolution within the restricted limits of an essay for a review might seem rash, and that is why some initial clarification is required.

In fact, it is not easy to make a definition of science, pointing out the characteristics that appear to be more or less constant in all the various sectors that science is divided into, i.e. the individual sciences. We all believe that we know far more than we actually do, so when we are faced with the real importance of the problem, we end up confusing the few clear ideas we have, retreating into the commonplaces of solidified knowledge, prevailing academism or ideologism.

The more we go into things, the more we tend to establish a distinction between the truths supplied to us by the factory stamp of scientific truth, and the certainty that we carry in our hearts that everything has been produced by exploitation, and that the dominion of capital must be destroyed, science included. We feel a sense of disgust for everything, even for the certainties and progress that man has accomplished along the road of liberation, and which have duly been mixed up in the great caldron of science and the absurdity and ideology masked by scientism.

But then, on reflection, we realise that the effective improvements realised by science have been artfully mixed by our dominators in the midst of a jumble of metaphysical theories, and we cannot throw everything away, but must develop a method that consents us to decodify the swindle, separating all that really constitutes progress brought about by science, from that which constitutes superfluous ideological cover aimed at perpetuating power.

This should not lead us to believe that a use of the instruments of repression is possible in the revolutionary sense, something like the use that marxists claim to make of the repressive and productive mechanisms of the State as they wait for its impossible extinction. Science is undoubtedly one of the most efficient instruments of repression, but that is not all it is. It is also an instrument; not taken as a whole, but it is in part an instrument. Today, presenting itself as an (apparently) organic co-ordinated complex of knowledge, it has turned out to be addressed exclusively towards exploitation; tomorrow, submitted to a suitable selection based on revolutionary criteria, it could become one instrument of liberation, contributing to those irreplaceable constructive forces which are today diverted with metaphysical coverings in favour of oppression and exploitation, to man's struggle for the construction of a new world.

The social revolution would not be able to change the science of today all at once, which is undoubtedly the science of the bosses, into proletarian science, or a science of the revolution. The marxists, coherent with their initial error, fell prey to this illusion, claiming to be able to use the instruments of repression taken as a whole. The proletarian science of the future has been in the course of construction for centuries, only it is necessary to free it, begining now, from its obligatory marriage with all the metaphysical and ideological distortions that the project of managerial exploitation has constricted it with.

Before discussing this necessary selection, which could be brought about now, and in certain aspects is already being realised, it is necessary to better make an outline of the problem in all its particulars.

Science and knowledge

As a rule, science means knowledge in the widest sense. But to better clarify it, we should mean by this term a kind of knowledge that is particularly suited to becoming a method of control, capable of guaranteeing the reliability of the results obtained within certain limits.

If we strip science of its metaphysical, theological and ideological layers, as far as such an operation is possible today, we can see that the concept of truth, which is how the knowledge specific to science is qualified today, would be better substituted with the concept of reliability, or, if we prefer, validity, approximation, and so on.

If knowledge includes a much wider field than that specific to science, in that it includes the experience of daily life, the method for qualifying the results achieved by science is not really very different to the method of common sense, which qualifies the consequences of the experience of everyday life. In fact, it could be said that the man in the street does not think in ways that are better or worse than the scientist, and is afflicted with the same objective limitations, and tormented - nearly always without realising it - by the same ideological deformations. The cleaning up made necessary concerning concepts of daily life, always at the prey of deformation by the means of mass information, is equally necessary concerning scientific concepts, which have been submitted to another, more refined kind of ailment.

But for the time being what we want to do is to point out the main procedures used to qualify scientific results. We must say right away that the procedure used by marxism is not included in this list, for the simple reason that it is not actually a specific procedure, but at best is a repetition of the descriptive one. We shall see the real significance of the marxist analysis on this argument further on.

1) The demonstrative procedure. The results obtained are placed at the end of a chain of statements bound by logical rules, constituting a more or less complete system. Aristotle writes at the beginning of the Primi Analitici: "Above all it should be said what object is concerned and the discipline the present enquiry is concerned with, that it concerns the demonstration and is up to demonstrative science."[1] And Plato "True opinions (i.e. science), for the whole time in which they stand, are a beautiful possession and produce every good, but they do not want to stand firm for long and flee from the human soul, therefore they are not worth much, until someone manages to link them with a casual reasoning."[2] Descartes finds in " … these long chains of reasoning are simple and easy of which geometers usually use to reach their most difficult demonstrations" a new method for re-examining all the "things susceptible to fall under human knowledge."[3] Kant reproposes the procedure at a more complete level: "..Systematic unity is the only element that is capable of transforming common knowledge into science - thus drawing a system of a simple aggregate of knowledge."[4] Hegel concludes: "The need to produce a totality of knowledge, a system of science, must arise. Only under this condition can the multiplicity of relations free itself from accidentality, in that the latter receive their place in the whole of the objective totality of knowledge and reach their objective accomplishment. "[5] And more recently, to conclude concerning the "systematising" fortunes of science, Hermann Cohen: ".. the category of the system, like the category of the object, is the category of nature. From this the concept of the object is therefore determined, as object of the mathematical science of nature."[6] This procedure has now been considerably devalued. The concept of system claimed to give qualification not only to the results of research but also to the single procedures which made the research possible, right to the individual concepts. In this way it is easy to understand that a concept with a given meaning elsewhere, took on another one once in the system, leading to considerable consequences in the qualification of results, now strongly impregnated with the metaphysical premise.

2) The descriptive procedure. Upturns the claims of the demonstrative procedure. It does not begin from a general a priori system of ideas, but from the investigation of single phenomena. In the Discours preliminaire of the Enclyclopaedie d'Alembert writes, referring to Newton: "This great genius saw that it was time to banish physics, conjecture and vague hypotheses, or at least not give them more than they were worth, and that science should be submitted to experience and geometry."[7] And further on, in the same Discours, it is not insignificant that the same d'Alembert referring to Newton's System of the World[8], writes in brackets "I am not referring in fact to his System, but his Theory of the World."[9], making clear, even at the simple level of terminology, the refusal of any kind of system, a refusal which characterises the spirit of the Enlightenment. Compte bases the theory of positive science on the refusal of the search for a cause: "(it is necessary) to consider all phenomenon subject to invariable natural laws, the precise discovery of, and reduction to the minimum possible number, is the aim of all our efforts, while we consider the research for what are called causes to be absolutely inaccessible and senseless."[10]. The most obvious characteristic of this

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[2] ..true opinions: while they abide with us they are beautiful and fruitful, but they run away out of the human soul, and do not remain long, and therefore they are not of much value until they are fastened by the tie of the cause; and this fastening of them, friend Meno, is recollection. ~ Socrates in Plato's Meno

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way of thinking is not so much determinism, which can also be alimented by the preceding demonstrative procedure, so much as economism The clearest formulation in this direction is that of Mach. "Every science must substitute or save facts, copying them or constructing models of them in thought, which are, precisely, copies which we can use more easily than the events themselves, representing them for us advantageously in more than one aspect. This economic function of science, which penetrates its whole essence, already appears clear at the most general reflections on the subject. Once the economic principle is understood, all mysticism disappears from science."[11] The descriptive procedure still finds wide acceptation in the scientific world today. Thus one of the most famous theoreticians, Richard B. Braithewaite writes, "The function of science… is to establish general laws which reflect the behaviour of empirical laws or objects which the science in question deals with… and to supply reliable forecasts of events that are as yet unknown."[12] The characteristic of this procedure of qualification is therefore the refusal of the system, and the reduction of scientific laws to simple enunciations of phenomena which develop in a given way. The demonstrative procedure on the other hand added something more than simple generalisation to scientific laws, although it did not succeed in explaining what this something more was, beyond a "fideistic" adjournment to the normative capacity of the scientific system as a whole.

3) The fallible procedure. Although this position was developed and accepted by other scholars, it is to Popper that we owe the best formulation. In a letter sent by Popper to the editor of the review "Erkenntnis" in 1933, we read: "We can, in a perfectly coherent way, interpret natural laws or theories of nature as genuine assertions that can be partly made assertions, that is, which for logical reasons are not verifiable, but are only falsifiable, in an asymmetrical way: they are assertions which are controlled by submitting them to systematic attempts to falsify them."[13] This proposal, which was to become the battle horse of the social democrats and liberals, advocates of the new course of science, that is of the attempt to bring the structure of science up to the requirements of capital, comes to be considered by Popper himself as an "agreement or convention"[14], making it possible for the epistemologists, men of science and all researchers, to discuss problems that interest them "reasonably", in such a way that any criticism is utilised and inglobated.

4) The procedure of methodological anarchism This is almost exclusively based on research carried out by Feyerabend. In the next issue of this review there will be an in depth examination of one of Feyerabend's most important books, paying particular attention to his concept of "anarchism" which, as can be seen, has little in common with what we as anarchist militants mean by it. Here we are interested in pointing out that the methodological thesis of Feyerabend criticises the positivist rationalism of which Popper is the outstanding representative, in that this: "..(gives) an inadequate framework of the previous development of science… and obstructs its future development."[15] Feyerabend continues: "Without chaos, there can be no knowledge. Without a frequent renunciation of reason, there can be no progress. Ideas which form the very basis of science today, only exist because there were things like prejudice, opinion, passion; because these things opposed themselves to reason; and because they were allowed to operate in their own way."[16] It is not difficult to discern the limitations of this conception which, contrary to what various scholars of the philosophy of science have done[17], are not to be found in the contradictions of a thesis which picks up history again, the abandoned theories of the past and all that has been considered "outdated"; so much as in the fact that has always

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claimed, remaining within a structure of scientific research under the dominion of the exploiters, to improve the research itself without considering that the thing is impossible if it does not insert itself within an action of a struggle aimed at defeating the exploiters along with their scientific domination and their "vision" of science.

None of these procedures of qualification supply a secure, unsuspectable key of reliability, in that they all postpone everything (methodological anarchism included) to an affirmation or re-affirmation of the old myth of truth, even if this is in the new guise of modern reformism (approximation, Systemisation, adjustment, resolution of problems, improvement, Progress, etc).

The determinist mechanism

Assigns the real world into the hands of science, considering the latter to be attainable through the perception of the senses. It includes the objectivist, behaviourist, mechanistic tendencies, as well as a number of others which can be traced to the latter. The principle of cause and effect is at the basis of this interpretative tendency of science, a principle which presupposes the idea of the order of nature. Newton's law of the motion of planets and the mathematical system he derives from it, maintains that the initial conditions of the solar system rigorously determine the future. In this way Newton substitutes the exclusively empirical method with a generalisation capable of predicting possible future events. The most famous formulation of mechanistic determinism is that of Laplace: "An intelligence that were to know all the forces that act in nature at a given moment, as well as all the positions occupied in that moment by all the things of the universe, would be able to comprehend in one single formula, the motion of the larger bodies in the same way as the lightest atoms of the world, provided that its intellect were able to submit all the data to analysis, for it nothing would be uncertain, the future, like the past, would be present in its eyes."[18]

The scientific analysis conducted in the eighteenth century came under the influence of determinism, and in particular its philosophical elaboration, positivism. In this way science became the only knowledge possible. The empirical scientific method became the only acceptable one, the description of facts and the connections between facts the sole means for prediction ("seeing in order to foresee"). Many anarchist analyses have remained at this concept of the task of science and theory and this interpretation of the world, because they were developed at the end of the nineteenth century in a positivist and evolutionist philosophical climate. Very little has been done to examine this theory and its consequences critically, for example Kropotkin's determinism on the organisation of the international anarchist movement before the Russian revolution.[19]

The model of classical mechanics came to be taken as point of reference by every philosopher and man of science. Economists built the laws of the "capitalist market" on the mechanical model of equilibrium. Mathematics supplied the framework suited to essentialising the evidence of the conclusion reached. The capitalists dreamed of eternal dominion, the revolutionaries of the automatic coming about of their revolution: each deceived themselves with the myth of science, drawing comfort from the expectations derived from it. Very soon, however, these myths and expectations were to be upturned.

Towards indeterminism

From the beginning of the nineteenth century, geometry had been experiencing strong underground tremors, which were known to the specialists but capable of throwing the entire community of scientists into a panic. The foundations of Euclidean geometry, considered for centuries to be unshakeable, came to be disputed by other parallel geometries, different to that of Euclid and just as logical, although in radical disagreement with what the senses immediately perceive.

Something similar happened in mathematics, where the concept of number came to be denounced as mystificatory. In this way mathematics began its own revisionism, which goes from the phase of the analysis of preconstituted truths to the phase of language capable of going into formal knowledge.

[18] Laplace: "An intelligence that were to know all the forces that act in nature at a given moment, as well as all the positions occupied in that moment by all the things of the universe, would be able to comprehend in one single formula, the motion of the larger bodies in the same way as the lightest atoms of the world, provided that its intellect were able to submit all the data to analysis, for it nothing would be uncertain, the future, like the past, would be present in its eyes."(18)

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But physics is without doubt the science which has produced the most astounding results, bringing about the definitive collapse of the determinist illusions. Planck contributes to modifying the very old conviction that nature does not go forward by leaps and bounds. Einstein relativises time and space, which for centuries had been considered as absolute. Going into the critique of causality, the use of statistical analysis and the analysis of approximation has spread.

The culminating point of this revision brought about by physics is to be found in Heisenberg's principle of indetermination. Here is how it comes to be described by Reichenbach: "It (the transversal law of limitation of measurability or principle of indetermination ndr) establishes that contemporary values of independent parameters cannot be measured with as much exactitude as we would like. We can only measure half of all parameters with the desired level of precision, while the other half must remain partially indeterminate (therefore) if the value of the independent parameters are not known exactly, we cannot expect to be able to make rigorous forecasts concerning future observations."[20]

Progressive science

The most widely accepted concept of science today is the progressive, or rather, possibilist, one. It has maintained its empirical content, but without the dogmatism that concealed itself under the metaphysical developments of positivism. Scientists today are for the most part laymen and social democrats. They consider that science is not a whole of "true" observations which, once fixed, are not returned to, just as they consider that science is not an organic system which is advancing definitively towards its conclusion. For them science is not knowledge in the sense of the conquest of truth, nor is it the idea of the conquest of a second rate truth such as probability. In this sense the illusions which Heisenberg's principle of indetermination left standing, and which were to be alimented in the extraordinary technical capacity developed with the manipulation of the atom, subsequently fell. Thus Popper: "The old scientific ideal of the episteme - of absolutely certain demonstrable knowledge - has turned out to be an idol. The need for scientific objectivity renders it ineluctable that any affirmation of science must necessarily remain at the level of test. It is also true that a scientific assertion can be corroborated, but each corroboration is relative to other assertions, which in turn have the nature of a test. We can only be absolutely certain in our subjective experiences of conviction, in our subjective faith."[21]

Today science avails itself of a agile use of its results by capital and, at the same time, in the sense of a better, more direct possibility of conditioning concerning financing and research projects. Dogmatic perspectives such as evolutionary positivism were no longer suitable for this purpose. Not by chance, the culmination of the development of this interpretation of reality corresponded to the phase of artisanal and individual discovery in science, and the phase in the development of capitalist dominion we could define as formal. In an extremely different phase, such as the present one where capitalist dominion covers the totality of the real, the model of scientific research is that of the big university, the big institute, the big State department, with financing and projects controlled by the State.

The taking up again of the subjectivism referred to by Popper is possible because it is submerged in capitalism's false intention of guaranteeing the freedom of the individual (and therefore also of scientists). And with subjectivism, metaphysics is also reappearing. In fact, science has come to be considered as a (non-organic) whole of research, analyses, hypotheses, etc., which finds its roots precisely in metaphysics, i.e. in the primary formulae of philosophy. So, according to the new scientific intentions, metaphysics are not to be rejected as a whole, but should be criticised and gone into more thoroughly. But these questions should not be considered the same as those which should be attracting our attention, i.e. those relative to the conditioning which the structure of power exercises on knowledge in its formation. This political vision is rejected by most scientists because it would disturb the peace of their conscience. Still Popper defines "intolerant and totalitarian" a conception of the world which starts off from the "conspiratorial" point of view. In fact, this point of view considers that a "conspiracy" of forces exists, putting erroneous ideas into circula-

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tion aimed at concealing the truth. He writes:[22] This consideration of truth is typical of scientific research today. It is thought that scientific realism can have a logical, rigorous form of expression (for instance through the mathematical language of computers), making it possible to speak of reality in an accumulative, controllable way. But these affirmations are only hypotheses based on fundamental myths such as the objective existence of the real, independently of our action, the progressive accumulation of observable data and phenomena, and the control or measuration of their level of truth.

The social democratic conception at the basis of this reasoning can be seen clearly, showing how recourse is always made to the procedure of control and the idea of a progressive elimination of error. These conditions are considered indispensable by science today, in order to allow growth in knowledge and to struggle against dogmatism and intolerance. And this is the best that real dominion can desire.

The social democratic critique of science

The enthusiasm for determinism was exported with ease from the strictly methodological field of the so-called natural sciences to the problems of society as a whole; on the other hand, critical reflection and preoccupation had difficulty in going beyond the tight circle of specialists.

In fact, such preoccupations were not lacking. Going back in time, we find that it had ethical and philosophical characteristics, such as the attempts made by the Church to put a brake on scientific development, considering it a danger to the health of the spirit; or the attempts of the idealist philosophical schools to reject the premises of evolutionist positivism in the name of an absolute value of the self (*ich* in German). Later on, on the other hand, with the full maturation of the class struggle, other preoccupations emerged. The science of society was more widely recognised, due to the need to find a final solution to the social question. The positivist faith was no longer sufficient. Pareto, who was indisputably one of the most brilliant heirs of the mathematical school of economy, successor in Lausanne of its founder Walras, renounces this perspective with a public declaration[23], and all the consequences this implied, to dedicate himself entirely to the study of sociology. Certainly in these studies, as was to happen for Weber and others, the myth of science is still intact, but some interesting doubts and perplexities have been put forward.

Pareto writes:[24]

In a more detailed way. Weber.[25]: and elsewhere:[26]

But this critique stops here. Neither Pareto or Weber take the next step, that of affirming that science is socially conditioned in its internal structures. This step would have been revolutionary, and neither of them were able to take it.

Subsequent investigations were made by the theoreticians of the sociology of knowledge who, moreover, were already living in a different general political climate, one which had seen the formation, development and defeat of the great labour organisations in Germany. Mannheim writes:[27]

Important from a sociological point of view are the more recent critiques of science, by scholars who want to modify and improve the ramifications of power upon which it stands. Kuhn, for example, has made a distinction between normal science and scientific research. The majority of scientists, the mass of labourers which the power structure bases itself in order to bring about its projects of dominion, is not made up of researchers and innovators, but of men of routine. Kuhn writes:[28] This mass of labour, these scientific manpower, are not in fact disposed to putting their social position in question by bringing out dangerous theories: more simply it is a question of individuals who are prepared to obey in order to earn their salary. Kuhn points out that the normal activity of scientists does not include taking the

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trouble to examine the basic precepts which justify the limits and reasons for their work.[29] But the theses supported by most of those *addetti ai lavori* to work reject Kuhn's preoccupations in such a way as to block the road to the hypothesis of an interference by power and the political structure. Once again it is Popper who is the clearest theoretician of the new progressive conservatism.[30] But Popper does not make it clear whether this contaminating presence that appears in the concept of "applied scientist" is of an ideological nature. More than anything it seems that Popper wants to point out a danger, something that deforms the correct way of intending knowledge and the processes that preside over its development and possibility for growth. For example, speaking of Boltzmann[31], he says that although he had been a follower of Maxwell[32], he cannot be considered a "normal scientist" in that, for his whole life he was "a brave combatant who resisted the dominant fashion of the moment"[33]. But there is nothing revolutionary about this "resisting". Popper simply wants to point out the activity of a scientist who did not allow himself to be dazzled by the myth of absolute truth, but, while largely remaining faithful to a certain basic conception, is fighting to find and eliminate eventual errors. No more than that.

The Frankfurt school was to give its contribution, but always within the limits of a criticism of restoration and maintenance: the power of the scientific elite and their submission to power, which much of the pollution about the objectivity of knowledge is derived from, are never questioned. Attempting to demonstrate, within the above-mentioned limits, the concrete conditions and contradictions of society, Adorno denounces the risk of exalting method as something absolute, leaving out of consideration the objective reality to which it is applied. He writes:[34] His conclusion is of the materialist-dialectical type, it keeps account of the contradictions caused by ideological action in reality, which denies the possibility of an objective analysis in absolute. So the same author writes:[35]

Close to Adorno's position is that of Habermas. If the sciences of society were to be seen through the restricting lense of the natural sciences, one would end up reducing their normative content to a simple analysis of means, while nothing is said concerning ends. In this way a dualism comes about between facts and decisions, corresponding to the distinction between knowing and evaluating. But that puts all the facts/events of private life beyond science, reducing them to experimental research, or that which can be led back to the quantitative. In the dialectical materialistic methodology, Habermas affirms:[36]

The marxist critique of bourgeois science

Marxism has never developed a true critique of science, but has always claimed to make a critique of "bourgeois" science, carried out by juxtaposing it with what was claimed to be proletarian, exemplified by the research and knowledge carried out in the countries of so-called real socialism.

Here we will give an account of Marx's critique of science, along with that of other classical marxist theoreticians, then try to point out the limitations and validity of the above affirmations. There have been attempts[37] to pass Marx off as the precursor of the modern marxist critics of science. There is practically no foundation to this. For Marx, science goes through precise phases of development, in that it is one of the productive forces which intervenes as technology in the process of production as a whole. When Marx happens to refer to a model of precision which he would like to apply for his research, he, like everyone else in that period, refers to the natural sciences[38]. Writing to Annenkov in 1846 Marx affirms[39]. And, as was pointed out earlier, science, according to Marx, is one of the forces of

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[38] When Marx happens to refer to a model of precision which he would like to apply for his research, he, like everyone else in that period, refers to che natural sciences (38).

[39] Writing to Annenkov in 1846 Marx affirms.

production. In substance, Marx, as well as other revolutionary socialist theoreticians of his time, set himself both the acceptation of the myth of determinist science and the aspiration towards a different society that would be capable of changing the social structure of dominion, therefore also of science. It was his followers, once again, beginning from the great responsibility of Engels, who were to crystallise the process of the new science in proletarian science, simply by applying methodological principles which were considered to be revolutionary but were basically specific to the scientific climate of the time. In this way the proletarian legitimacy of the new science came to be based on the conquest of power by a revolutionary minority: methodological ground which is laughable today, but which led directly to the incredible affirmations of the Stalinist era. Engel's work The Dialectics of Nature supplied the foundations for the first great sclerotisation of Marx's position. The *Anti-Dühring* was a kind of simplification for the social democrat party, a kind of simple encyclopaedia in which all theoretical problems were to find a simple solution: so the Dialectic of Nature demonstrates its substantial and ingenuous 19th century positivism.[40] Clearly, a regular position, in line with the objectivist illusions of the science of Engel's time. Thus in the *Anti-Dühring*:[41]

The Materialism and Empiriocriticism of Lenin takes up Engel's thesis again after he had hinted in What are the friends of the people at a return to the more original positions of Marx on the problem of the relationship between determinism and dialectical materialism.[42] So he writes:[43] Stalin extends the above described determinism directly to the foundation of the political praxis of the party.[44]

The grotesque circumstances of this position, indicated in the USSR with the word diamat, did not end with the Stalinian period but still persists, although in a more attenuated way. In substance it is a question of using methodological principles produced by that world which is rightly considered bourgeois or reactionary, and declaring them, freezing them, principles of proletarian science simply because they are used by a State and a scientific apparatus which defines itself proletarian. It follows that every subsequent examination of the principles carried forward by science (always of a bourgeois and reactionary world) comes to be considered a negation of the results obtained by real socialism, and not simple investigation and progress in methodology. These investigations in fact are expected from the activity of the so-called proletarian State and its scientific bureaucracy, something which is impossible given that, leaving everything else out of consideration, these initial principles, transferred into so-called proletarian science, have been declared absolute truths once and for all. The diamat defines bourgeois the science of the capitalist countries with the US in the lead, and proletarian the science of the USSR, which in turn comes to be identified with the most deterministic of Engel's thesis. The elements which led to this ridiculous farce were: the need to found the theory of the party of the proletariat scientifically, the closure due to the thesis of socialism in only one country, and the Stakanovist movement. The theoretical terrorism of Marx limited itself in fact to declaring his own socialism as scientific, opposing it to that of the French utopians, but he did not clearly explain the method on the basis of which this scienticity made his thesis superior. Moreover he did not explain whether such a scientific method could undergo future improvements. If the construction of the Second International and the German Social Democratic party could have been made with the humanism[45] of Bernstein and Kautsky, in view of a parliamentary conquest of power, the same could not be said for the Bolshevik revolutionary party, whose power it had already conquered, and which it wanted to maintain. Although there is a logical continuity between the two positions it required, in the face of different conflictual situations, adequate, therefore also different, theoretical instruments. That does not want to be a justification of the diamat which, apart from its tragic consequences on the concrete level of the mass slaughter and concentration camps, is a little ridiculous, but wants to point out the ineluctable consequences facing it which place themselves in the optic of the revolutionary party: everything becomes rigid for them, everything becomes sclerotic, even thought and science itself: Everything transforms itself into a fixed model which must be imposed by force. With the coming about of the theses of socialism in one country and the consequent nationalism, indispensable instrument for winning the war against Hitler, but a double edged instrument: the exaltation of a national science, runs parallel the exaltation of a national philosophy, literature, art, cinema, theatre.

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The Stakanovist movement based itself on the theses of the socialist emulation which was indispensable for carrying the industrialisation of the USSR to completion. The grotesque consequence was that the communist society was to have the characteristic of being a society which guarantees the right to work, not for oneself but for the State.

The most extraordinary case of the diamat was that which came to be defined the Lysenko affair[46] in which results of experiments were invented *di sana pianta* and imposed by the force of the party, also abroad. The height of the farce was that in France some well-known scientists came out with incredible declarations of shabby servility simply because they were linked to the Communist Party.[47]

The anarchist critique of science

The title of this paragraph is not exact. In fact a true critique of science by anarchists does not exist. As we shall see, anarchists have nearly always limited themselves to taking a distance from science, stating with opportune caution that after the revolution its results would also be unusable; whereas all their attention has been directed to the position of scientists and their relationship with power, old and new. In this direction their theses are more important and actual than ever. In the case where, like Kropotkin, they have specifically faced the problem of scientific method, taking a position, they have remained within the limits of the scientific development of their time, and it could not be otherwise.

Let us take two scientists of the last century, two eminent scientists: Kropotkin and Reclus, both militant anarchists. Their conception of science is clearly deterministic, but their revolutionary conclusions differ: they also consider elements such as enthusiasm, creativity, revolutionary destructiveness, etc. It is precisely these elements which also end up modifying the theoretical setting given by them to the problem of science. Only, in the end everyone only reads what they want to read, and we should not marvel at the fact that at least one of Reclus' writings[48] and many of Kropotkin's[49] have been seen as almost an invitation to waiting and resignation. This has led to negative consequences, which to a certain extent can be imputed both to Kropotkin (the Manifesto of the Sixteen is a case in itself) and to Reclus.

The latter writes *[50] So begins Reclus' most complete theoretical work, but what follows, his harmonious development, is all an appeal to human action, to revolutionary engagement, to the struggle against exploitation. And that is not a contradiction. Certainly, whoever wants to read only the first aspect into it, the debt of the scientist Reclus, ends up putting the second aspect the enthusiasm of the revolutionary Reclus into the background. The same can be said, more amply, for Kropotkin.

He tries to realise a quite complete scientific system capable of explaining even Anarchy. It is not just a question of method, but of an actual *systemisation* which, as is easy to understand, finds its limits in 19th century science. Kropotkin writes:[51]. Concerning method, he favours the inductive-deductive method to the dialectic:[52]. In his book Ethics, Kropotkin affirms that he wants to examine[53] These main theses, developed organically in many high quality publications, were to transform Kropotkin into a necessary point of reference for anarchists, indirectly causing an almost necessary acceptation of his theoretical positions in that no one else would dare to develop a coherent and just as exhaustive critique. Malatesta himself, who in 1931 was to develop a satisfactory critique, wrote very little on the problem before Kropotkin's death. In 1913 he wrote:[54], which if in a few words encloses the opposition between determinism and voluntarism, it is certainly not enough to put Kropotkin's work in difficulty. And Malatesta admits this and recognises his own responsibilities for not having made the necessary criticisim. In 1931 Malatesta writes:[55] This argument is important, in that it proves that the dangers of *influentiality* (authoritativeness) can sometimes come close to the dangers of *authority*. In the face of the manifestations of a more or less voluntary *elitism* I do not know to

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what extent anarchists are still sufficiently prepared to resist this today. Basically the need for catechisms, especially if well done and rich in scientificness, remains constant. To delegate the task of analysis to others, to the more prepared comrades, and reserve the task of action (often fascinating and romantic) to oneself, is an involuntary residual of the capitalist division of labour. When, for contingent and technical reasons a comrade does come to find himself in this situation, the others must continually *keep an eye on him*, follow his analyses with a critical spirit (not with gratuitous, destructive resentment), suggesting their objections without fear of being naive or vague. However, as far as possible, in depth theoretical problems should be faced by as many comrades as possible.

Returning to Malatesta's critique, he rightly singles out in Kropotkin, a follower of Moleschott, Buchner, Vogt, etc, and therefore a thinker who is rigorously tied to the determinist mechanism.

So he continues:[56] Malatesta also admits that enthusiasm, the love of men, the sympathy for the poor and oppressed were in Kropotkin well above the limits of his scientific system, but he also admits that the consequences of such an interpretation of science can be very serious for the social revolution. So many comrades reach the conclusion - Malatesta continues - that the "revolution".. will come in its own time, and it is useless, anti-scientific, and that it is even ridiculous to want to make it."[57]

From this accurate critique of Kropotkin's determinism by Malatesta, the Italian anarchist's ideas on the problem of science become quite clear. Only he does not make exception in accepting science as *dato di fatto* and in turning attention to social activity as if it were a question of two distinctly separate sectors: the field of the natural sciences and that of the social sciences (that is of revolutionary activity within society). Basically, Kropotkin's mistake was to apply mechanicism to the social struggle and the structure of society, but it was certainly not that of keeping the science of nature separate from the science of society. The union he suggested was harmful because it drowned this in blind determinism of the science of nature; but a vision directed at separating the two sectors has different dangers but not less serious ones.

Defining science, Malatesta writes:[58] Here the mechanistic concept of *objectivity* which Malatesta attributes to science emerges. These words, written in 1925, might perhaps have been different, also considering the fact that Malatesta was a man who paid a great deal of attention to the theoretical developments of his time in philosophy and scientific theory, as Luigi Fabbri underlines[59]; but they are not, because Malatesta's interests were those of the revolutionary militant who believes in being able to put the theoretical position aside in order to better reach the practical consequences of action. This is a mistake that can be summed up in his own words:[60] Precisely, one cannot be anarchists starting from spiritualist, idealist, personalist bases and so on: one believes in one's own anarchism, but this, from time to time, ends up by meeting not so much the obstacles of one's own basic theory, but the far more concrete obstacles of one's conscience which that choice justified and rendered necessary. Anarchism needs a basic *materialist* foundation, but dies if this materialism dries up in mechanicism; it needs a basic *scientific* foundation, but dies if this foundation, rather than be placed on science, comes to be placed on blind, acritical faith in supposed absolute principles of truth; it needs *thought*, but dies if this thought suffocates it in a useless covering of doctrine; it needs *action*, but dies if this action suffocates it in a routine of forced doing.

Remarkable is Bakunin's analysis which, after having alluded briefly to his own formal esteem with regard to the greatness of the science of his time, immediately outlines the dangers of the power of science and scientists in particular. In Russia, he writes, out of 80 million inhabitants one can perhaps count on 20 scientists,[61]. And he continues:[62] Even when science is no longer exclusive to a privileged class, after the social revolution, there will always be few people gifted with "encyclopaedic heads" capable of being "really scientists". And many revolutions will be necessary - Bakunin

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continues - in order for science to really become "at everyone's level ". In the meantime[63] And in Bakunin's words, we enter into the quick of the modern critical theme on science.

What we mean by selection

As we said at the beginning of the present work, it is not possible to transfer present day science in block, both in its methodological and practical aspect, into social reality after the revolution. In fact a social modification, even a profound and perturbing one, would not be enough to *proletarianise* science as it has been stratified until now. It is therefore necessary, starting now, to bring about a *selection*, that is a separation, of what is useful to man from what is damaging to him.

But this selection must place itself effectively in a revolutionary perspective, and not be dictated by the *guilty conscience* of power (the democratic-progressive fringe of today) or the ideology of the *new power* (movement of contestation post '68 and Chinese cultural revolution).

The revolutionary prospective must be able to seize two moments in this process of selection: one *preceding* the revolution itself and one *following* it. The selection necessary in the first moment will have different characteristics to that necessary in the second one.

Science and democratic guilty conscience

Already in the course of the second world war democratic and progressive fringes, even indirectly influenced by the soviet ideological position, reached the following conclusions: a) a distinction is not possible between pure and applied science (technology); b) all science responds to the practical needs of society; c) the abstract ideal of scientific research is a capitalist belief; d) social control over science is necessary; e) scientists, instead of serving power should be participating in the construction of this social control over science.

The idea that power conditions science irreparably became current immediately after the second world war, in the period of the cold war. Born wrote in 1960:[64] And these words from one of the fathers of modern physics can be considered as the sign of a state of mind which was common in many of the so-called left-wing scientists of that period.

These critical points can be indicated thus: a) State action conditions the organisational system of scientific research in a determining way. b) industry is the most advanced sector of capitalism as far as the conditioning of science is concerned, both through direct financing, or that applied in their own research laboratories, as well as through pressure exercised on governments; c) the dominant ideology (liberals, totalitarian, socialdemocratic) is an ulterior *cultural* element of conditioning; d) the rate of capitalist accumulation allows for more or less advanced levels of research based on the necessity of the development of capitalism, therefore promotes or slows up the development of science; e) the structure of the scholastic system, more or less directed towards scientific study, following certain more or less hegemonic projects of capital have further effects on science; f) international relations, division in blocks of political attraction, economic dependence, etc, have other consequences, closely following the capitalist development of each individual nation; g) finally the level of the class struggle constrains capital to condition science one way or, in order to be able to use it as an element of threat or of slowing up as the case may be.

Science and the ideology of the new power

After '68 the *self-criticism* of science developed with greater involvement, while remaining more or less faithful to preceding rules (canons) of internal attack against power. Neither the power of the science or the power of the State are discussed (considered), there is simply an attempt to better select the relationships between science and the State with the clearly idealistic aim of separating the former from the negative influence of the second.

It does not take much to understand how the initial solicitations of '68, which, as far as culture in general is concerned had revolutionary characteristics, were distorted as they were gone into more deeply and *institutionalised*,

[63] Even when science is no longer exclusive to a privileged class, after the social revolution, there will always be few people gifted with "encyclopaedic heads" capable of being "really scientists". And many revolutions will be necessary - Bakunin continues - in order for science to really become "at everyone's level ". In the meantime

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also following the increasing interests of a technocratic bureaucracy which not only founded itself on the use of science but which had an interest in developing this within precise canons of domination.

The essential points of this position are: a)science is in the service of capital, therefore presents itself in the modern State as capitalised knowledge; b) the power of knowledge means knowledge of power, c) far from freeing man from fatigue through technology, science has made him a slave to mechanised work; d) science bases itself on the lie of an absolute search for truth and, in this sense, is the worthy inheritor of religion; e) scientists are the priests of today most faithful to the dictates of an absolute faith in reason; f) the present need for enormous means for scientific research has made clear the relationship between science and political power.

The basic mistake was visible in Rothe:[65] In this language the tone of the ideology of the new power is obvious. The breaking down of the barrier comes to be seen as possible for whoever has conquered power following the revolution, for which science, with no more barriers suddenly becomes very simple, will finish by delivering itself to all men in a happy climate of self-management. In a pamphlet entitled *A science for the people* some American researchers were asking themselves in 1971: What is to be done? and replied:[66] And it is precisely this populist illusion or, if one wants, camouflaged-jacobinism which is the danger of a new minority of scientists who make up the foundations of the new power, but are substantially still above the people. The truth is that not all science can be saved and that it is necessary to go towards a selection, no longer simply within the international scientific community, as the spontaneous product of the progressive fringe put under reactionary pressure but voluntarily decided and organised by the revolutionary movement in view of the social revolution first, and of the situation that will come about after, when the violent revolutionary process is in an advanccd phase of realisation.

Selection of science and social revolution

We have therefore reached the conclusion that science does not constitute an absolute value and that under the varnish of scientificness there often hides a cultural terrorism aimed at imposing choices of power and projects of exploitation,

An operation of selection is therefore necessary, that is a decision concerning what can be saved from science and what can happily be left to the dust of the libraries, museums, and science laboratories. Only this choice, descending into the specifics of the various sciences, presents some difficulties.

Objectively speaking, these difficulties would be insurmountable if the question were to be posed in the abstractness of the value of each individual science or of every form of scientific research, from atomic physics to linguistics, from methodology to economy, from physiology to mathematics. It is therefore necessary to reach clarity in two directions: a) the revolutionary perspective; b) the instrumental value of research. Not all science can be used as a revolutionary instrument, but this affirmation is modified with the modification of the social clash.

Let us examine the problem of the revolutionary perspective. It is obvious that only the anarchist revolutionary minority find themselves in precisely this perspective. The community of scientists, the centre of production of scientific theory and application and the power of the State find themselves standing in other directions. To hope to break this adverse front from within, in the sense of the progressive democratic illusion is absurd. But it is always possible to operate from the outside. Soliciting progressive scientists to become revolutionary and join us. In this way the selection made within the scientific community would produce a sufficiently clear selection in science itself. The research sectors that will be privileged will be those capable of supplying instruments to the revolutionary struggle. In this way the so-called vulgarisation of science, which makes most of us screw up our noses, will not only be possible but also desirable, the loss in perfection of the form of research moving towards gaining efficiency in the use of the instrument.

We thus have it that, in the phase of construction of the social revolution, when all the revolutionary forces are aimed towards attacking power, a strongly instrumental selection of science prevails.

In this phase, what we are asking of science is information about the class enemy. The maximum value of scientific research is reached when it supplies this information. When they move away from it, the value diminishes, until it disappears totally, becoming damage when the research itself, instead of supplying information to the revolutionary movement, becomes an instrument of power.

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[66] In a pamphlet entitled *A science for the people* some American researchers were asking themselves in 1971: What is to be done? and replied:

Without wanting to give exhaustive indications, let us try to distinguish the various fields of science where research could be considered useful to the revolutionary struggle in course. As we have already mentioned, we must bear in mind that favourable research should be considered as the application of research which has already been realised (at least in the majority of cases), the scientific knowledge available to power today being more than sufficient in order to be able to extract a part that could be used against power itself for the realisation of the social revolution. The revolutionary scientist must not therefore address himself to theoretical research, in general or in abstract, even if this could be of some importance later as we shall see, but should apply the completed research in such a way that with the limited means that the revolutionary has at his disposal, as efficient as possible instruments of struggle can be obtained.

Modern physics constitutes a vast theoretical reservoir which power draws from fully. Theoretical research on elementary particles, cosmic rays, to that concerning the symmetry of the universe and the new cosmology must be put aside. In their place, at this time, the revolution needs application in the field of electronics, on conditions that it is concerned with methods for a simplified construction of instruments such as radar, short wave apparatus, television apparatus in their various applications, calculators, lasers, and so on. Information of nuclear physics must be used, in a simple form, to denounce the dangerous construction of nuclear power stations.

Chemistry must put aside its development concerning general principles based on the quantum theories, the research on the structure of matter, the theory of valency and inter-atomic links. Taken in themselves, this research is sterile for the revolution. On the contrary, if the study of the structure of crystals is seen as an element for geochemical research, for example, then it can give important instruments concerning vulcanic phenomena, erosion, geological faults and many problems concerning earthquakes, flooding. etc. The chapter of poisons and explosives, as well as gases, can give interesting results and supply instruments of primary importance. Chemistry information can be used, in simple form, to denounce the capitalist exploitation of medicine, the dangers of chemical warfare, defoliants. etc.

The science of the earth (geology, meteorology, oceanography) must abandon the direction which leads to facing problems such as earth magnetism, the physics of depth, the study of the formation of territory, etc., to dedicate itself to the problems of alimentation: agriculture, fishing, hunting, food conservation, etc: to the problems of the prevention of and prevision for earthquakes, eruption of volcanoes, flooding, etc. Moreover, these sciences, in some sectors such as zoology, botanics, minerology must come through the infantilism of taxonomy, that is the listing and re-listing of the various families which at most can seem animated by a hobbyist vision of scientific research.

Medicine must put aside idealistic visions of a science in the service of man and supply elements on capitalist exploitation of its results. The search for cures for illnesses are always instruments that are working for the revolution. If a cure were to be found for cancer today, it would certainly not be the small the number of exploiters to escape death to make us regret scientific research, given that in comparison tens of thousands of proletarians would overcome the illness that condemns them. Moreover, a struggle against illness is always an arm against capitalism, in that it increases the average resistence of the exploited class and therefore their average capacity for struggle.

Biology should strongly limit its general research such as that of the genetic analysis of the biochemistry of bacteria and viruses, just as it should stop the huge analytical apparatus it has erected at the level of anatomical and morphological classification, experimental technique and concrete biological experimentation. On the contrary its research could bear much awaited fruit in pharmacology, the science of nourishment, the control of parasites, medicine, agriculture.

Biochemistry could put aside general research on the structure of molecules and the whole series of refined measuring instruments, as well as concerns speculation about life as a biochemical process or on thermodynamics of living organisms. Vice versa the information on enzymes, co-enzymes, vitamins, the process of photosynthesis, hormones, plant hormones, blood groups, etc., could be very useful to revolutionary action. From the study of proteic molecules, globular molecules, nucleic acids and viruses, which constitute a sector of molecular biology and microbiology which is already wide enough as far as revolutionary interests are concerned, one can expect interesting results concerning deficiency illnesses and cancer.

The group of formal sciences which include mathematics and linguistics, as well as logical research in general, has little to say in this phase. Their use should be reduced to a minimum. Statistics can give a valid contribution if it declared for what it is: a science of scarce reliability which requires interpretation on one side or the other. Mathematics, which as essentialised language from the logical point of view able to give a considerable contribution to the clarity of analysis, is not easily accessible today because of its prevailing humanistic formation (or pseudo-such) of a large part of the revolutionary movement.

The group of cultural sciences that includes sociology and economy, as well as psychology, anthropology, etc., supplies a large crop of elements that would be usable, although with difficulty. In fact it is necessary to avoid the danger of scientism i.e. the model that is offered by this science as expression of power. There is no doubt that knowledge of

society is indispensable in order to know where to strike. Having to identify our enemy we need to know as much as possible about social groups, social strata, the dominant elites, the mass, classes, power, the State, government, parties, trades unions. etc. But what we need to know is not the same as what the State wants to know, nor does the way in which we want to know it correspond to the way in which the State does. A badly concealed pride in one's work often leads us to mimicking in our analyses the analyses of the academy, in homage to the above-mentioned myth of scientism: well, this is the part to be rejected in the sciences of the cultural group. If in economy we are interested in the processes through which exploitation is realised, hence enabling us to reach a decodification of the action of power which often camouflages itself as social protectionism, we are not in the least interested in the analyses, let us say, of market equilibrium or the elasticity of supply and demand. In this way a large part of the enthusiasm of recent years for research in psychology or psychoanalysis needs to be redimensioned, while the sciences or pseudo sciences such as psychiatry or criminology need to be wiped out altogether.

More or less the same can be said for history. Often we anarchists are led to an idealisation of history. If nothing other, our own history. Well: to build museums, even of anarchism, is a fact which obstructs and does nothing to promote the revolution. When we refer to the past we must not forget that we are always speaking to our contemporaries. Not in the sense that every history is contemporary history just because we are living it, which would be a banal idealist thesis, but in the sense that history to be such, that is to be live, must be told to our contemporaries, that is it must tell them something, not simply document something that would have been valid for those who lived in the period in which the events took place and which mean absolutely nothing to us today. Our interlocutors, that is our revolutionary comrades, are the direct beneficiaries of our historical analyses, therefore this must be seized by them not only as reference to events which took place in the past, but principally as a measure of judgement to be used in the evaluation of events that are taking place today. Finally, the function of reawakening revolutionary enthusiasm, which has so much part in the development of individual militants, is not to be excluded. The concession to claims of objectivity is another myth which it would be well to be included, in that, as we have seen, an exclusively objective research is not possible except at an ideological level. History must not be objective therefore, but must be a history that takes sides, and our history is on the side of the exploited.

Finally, when even in the everyday revolutionary struggle which often takes the form of counterinformation, we develop analyses using sociological research, economy, history, psychology, etc, we must be careful not to forget the essential aim of our work: not the conquest of a university chair, but the singling out of the class enemy and putting at the disposition of the revolutionary movement as a whole instruments which are increasingly clear and are useful to carrying on the struggle. Any other use of science in the present phase of the class struggle is decidedly counter-revolutionary.

Selection of science and freedom

Once the social revolution is realised or, however, once the profound social transformation has begun in what we distinguish as a revolutionary period, must we maintain that selection? Clearly not. Freed from the mortgage of the State, all science has equal dignity and identical human value. The measure of usability could no longer constitute an orientation of scientific choice and human engagement, on pain of making the future society, based on equality and freedom, decline to the level of a society of accountants and savers.

A few sectors of science will however still have an immediate yield, giving life to uses that could by made directly by all; others will have an indirect fruitfulness, and should therefore be considered more than anything else as the expression of the artistic spirit of man, instead of the scientific spirit in the true sense of the word. But not for this can one consider them to be of secondary importance, or of less value.

Moreover, in the new perspective, scientific knowledge as we understand it today will come to reach feelings and experiences such as love, emotions, beauty, creativity, pleasure, joy. Today the latter are excluded from the range of scientific knowledge, but in the future, once all the barriers between first and second categories of knowledge have fallen, will have full right to enter them.

In this way the figure of the specialist will disappear. Today, in the face of a parcelized science, only in rare cases can a man be a specialist in more than one sector, and never in all sectors. After the social revolution and the falling of the sectorialising of science, the specialist will also gradually disappear and, from there, also the power of the specialist.

Contrary to what happens today in a scientific situation in the service of power, where the problems (of power) are faced by the technocratic elite, it will be possible to face problems collectively.

And from this grandiose widening of the horizon of knowledge the science of freedom will be born.

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Alfredo M. Bonanno
Science and the Social Revolution

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