

Gotthard Günther [*]

Cybernetics and the Dialectic Materialism of Marx and Lenin

Motto: One cannot completely understand Marx' *Kapital* and especially the first chapter unless one has studied and digested the whole logic of Hegel.

Vladimir Ilyich (Ulyanov) Lenin

The development of cybernetics in the Soviet Union and other Marxist countries has recently [⁰] become a subject of considerable interest to scientists and – to a lesser degree – to politician in the United States. An increasing number of reports and publications – some of them however only accessible to a limited circle of readers – testifies to this fact.

This interest covers so far almost exclusively the technical advances which have been made by scientists beyond the Iron Curtain and there is also some curiosity about the impact cybernetics has made on industry and social life. What Western observers have so far neglected to analyze is the amazingly and strong influence cybernetic theories are having on Communist ideology and on its philosophic basis, a fundamental ontology called: dialectic materialism. [¹]

* This essay is an enlarged representation of a lecture the author did deliver at the University of Cologne (Köln, Germany) July 17, 1964. Several passages of little interest to the American reader have been deleted.

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⁰ Note_vgo: 'recently' refers to the early Sixties of the 20th century.

¹ Friedrich Engels is very frequently considered the founder of dialectic materialism and Marx the originator of historical materialism. This is not quite true although a not inconsiderable number of textbooks on the history of modern philosophy voice such opinion. First, dialectic materialism is already an intrinsic part of Hegel's philosophy as Lenin correctly pointed out and when Marx inverted the ontology of the Great Logic (Grosse Logik) he inevitably turned dialectic idealism into an equally dialectic materialism. Second, dialectic materialism is also implied in Fichte's "Bildtheorie" (theory of transcendental reflection) when he maintains that subjectivity is a fictitious capacity. The statement: < I think > is according to him downright false. One is only permitted to say: "there is thinking". (II, p. 244) Walter Schulz who quoted this passage in his "J. G. Fichte Vernunft und Freiheit" (Pfullingen 1962, p. 16 ff.) adds that the concept of an absolute Self is in Fichte's theory of reflection in the grave danger to dissolve it self ("...wesenhaft in der Gefahr steht, sich überhaupt aufzulösen.") But if this happens then there is nothing left but dialectic materialism and the transcendental theory of reflection. The decisive step from "idealism" to dialectic materialism was prepared by L. Feuerbach but actually executed by Marx (cf. W. von Aster, *Geschichte der Philosophie* (1935) p. 364.) Fr. Engels collaborated to explicate the theory further.

There is scant interest in the United States for dialectic materialism. Owing to prejudices and lack of adequate knowledge about the development of transcendental logic from Kant via Fichte to Hegel, Marx' philosophic theory is mostly judged to be nothing but an ideological edifice to be used as tool to further political aims. Dialectic materialism has allegedly been conceived for the very purpose of overcoming the spiritual tradition of the Western World and its concomitant organization of human society. It is true that dialectic materialism has been used as a tool by one of the most powerful political movements in history but it is ludicrous to believe that it has been "invented" only to serve extraneous economic or social forces. The development of transcendental logic beginning with the *Critique of Pure Reason* (esp. with Kant's 'Transzendente Dialektik') and attaining its culmination in Hegel's 'Großer Logik' had clearly shown that all traditional categories of ontology were in great need of conceptual revision ^[2] and reformulation especially the classic antithesis of form and matter. Dialectic materialism derives its philosophic soundness from being the first serious attempt to revise the conceptual basis of Western history. (A second one the so-called 'Logik der Geisteswissenschaften' ^[3] has after a few decades referred on owing to its lack of consequence and inherent weakness.) It remains to be seen whether dialectic materialism may turn out to be the only legitimate heir of Hegel as it is claimed by Marxism. But one thing is certain those who continue to ignore Hegel's logic and Marx's conclusions from it have no competence to share in the decision about the epistemologic and ontologic validity of the new trans-classic materialism.

It should be admitted that an unbiased view of dialectic materialism and its proper assessment is difficult. The fault lies with Hegel as well as with Marx and Lenin (Engels may here be ignored. He lacked the profundity of Hegel and Marx and the intellectual incisiveness of Lenin. One does injustice to the theory by judging it from the writings of Engels.) An adequate interpretation of Hegel's logic is still an unaccomplished feat and in Marx as well as in Lenin the practical interest in application stilled the ambition to develop a full-fledged theory of dialectic materialism. Even today the theory is hardly more than an outline, a scientific program which still waits for its executor. The development of an exact logic of dialectic materialism was not a labor to the taste of a man whose probably most quoted statement is the eleventh and final thesis against Feuerbach: "Die Philosophen haben die Welt nur verschieden interpretiert; es kommt darauf an, sie zu verändern."^[4] The foundation of dialectic materialism is supposed to be the inverted system of Hegel's logic. But Hegel's text has never been rewritten in a form where Idea changes place with Matter. Marx demonstrated his extraordinary insight in the problem at hand by recognizing that such a rewriting job would be much more than a mere change from idealistic to materialistic terminology and that it would yield a considerable amount of new propositions about the relations between form and matter.

² Cf. Hegel IV, pp. 36-58. Hegel will be quoted from the Jubilee edition of Glockner, unless special reference is made to some other source. For the *Critique of Pure Reason* the original pagination is used, as it has become customary, distinguishing the first and second edition as A and B.

³ See Erich Rothacker, *Logik und Systematik der Geisteswissenschaften* (1927).

⁴ "the philosophers have interpreted the world in various ways; the point, however, is to change it. "The translation was gratefully copied from F. J. Krieger, *Soviet Philosophy, Science and Cybernetics*. RAMD corporation, Memorandum RM-3619-PR, May 1963.

From the hindsight of more than a century later it may be said that that Marx would not have succeeded anyhow, even if he had tried. His program demands a formalization of Hegel's logic.

But whether a formalistic approach to dialectics is feasible remains a highly controversial issue even now. It is interesting to note that with respect to a formalized theory of dialectic logic the mental climate of the Soviet Union is almost identical with that of the West.^[5] Both sides regard the prospect of a mathematization and formalization of Hegel's logic – as the standard work of dialectics – with misgivings and a deep distrust. It is instinctively felt in both camps that the successful accomplishment of such a task would have enormous and partly unforeseeable consequences. In the West it would tear down the defenses of the humanities which hitherto have protected them against the demand to be as logically accurate in the formation of their conceptual structure as the sciences have been forced to be a long time ago. All intellectual life would undergo a fantastic change which would have its repercussions in the moral, political and economic order of Western society. Present concepts of what is "private" and what is "public" would radically change.

In the Marxist orientated countries a mathematical treatment and effective formalization of dialectics would have equally grave implications. For the time being the instrument of dialectic logic is still in the hands of the politicians, i.e., the Party. Sometimes it is cleverly, sometimes it is stupidly but in any case there are no efficient test methods or criteria for the validity of a dialectic argument. It remains the tool of ideological beliefs which are pronounced with religious favor. But should it come to pass that a strictly formalized theory of dialectics – based on laws of mathematical logic – would be developed the control of this even now rather powerful instrument would pass from the Party to the scientists.

A trend pointing in this direction is already noticeable in the Soviet Union. The Communist Government are according to "classic" concepts of Marxism the obedient executor of the Party. And the Party also reigns supreme over the scientists. It has, however, slowly come to pass that the Government begins to assume what might be called the role of Buridan's ass which was equally attracted by two bundles of hay. The two bundles of hay are in this case The Party on one side and natural sciences [on the other side]. The suzerainty of the Party still exists. It may be safely predicted that it will remain so in the foreseeable future – for reasons which will be discussed later. But its reputation for absolute infallibility is on the decline. The Soviet scientists have been able to point out that it erred in several of its *ex cathedra* pronouncements. A striking case in the early period of Soviet rule was the condemnation of Einstein's theory of relativity on account of his "idealistic" concepts of space and time. This and similar mistakes by the ideologists are now readily admitted. In the course of such developments the Government has been forced to listen not only to the declarations and decisions of the Party but also to the statements and stipulations of the scientists. It is a moot question which group exerts as of this moment a greater influence on the executive of the USSR the Party and its ideology of dialectic and historic materialism

⁵ Ernst Troeltsch, one of the most legitimate successors of the orthodox Hegel and the "Historische Schule" called the dialectic "völlig antimathematisch". Cf. *Gesammelte Schriften*, vol. III (Der Historismus und seine Probleme. I. Buch: Das logische Problem der Geschichtsphilosophie.) p. 545.

or Science backed by the power of mathematics and objective facts. (It should be added that in this rivalry individual scientists have proved to be as fallible as the ideologists of the regime. A striking example – of even greater historical importance than the question of the compatibility of relativism with Communism was the case of A. M. Joffe (Deborin) which will later be reported [6] with some details. Here the Party showed a much deeper intellectual insight into the issue at hand than not only a group of Soviet scientists but a parallel group of positivistic scientists and philosophers in the West.)

At any rate the present intermediate position of the Soviet Government between Party and Science is basically due to the fact that neither Marx nor Lenin endeavored to provide Communism with a fully developed theory and logical system of dialectic materialism with a clear-cut distinction between Thought and Reality. It has been noted before that Marxism-Leninism remained essentially a program to be fulfilled by the following generations. Marx as well as Lenin were so obsessed with the urge that something should be done immediately that they were not aware of or interested in the disproportion and in congruity between the narrow basis provided by their theoretical statements and the giant dimensions of the practical execution of their historical program.

We have already pointed out that Marx knew that the only philosophic foundation for a conscious transition from the present "capitalistic" epoch of History to the next - and in his opinion final one – could only be the dialectic logic of Hegel. Provided of course that its Christian-idealistic background was abandoned and replaced by the epistemological maxims of materialism.

Whatever else might be said about Marx he has earned himself an unassailable place in the history of philosophy by showing that Hegel's system founded on an idealistic basis is self-contradictory and without a future. But that it may claim to provide the only feasible logical tool for the deliverance of Science from its narrow classic platform and its ontological prejudices. Ernst Troeltsch – being a conservative thinker and thus an unimpeachable witness for Marx – has pointed out that only Marxism deserves the credit for having significantly and usefully developed the Hegelian theory of Dialectics beyond Hegel's own vision of it. [7]

During the last decade of the "Vormärz" (1838-1848), the rest of the century and about the first two decades of the new one prospects for a revival of the Hegelian method of thinking did not look to rosy. A "scientific" myth was fabricated telling the uninformed that "speculative" and transcendental dialectics had "collapsed" and were definitely refuted by the recent advances of natural sciences. In rebuttal of this legend Ernst Troeltsch pointed out in his chapter "Die marxistische Dialektik" [8] that Hegel's logic was neglected, "stifled" because the mental atmosphere changed and the

6 See page.... [note_vgo: this refers to a part of the manuscript which was not finished by Günther].

7 "In ihrem eigentlichen logischen Sinne aufrechterhalten und über Hegels Erkenntnisse hinaus bedeutsam und fruchtbar fortgebildet worden ist die Dialektik nur im Marxismus" – Cf. ref.[5] p. 315.

8 Cf. ref.[5] p. 314-371.

intellectual interest turned to other topic but it has never "intrinsically refuted"^[9]. Only Marxism maintained its interest in it, trying to adapt it to the new situation and by doing so changing and sometimes distorting it. The modern critic scrutinizing Marxism-Leninism and its emphasis on dialectics should always keep in mind that two entirely different evaluations of the theory of dialectic logic are possible. First, one might look at it as a doctrine which was used, adapted and (in the eyes of the Western scholars) warped for the sake of political and revolutionary aims. Second, one could also analyze it as a purely theoretical and abstract systematic view of logic with complete disregard for possible applications in the sense of Marx and his followers. After all the idea of dialectics is at least as old as the Platonic dialogue. Aristotle recommends its use in his *Topic*. The dialectic "meta-theorem" of Stoic logic is considered to be a culmination point of this doctrine.^[10] Dialectics plays its part in the structural build-up of Plotin's *Enneads* in the Syrian Neoplatonism of Iamblichus and others. Neo-platonism influenced medieval logic to a considerable degree. And it should not be forgotten that such a sober logician as Kant devotes in his *Critique of Pure Reason* only 228 pages to Aristotelian basis of logic and its transcendental aspects (*Transzendente Dialektik*)^[11] The dialectic character of Hegel's logic with its complete absorption of all non-dialectic formalisms is an inevitable conclusion from statements made by Kant in his transcendental dialectics.^[12]

If the second view-point is taken it should be possible to evaluate dialectic logic and – as one of its possible implications dialectic materialism according to their own merits and not as inextricably enmeshed, and partially identical with, the political theory of Marxism-Leninism.

Such an approach has become necessary since the advent of cybernetics in the Soviet Union. Although the recognition of cybernetics in Russia has been rather recent Marxist theorists have nevertheless found it necessary to confront the new science with their ideology. It was felt from the very beginning among soviet philosophers that cybernetic theory was considerable more than one new technical discipline among others developing a partial scientific aspect beside other coordinated view-points. Its universal interdisciplinary character which stemmed from new, trans-classic epistemological and ontological assumption was quickly recognized in the Soviet Union. This raised at once the question whether cybernetics (and its implied philosophic assumptions) were compatible with Marxism-Leninism and its conceptual basis of dialectic materialism.

At first the answer was wholly negative. An anonymous author wrote 1953 – five years after publication of Norbert Wiener's "Cybernetics: Or Control and Communication in the Animal and in the Machine" (New York 1948) – in *Voprosy Filosofii* that "Cybernetics serves the reactionaries of bourgeois society and idealistic

⁹ "Die veränderte Atmosphäre hat (das Hegelsche System) erstickt, nicht die Logik von innen her überwunden." - Cf. ref.[5] p. 314.

¹⁰ Cf. I. M. Bochenski: "Formale Logik" (Freiburg/München 1956) p. 147 f.

¹¹ Count of the pages Meiner's edition, *Philosophische Bibliothek*, vol. 37a (1956)

¹² Cf. Richard Kroner: "Von Kant bis Hegel", vol. I and II. (Tübingen 1921)

philosophy."^[13] But the tenor of the comments on cybernetics changed rapidly – and not only in the Soviet Union. This change is heralded by the six "Dialogues on Cybernetics" which were published in Warsaw in 1954 by Bogoslavski, Grenievsky and Szapiro ^[14]. The dialogues admit that the theory of programming of computers, of transmission of information and prosthetic technique are compatible with Marxist concepts. In the very same year a lecture was delivered by Arnost Kolman at the Academy of Social Sciences in Moscow (November 1954) where this scholar, who became later the director of the *Philosophic Institute of the Czechoslovakian Academy of Sciences*, made the following statement:

"Cybernetics are indeed used by the reactionaries to "freshen" bourgeois sociology and idealistic philosophy and give them a scientific coating... They looked at cybernetics as a novel field of sciences only under this narrow view-point (of the regeneration of bourgeois thinking) and neglected all positive aspects of it. Around cybernetics a large and far reaching movement has developed in the West. It is, of course, very easy and simple to defame cybernetics as mystifying and unscientific. In my opinion, however, it would be a mistake to assume that our enemies are busy with nonsensical things, that they waste enormous means, create institutes, arrange national conferences and international congresses, publish magazines – and all that only for the purpose to discredit the teachings of Pavlov and to drag in idealism and metaphysics into psychology and sociology. There are more effective and low expensive means than the occupation with cybernetics if one intends to pursue idealistic and military propaganda." ^[15]

Kolman made his position very clear and demanded that not only mathematicians and technicians should pay attention to cybernetic theories but that Marxist philosophers should also consider it and reverse their extremely negative attitude. ^[16]

Kolman deserves the credit for being the first to have defended cybernetics under circumstances which made him widely heard against the ideologically orientated attacks by professional Marxists.^[17] From then on things started to move rapidly. The XXth Party Congress (Febr. 1956) might be considered the starting line for an

¹³ For more quotations in the same vein, see Roger Levien and M. E. Maron: "Cybernetics and Its Development in the Soviet Union", Memorandum RM-4156-PR, July 1964, RAMD Corporation. The 1963 edition of M. M. Rozental' and P-F. Yudin: "Kratky filosofsky slovar" (Short Philosophic Dictionary) has changed its tone. The value of cybernetics is not conceded for the automatization of production, for biological mechanisms of hormonal, nervous or hereditary nature and for some technical aspects of medicine. "Promising also is the application of cybernetic methods to the structure of economics as well as other fields of organized human activity." p. 197.

¹⁴ Stanislav Bogoslavski, Henryk Grenievski, Jerzy Szapiro, "Dialogi o cybernetyce", *Myśl filozoficzna* IV (14) pp 158-212.

¹⁵ Quoted from Helmut Dahm, "Zur Konzeption der Kybernetik im dialektischen Materialismus" (Unpublished manuscript, p. 25)

¹⁶ According to Dahm (see note 15) who based his statements on a revised short-hand copy of Kolman's lecture which was printed in "Voprosy filosofii" (1955)

¹⁷ There might have been similar defenses by other which were not published. One of the first computers of the Soviet Union, the BESM, was already completed in 1953 and computer study and experimental work had been carried on even before that time (see RAND-Memorandum RM-4156-PR, p. 17). this would have been impossible in an atmosphere unreservedly inimical to cybernetics. Thus it is probable that Kolman only voiced opinion in public which had been privately uttered by many of his colleagues.

accelerated automatization of Soviet industry and for a development which finally led to the practical capitulation of the ideologists to cybernetics. Such surrender was unavoidable since the Government permitted the translation into Russian language of the original sources of cybernetic research.

C. Shannon's information theory was accessible to Soviet scholars as early as 1956. [18] Very shortly afterwards (1958) Norbert Wiener's "Cybernetics" was translated. His – to Marxist readers much more controversial – next book: "The Human Use of Human Beings" was also made available to Soviet scholars. Only a year later W. Ross Ashby's: "An Introduction to Cybernetics" appeared in a Russian edition. The previous work: "Design for a Brain" followed exactly ten years after its first publication (1952) in New York. [19] At this time of the translation of "Design for a Brain" the reception and absorption of Western cybernetics was already in full swing. In 1960 a series of translations for cybernetic works from the West was introduced under the general title, "Cybernetics Collections" [20]. So far (July 1964) six volumes have been printed.

The time from approximately 1960 to 1962 are the decisive years of some sort of Ideological Breakthrough and for the beginning of an intellectual revolution in Russia which will unavoidably enforce a re-evaluation of the Marxist-Leninist foundation of the Soviet system. It is the time when one begins to speak of a "dialectic conception of Cybernetics". In 1960 an official organ of Leningrad University: *Vestnik Leningradskogo Universiteta* published an essay by L. A. Petrushenko where the following interesting statement was made: "The continuous change of the difference (opposition) between the given and the effective state of a system is for cybernetics only the observable expression of a much deeper and more radical opposition between information and entropy since information presents a measure of organization entropy on the other hand a measure of disorganization of any system. The contradiction between information and entropy, between order and disorder may be regarded as the basic contradiction of the cybernetic system ... (seen from here) the principle of feed-back ... possibly represents a sort of dialectic movement." Petrushenko does not fail to refer to Lenin in this context to show that feed-back is an element which fits well into the dialectic principle of the official doctrine. [21]

Much more aggressive are the words by which Georg Klaus claims cybernetics for dialectic materialism in the introductory passages of his book "Kybernetik in philosophischer Sicht" (The first edition for this ideologically interesting work was published in 1961). Klaus starts by referring to Lenin's thesis of 1908 that modern physics is on its way to develop dialectic materialism: "Modern physics is about to

18 It was published among other papers in "Avtomaty" (Moscow 1956).

19 U. Ross Ešbi: "Konstrukcija Mozga" (Moscow 1962).

20 Kibernetičeskij sbornik.

21 L.A. Petrushenko: "Filosofskoe zuačenie ponjatija 'obratnaja svjaz' v kibernetike", in Vestnik Leningradskogo Universiteta. Serija ekonomiki, filosofii i prava; Leningrad (1960). Translat. German in: Ostprobleme (Godesberg/Bonn 1962) 14, I; pp. 19-27. The German text contains the words 'Bestimmtheit' und 'Unbestimmtheit' which our translation renders: Positiveness and non-positiveness, since the German expressions are specific terms of dialectic (transcendental) logic to which Petrushenko obviously refers.

give birth to dialectic materialism." [22] After a lengthy quotation of Lenin he then continues: "What Lenin says about physics is, in our opinion, even more valid for cybernetics. This science expresses everywhere unconsciously and spontaneously dialectic-materialistic trends of thought. But that means that cybernetics represents in its entirety, in its scientific core (and this core is so massive and so unshakeable that the other, "the garbage", the reactionary philosophic misuse, the epistemological mistakes of important Western cyberneticists etc., can be regarded as irrelevant) a considerably matured subject-matter for philosophic abstraction in the sense of dialectic materialism and it should be considered as one of the most impressive confirmation of dialectic materialism which up to now have come into existence." [23]

Klaus, a true-blooded Communist, is very enthusiastic about the vistas cybernetics has opened up. He predicts for it a gigantic development (riesenhaftes Wachstum) but he adds – carefully and significantly: "One should not limit this new science by some dogmatic boundaries otherwise damage will be done in the philosophic, scientific and finally even the technical and economic field." [24] Klaus concludes his introductory remarks by expressing his indebtedness to his colleagues Poletajew [25], Moissejew [26] and Rowenski [27] and adds: "I have also taken some suggestions from the works of Ashby and Wiener. I could do this, because both, whether they will admit it or not and despite serious philosophic mistakes which appear in their works, produce... clearly recognizable dialectic and materialistic trains of ideas." [28]

There is no doubt cybernetics has since about 1960 arrived in Marxist countries in full splendor. It has arrived not only as a new special discipline with important technical consequences but as a basic theory of deep philosophic significance which is about to enforce the re-examination of certain positions of Marxist ideology. Soviet

22 "Materialismus und Empirioskritizismus". Werke XIV, p. 316 "Die moderne Physik liegt in Geburtswehen. Sie ist dabei den dialektischen Materialismus zu gebären." (Modern physics is in throes of birth-pains. It is about to give birth to dialectic materialism.)

23 Quoted from the third (revised) edition. (1963) p. 22. The translated passage however, was already part of the first edition of 1961.

24 Loc. cit. p. 23.

25 I. A. Poletajew, known as author of: "Kybernetik". Eine kurze Einführung in die neue Wissenschaft. (Berlin 1962).

26 W. D. Moissejew. Known as author of: "Fragen der Kybernetik in Biologie und Medizin". (Berlin 1963)

27 S. Rowenski. Co-author of: "Maschine und Gedanke", "Philosophische Probleme der Kybernetik" together with A. Ujemow, J. Ujemowa. (Leipzig, Jena, Berlin 1962).

28 Loc. cit. p. 24. Italics from the present authors (For Ashby as "dialectic materialism"). See also p. 51, pp. 206-218, 247f, 363f, 394f, 523. For Wiener we learn on p. 177 "... that his materialism is essentially identical with mechanical materialism." He uses a concept of materialism in principle false and unscientific. The same we are told p. 331, p. 351 and p. 355. It seems Klaus is not quite consistent. It is true that Ashby is - apart from p. 24 - six times described as willy-nilly harboring tendencies of dialectic materialism. In the introduction, the same is claimed for Wiener (p. 24). But the text afterwards accuses him only as a cyberneticist who knows nothing but the false mechanistic principle of materialism. There would of course have been some opportunity to claim Wiener for dialectic materialism if Klaus had been digging a little deeper and directed his attention to Wieners distinction between Newtonian and Bergsonian time which is the topic of the first chapter of "Cybernetics...". The relation of reversible to irreversible time in physical systems has indeed 'dialectic' character. (Cf. Hegel IX (System der Philosophie III) p. 3221f.

scholars concerned with the new field of knowledge begin to speak to the ideologist of dialectic materialism in a language they would not have dared to use several years ago.

An example in kind is an article by P.L. Kapitza, entitled "Theory, Experiment, Practice" (*Teoriya, eksperiment, practica*) which appeared in *Ekonomicheskaya Gazeta*, Moscow 34, 13 (March 26, 1962). There the well-known Academician wrote:

"The separation of the theory from experiment and practice is especially damaging for the theory. I want to prove this idea by means of the work of the philosophers who are dealing with the philosophic problems of natural science. There is a discipline which is conventionally called: Cybernetics. What this name means and which enormous part cybernetics play in the modern social life is known to many people. Nevertheless one can read in the fourth edition of the "Philosophic Dictionary" about it: "Cybernetics (from the Greek word for steersman) is a reactionary pseudo-science which originated in the United States after the second world war and which also received wide dissemination in other capitalistic countries; a form of modern mechanizism."

"It is a fact that this statement about cybernetics is contained in book which has been written 8 years ago; and in the meantime the mistake has been corrected. On the other hand it is the task of the philosophers to predict the development of natural science and not just to take cognizance of a way which has already been covered.

"If our scientists had listened to the philosophers and taken the above definition (of cybernetics) as valid for the future development of this disciple the conquest of Space - which we are justly proud of and for which we are honored in all the world - would not have happened. Space-ships cannot be controlled without cybernetic machines". [²⁹]

It should not be forgotten that for all practical intents and purposes "philosopher" means in Russia ideologist and interpreter of the Party-line. Any other kind of philosophic reflection inadmissible and will not be printed. [³⁰] Kapitza's attack against Soviet philosophy is therefore a more or less indirect assault of the Party. It is symptomatic for the changing political and mental climate that it is now possible to accuse the Party – even if indirectly – of failing to provide the intellectual leadership which is its self-assumed obligation. It goes without saying that only persons of the scientific stature of Kapitz and Kolman and others in similar positions and of equal value to the system can as yet afford to do so. But attacks of this kind must have been numerous and probably rather aggressive. Because a need was felt to smooth the ruffled feelings of the ideologists and to reach some sort of reconciliation. An indication of such efforts is an article by Aksel I. Berg, a member of the Academy of Sciences, an admiral in the Soviet Navy and a former Deputy Minister of Defence. Berg's essay appeared in *Voprosi filosofii* (philosophical problems) and it dealt with Norbert Wiener presented in his book "Cybernetics, or Control and Communication in the Animal and the Machine..." were offered with hazy had sometimes even false ideologic-philosophical view-points. An unhealthy activity originated around the ideas of Wiener. The Western press took great pains to render superficial the very profound and valuable ideas of the author of "Cybernetics..." and to present them in distorted

²⁹ Quoted and translated from the German text by Helmut Dahm. Loc. cit. p. 19 f.

³⁰ Between 1922 and 1930 a few exceptions were still made and it was possible, but dangerous, to have ideas published which were tamely heretic. This stopped completely after 1930. The indissoluble unity of philosophy and (Marxist) politics was reaffirmed early in 1931. Cf. I. M. Bocheński's very informative book: "Der sowjetrussische dialektische Materialismus" (Dalp-Taschenbücher vol. 325. Second ed. 1956) p. 36.

form. All this produced caution and distrust of this discipline with some part of the Soviet intelligentsia. Unfortunately it is a fact that this long procrastination in producing a sensible relation to cybernetics has undoubtedly been detrimental to our science and technique. One should draw the corresponding conclusion from it, since one may count on it that also in the future many deserving and useful ideas may arrive in similar ideological disguises." [31]

The attempt to mollify the ideologists and make excuses for them is obvious. On the other hand Berg's remarks serve notice on the Party and on the ideologically orientated part of the intelligentsia that cybernetics has come to stay and that it poses for all Marxists the problem to reconcile the official doctrine with it. And if anything has to give in the process it will not be cybernetics because the argument of the latter are formulas of symbolic logic and mathematics not to forget the "hard-ware" that has and can be built.

In this context we would like once more to refer back to Georg Klaus' statement that cybernetics represents in its core "the most impressive confirmation of dialectic materialism." Since the first edition of his book was published in 1961 (and Klaus is a professor at the East German Humboldt University of Berlin) it must have been possible to state and write such opinions at least in 1960. In order to evaluate this fact, one should be aware that of all countries within the Soviet orbit Stalinism exerts still its strongest influence in East Germany, and that there even a scholar of stature has to toe the Party-line much more carefully than his colleague at the Academy of Sciences in Moscow would find it necessary. Klaus' book has so far had three editions in East Germany. It has been translated into Russian language and the Moscow edition was scheduled for the last part of 1963.[32]

There can be no doubt but that a re-examination of the philosophic doctrines of Marxism-Leninism is in the offing. Which results will emerge from it this author would not care to predict. However, one thing should be made clear no matter what influence cybernetics is gaining in the Communist world and no matter how it will modify its intellectual as well as its political and social character it will not lead to a philosophic overthrow and extirpation of Marxism-Leninism! This cannot be emphasized too strongly. There exists – especially in the USA – widespread opinion that "Cybernetics is a science with ideological implications that contradict and challenge the basis tenets of Soviet Marxism-Leninism." This statement which is contained in Memorandum RM-4156-PR (July 1964) of the RAMD-Corporation,[33] should be taken with more than a grain of salt. It is based on a premise which is – for the time being at least – unallowable. This premise is that we

³¹ Cf. "Ost-Probleme", (Bonn 1960) XII, 18. p. 546-556. *Voprosi filosofii* (1960) 14,5. p. 51-62. Helmut Dahm adds (Loc. cit. 22) that Berg is not quite correct in his description of the situation. Some Marxist journals tried already in 1955 to introduce some cybernetic aspects in genetics, neurophysiology, psychology, sociology, and even ontology into the philosophy of dialectic materialism. The quotation in the text stems from an article by Berg: "Some problems in cybernetics". This essay has been translated and published in English language by the "US Joint Publications Search Service" (JPRS) 3953-CSO: 4284-D. (OTS: 60-31,781) There the quoted passage is found p. 4 f. This author's translation is based on "Ostprobleme".

³² When the text was written no information was available to the author whether the book is now available for Russian readers.

³³ Loc. cit p. 16.

know what the philosophic ontological significance of cybernetics is. Marxism-Leninism is based on a profound "metaphysical" theory: namely Marx' interpretation of Hegel. Soviet Marxism-Leninism is an application of it. With cybernetics the case is very different. At present cybernetics is hardly more than a rapidly growing field of empirical techniques. Its underlying logical, epistemological – let alone ontological – principles are not even dimly understood. Cyberneticists are at best vaguely aware that their way to look at the Universe seems to contradict an old and established world-conception (Weltanschauung) which grew out of the principles of classic ontology. But this is about all that may be said as of this moment about its "ideological implications". Significantly, the very same Memorandum from which the statement above was taken presents from another author the following admission: "Cybernetics denotes many things to many people and, even among experts, there is no complete and precise agreement as to its content." [34] This is undoubtedly correct.

But this leaves us in an awkward position. While Marxism-Leninism is founded on a philosophic theory cybernetics most decidedly is not. But that makes it patently impossible to compare both as to their ideological (or better: ontological) content. Thus we are not in a position to say that cybernetics contradicts the basic tenets of the world-conception on which life in the Soviet system is based.

It is a different proposition if one confines oneself to the statement that cybernetics constitutes a challenge. But this challenge might address itself with equal force to the Western civilization and the Soviet system. Since it is an historic fact that Marx developed his theory in exact contraposition to the "traditional" or "conservative" interpretation of Hegel which constitutes and encompasses all that is left of classic ideology and metaphysics in the Western World, three logical possibilities exist for the part cybernetics is playing in the present ideological set-up of human society:

- a) cybernetics agrees with Western tradition and challenges Marxism;
- b) cybernetics challenges Western tradition and does not challenge Marxism;
- c) cybernetics challenges both Western tradition as well as Marxism.

A fourth possibility: that cybernetics agrees with Western tradition as well as with Marxism must be ruled out *ab ovo* since Marx' philosophic basis is a contradictorial inversion of Hegel's logic.

If we assume case a) to be true then the challenge of Marxism might develop into a down-right contradiction of the ontological tenets of Marxism-Leninism. But the Western scientist and scholar can hardly assert a). One does not need cybernetics to demonstrate that our traditional concept of ontology is rapidly on the wane. The gradual dissolution of our classic ontological concepts has been recognized long ago in theoretical and experimental physics

From the many voices which have testified to this fact (e.g. W. Heisenberg, H. Weyl, E. Schrödinger, C. F. v. Weizäcker) we will suffice quote W. Heisenberg: "...the change in the concept of reality manifesting itself in quantum theory is not simply a continuation of the past; it seems to be a real break in the structure of modern science" [35] If this is the case for quantum theory it must also be true for cybernetics since the

³⁴ Loc. cit. p. 2.

³⁵ "Physics and Philosophy", (New York 1958) p. 29.

latter depends in certain respect on the characteristics of the former. But this rules out the assumption of a).

With regard to the next case b) it may be said that the refutation of a) already implies the acceptance of the first part of thesis b). This position seems to be taken by Georg Klaus – although even this scientist would concede the possibility of minor revisions under given circumstances. The philosophic relevance of cybernetics could be considered as a major challenge to dialectic materialism and as a motive to a thorough re-examination of the legitimacy of Marx' contention of the inversion of Hegel's Science of Logic. An investigation of this sort might lead to a reconfirmation of dialectic materialism but with major and fundamental changes in the basic theory. These changes could be so sweeping as to involve far reaching of the present communist ideology – which is not indissolubly bound up with dialectic materialism and would be easily changeable in a favorable political climate.

The 3rd possibility, of course, is that a re-examination of Soviet philosophic thinking induced or even enforced by cybernetics could bring about the down-fall of the theory of dialectics as embodied in dialectic materialism. Then the doctrine of historical materialism would also go and with it is concomitant ideological trappings.[³⁶]

We anticipate results of an analysis of the problem at hand on the later pages of this text when we state that this last and most radical possible consequence of the advent of cybernetics in the world of dialectic materialism can practically ruled out. If Marxism-Leninism undertakes a sincere self-analysis – which seemed to be due even before the advent of cybernetics – it has, of course to consider the theoretical possibility of a complete departure from the principle of dialectics and dialectic materialism.

But is Marxism really above a challenge from cybernetics? As to this question the present attitude of philosophers and scientists in the orbit of Communism seems to be ambiguous. The opinion of S. Klaus seems to be that cybernetics represents a triumphal confirmation of dialectic materialism and constitutes no challenge at all to the ways of Marxist-Leninist thinking. Although Klaus, if hard pressed, would probably admit that minor modifications of the dialectic theory (just cybernetics plays, in the words of Klaus, only the part of "a considerably matured subject-matter for philosophic abstraction in the sense of dialectic materialism"). If this, however, is the case then cybernetics has no more philosophic significance than other old-fashioned disciplines which also are supposed to serve as confirmations of a philosophic-political theory. The theory permits no alternation of its principles and if an empirical science does not conform to its expected role of a prop of dialectic materialism the

³⁶ A symptom which indicates such tendencies is the publication of J. H. Findlay's book on Hegel (London 1958). In this very solid "re-examination" the author succeeds in showing that Hegel "is misconceived, first of all, as being a transcendent metaphysician" (p. 15). He then disposes efficiently of the "subjectivist charge" against Hegel. He even rises to some sort of defense of dialectics (pp. 73-79). And one can only agree reading: "We may hold, in fact, that Hegel's notion and (dialectic) use of contradiction, confusing as it in many ways is, none the less embodies, one of the most important of philosophical discoveries, whose full depth has not even yet been properly assessed" (p. 76). Findlay's work shows clearly that the author is – probably without being aware of it – on his way not to straight dialectic materialism in the radical sense of Soviet philosophy but to a position in which the epistemological conception of dialectic materialism will play an important role. It is the way along which certain recent logical analyses of quantum mechanics and cybernetics are drifting.

resulting disharmony between decreed doctrine and practical experience is not to be solved by an alteration of the basic theoretical frame but by a re-interpretation of the empirical facts. In this sense the various scientific disciplines are just "subject-matter" for the sovereign use of the ideological theory. But if Klaus and his colleagues in the East assign to cybernetics such a supporting character where the new sciences is only permitted to serve an unmovable doctrine obediently without being capable to prompt a revision of the basic tenets of dialectic materialism then no ground exists to speak of the philosophic significance of cybernetics. But Klaus himself refers to the "Weltanschaulichen Konsequenzen" of the new science apart from the changes it way induce in social life and in other particular scientific disciplines. [37] It is obvious that Klaus' voice is only an echo of opinions and epistemological attitudes which have already taken root in Moscow. A professor at the Humboldt University in East Germany told not afford to propagate ideas without the previous stamp of approval from what has so far been the ideological center of Marxism-Leninism.

At any rate, for the time being it remains obscure what it meant if a Marxist admits to a certain philosophic significance of cybernetics. If its defenders do not think that the basic concepts of dialectic and historical materialism are involved and affected in this case they should come out and say so. It would immensely strengthen their present position with the Party ideologists. Instead of it Klaus, for instance, points out that the new science should not be hampered by "dogmatic limits" [38] But this means serving notice to Marxist philosophers that a revision of some basic tenets of Marxism-Leninism cannot be ruled out. If Klaus' attitude is ambiguous it mirrors exactly the situation in the Soviet Union. There too cybernetics is, as far as its philosophic significance is concerned, enveloped in a hazy twilight. In his essay "Some Problems of Cybernetics" (see note 31) A. I. Berg declares that:

"Cybernetics has its philosophic problems as well as mathematics, physics and biology have, but it is deeply erroneous to regard cybernetics as a philosophic theory which would be capable of replacing dialectic materialism. Dialectic Materialism is a science which deals with the more general laws of the development of nature, human society, and thought. The main feature of the philosophy is that it is a world view. A world view of the world around them and answers the questions: What is the world? Does it remain unchanged, or is it constantly developing and changing? What place in it do mankind and human society occupy? The problem of the relationship of human consciousness to existence, spirit to matter of that which is fundamental, primordial – surrounding nature: It is matter, or just thought, spirit, reason or ideas? ... This is the main problem of philosophy as a world view. These are all well-known truths, however, it is already apparent from this general characteristic of philosophy that cybernetics differs in so far as it is incommensurable in the object of its study, the problem set before it, and in the breadth of its generalizations. Although cybernetics deals with complex developing processes, it investigates them only from the point of view of the mechanism of control. The energy relationship, and the economic, aesthetic and social aspect of the phenomena which occur are of no interest to cybernetics ... Although cybernetics is based on wide generalizations which are correct for all control systems, it has a scientific basis that is incommensurably more narrow than philosophy.

37 Loc. cit. p. 20.

38 Loc. cit p. 23.

Cybernetics has no type of principles which purport to replace or substitute materialistic philosophy." [39]

This seems to be very clear and unequivocal. The Soviet position is quite clear: no positive, scientific discipline can ever refute dialectic materialism. But since nobody can ever predict what new sciences with as yet unforeseeable epistemological premises may turn up in the future the words of Berg express only a pious belief. Particular have, of course, their philosophic problems this is conceded but they are not of first ontological order. Thus they cannot affect the first order ontology of dialectic materialism.

The Western critic, will of course, object to this attitude. He will argue that the unity of philosophy and especially of logic is destroyed if we are supposed to assume that individual sciences have their private departmental philosophies which are in principle incapable to be relevant for the truth-character of the basic, interdisciplinary philosophic system which happens in this case to be dialectic materialism. The issue of the unity of logic which involves that of philosophy in general is in fact a pressing problem of Soviet philosophy. There have been heated controversies about the relation of formal to dialectic logic after the original ban about logical formalism was lifted. No satisfactory solution so far has been found and it is safe to predict that the discussion between formalists and dialecticians will continue into the future. The formalists represent, of course, the position of the empirical sciences against the dialectic ontology of Marxism-Leninism. The philosophic problems of individual scientific disciplines are supposed of a mere formal-mathematical nature and for this very reason for ever incapable of rebutting the non-formal essence of Dialectic Materialism. Starting from this (controversial) distinction of formal and dialectic logic Berg inevitably arrives at the conclusion: "that Cybernetics has no type of principles which purport to replace or substitute materialistic (dialectic) philosophy.

At this point a comment is in order. It would be very erroneous to believe that serious Marxist scientists make such statements with regard to dialectic materialism because they are under an ideological pressure by the Party or the Government. Such pressure exists undoubtedly and may have the described effect in many cases. But in perhaps the majority of scientist and scholars who are confronted with the problem of relation between science and philosophy the belief that no scientific statement can ever refute and disprove the basic tenets of dialectic materialism is undoubtedly sincere. In fact it is more of a belief it is a knowledge based on two undisputed facts. First, the theory of dialectics is of a higher logical order than any formal-mathematical logic a particular scientific discipline may apply. Second, in the development of logic from the pre-Kantian to the post-Hegelian stage the concept of the "Transzendental-dialektische Logik" has been bypassed together with its ontological motives. But neither these motives nor their logical implications have ever been voided by the West. [40] Soon after the death of Hegel Western philosophic reflection got more and under the influence of the causality thinking of natural science, style 19th century. This 19th century influence even persisted after natural science started to abandon its former

³⁹ Loc. cit. p. 5 f.

⁴⁰ Cf. note 9. Symptomatic for the attitude of the West is K. Vorländer's: "Kant und Marx" (Tübingen, 1910). Vorländer replaces the Hegelian-Marxism dialectics by "historic" causality. This became quite a fashion.

position around the turn of the century. This scientific climate was most unfavorable to dialectic and the theory of transcendental dialectic logic was abandoned (except in the writings of Marx and his followers). [41] It plays no part in the rapid evolution of modern logic since the middle of the last century. This did not happen because the methods of Kant, Fichte and Hegel proved to be unmanageable in the field of logical calculus. It happened because the ontological problems which led to the writing of the *Critique of Pure Reason*, the "Wissenschaftslehre" and Hegel's "Wissenschaft der Logik" were less and less understood and finally almost completely forgotten because they were not the problems of natural science in the 19th century. Even the social sciences and the humanities were infected by this trend. Although the representatives of the *Geisteswissenschaften* loudly proclaimed the "essential" difference of their disciplines from mathematics and natural science they tenaciously clung to the traditional logic which was just the organum on which all natural science up to and including the 19th century was based.

The widely advertised "Logik der Geisteswissenschaften" remained a newer implemented program and every attempt of a real departure from classic (two-valued) logic was and is still regarded with a deep distrust. The deep irony of the situation is that, while social sciences and humanities are still desperately clasping the life-belt of classic logic, physics and mathematics made every effort to depart from Platonism and Aristotelism in logic. They showed a readiness to give up obsolete concepts which was sadly mining in the *Geisteswissenschaften* [life sciences] and philosophy. As far as logic is concerned the result was inevitable. Already in 1922 Ernst Troeltsch judged contemporary logic as being in the state of "Subjectivistic devastation". [42] Logic became the almost exclusive domain of conventionalism and logical positivism and logical problems such as Kant, Fichte and Hegel had developed were declared to be "Scheinprobleme" (pseudo-problems)." [43]

41 Th. Litt, loc. cit. p. 287: "... Wir trennen uns von (Hegel), wenn er die These von der Inhaltsbezogenheit der Logik zu der Behauptung fortbildet, es sei dieser Logik gegeben, den fraglichen Inhalt durch dialektisch fortschreitende Entwicklung ihrer selbst zu erzeugen." But this is just the point where Marx and Lenin follow Hegel. Litt is – despite its attempt of a rejuvenation ("kritische Erinnerung") of Hegel at typical representation of Western thinking. As further example of the anti-dialectic attitude of Western philosophers we quote from J.H. Findlay's Hegel book: "The supreme defect of Hegel's dialectic treatment of notions lies ... in his view that dialectic development follows definite values ... that it can be regimented into a sequence of triads, that it constitutes a new sort of knowledge or science, having some sort of rigor of its own even if not the rigor of other scientific disciplines. If the painful analyses of this book have established anything, it is that there is no definite method called dialectic ...". Loc. cit. p. 357f. This statement of Findlay should be compared with the one, re-dialectics, in note 37. On the one hand there are unmistakable symptoms that the West is being forced into some confrontation with the problem of dialectics and some sort of recognition of it. On the other hand the attitude persists that dialectics have no rigorous scientific core. But this is just the contention of the Marxist-Leninist.

42 Loc. cit. "...die (in der Antike und im Mittelalter bis) in die letzten Tiefen zurückverfolgte Logik (ist) in der modernen Welt verfallen und subjektivistisch verwüstet." p. 104.

43 See, Rudolf Carnap: "Logische Syntax der Sprache" (Wien 1934) p. 196, p. 238 ff. Also from the same author: "Die alte und die neue Logik", Erkenntnis I (Leipzig 1930) p. 12 -26. - Against this radical attitude see H. Scholz: "Der Positivismus ist aufgebläht worden zu einem Erfahrungsmaterialismus, der nicht nur gegen die Übergriffe und Präntionen des absoluten Geistes protestiert, sondern gegen den Geist überhaupt, und zunächst gegen die Selbsttätigkeit dieses Geistes in der Physik." *Mathesis Universalis* (Basel/Stuttgart 1961) p. 392.

One has to be aware this de-ontologization of logic and philosophy in general to understand the posture of superiority and infallibility the followers of Marxism-Leninism assume then they speak of dialectic materialism as the unquestionable philosophic basis of modern science as well as of social life and politics. Since the West has – as far as science is concerned – discarded the problems of dialectics, of self-reflection, and everything else that is new in Hegel's logic, as "Scheinprobleme" no Western scholar is in the opinion of his Eastern counterpart in a position to judge the merits of dialectic materialism. Since he is ever aware of the existence of the problem how could he discuss the possible solutions it might imply.

It should be admitted that this criticism is well founded in the history of Western thought since the death of Hegel in 1831. Hegel and his dialectic logic was, despite the weakly and inconsistent attempt of a Hegel-Renaissance, discarded. His theories meant nothing to budding natural science. In the *Geisteswissenschaften* only an emasculated Hegel without the life-blood of his dialectic logic was welcome. It is true that the Anglo-Saxon world succumbed to some degree during the last half of the 19th century and the first quarter of the present one to the allure of Hegel. Hutchinson Stirling published his "Secret of Hegel" in 1865. It was followed by F. M. Bradley's "Principles of Logic" in 1883 and his "Appearance of Reality" in 1893. Also W. Wallace, Th. H. Hodgson and E. Caird fell under the influence of Hegel. Bernhard Bosanquet's important "Logic", or the "Morphology of Knowledge" was first printed in Oxford in 1888. Three years after his "Knowledge and Reality" had been published. McTaggart's "Studies in Hegelian Dialectic" and "Commentary on Hegel's Logic" came out in 1896 and 1910. Significant for the role Hegel played in work of his epigones is also the work of M. Fairbairn (1838-1912) who made a valiant attempt to connect Hegelianism with orthodox theology. In the US Hegel obtained influence first in Missouri (St. Louis) through the efforts of Henry Brokmeyer as well as Torrey Harris and Denton J. Snider who published the "Journal of Speculative Philosophy" from 1867-1893. When Harris later became United States Commissioner of Education (1889-1906) he tried to put Missouri Hegelianism into political practice "by expounding it as a theory of education and by representing the institution of national, public education as the culminative embodiment of freedom." [44]

One has to admit, however, that Hegel never exerted more than a superficial influence on the development of a pure systematic theory in American philosophy, despite Laurens P. Hickok's "Logic of Reason" (1875) and Alfred H. Lloyd "Dynamic Idealism" (1898). Transcendentalism and dialectic idealism which were characteristically separated in the philosophy of the USA were never able to fuse [45] even after they met at Concord Summer School of Philosophy. Neither movement possessed enough affinity to American thinking in order to make it possible for both of them to launch conjointly a basic philosophic tradition which might have been considered a legitimate continuation of the idealistic tradition from Plato and Aristotle to Kant and Hegel.

It is in view of Marx' criticism of dialectic idealism significant that the lasting influence Hegel did exert on the North-American continent was rather political and economical. If we follow H. W. Schneider we may say that "the impact of Hegel on

⁴⁴ Herbert W. Schneider: "A History of American Philosophy" (New York 1946) p. 184. See esp. chapter 15, p. 171-193.

⁴⁵ H.W. Schneider, Loc. cit. p. 184.

democratic theory in America was greater than is generally believed, and it is scarcely an exaggeration to claim that it was primarily the Hegelian influence which prevented national collectivism ... from taking a decidedly undemocratic turn and gave America an appropriate ideology for understanding the growth after 1880 of national socialism and economic democracy." [46] In this sense the influence especially of Hegel's "Grundlinien der Philosophie des Rechts" still persists. But as a foundation of scientific logic and epistemology Hegelianism has completely disappeared from the world of Anglo-Saxonian thinking. The (mostly) German and Italian attempt to translate Hegel into a "Logik der Geisteswissenschaften" misfired, apart from other reasons, because a logical distinction between natural sciences and *Geisteswissenschaften* is completely un-Hegelian.

It remains to be seen whether this disappearance is final or whether this has only been the first period of Hegel's influence on a world-wide scale and a second is still to follow. [47] But for the time being there exists a situation where philosophers and scientists of the Marxist-Leninist world may rightly feel to be in an superior position. It is an uncontestable fact that Science in the Western World has been going along without a basic philosophic ontology and concomitant theory of logic for a considerable period of time. One might say that Leibniz was the philosopher of world-historic rank who provided in his Monadology an ontological platform for Science but as far as the complementary system of logic was concerned he never succeeded in doing more but to make suggestions for its future implementation. He dimly perceived that the logic of the future world be a generalized theory of combinatorics. But he could not succeed in developing the idea of logic he envisioned because the Monodology – although a step in the right direction – afforded too narrow a *locus standi* for his purpose. It should be pointed out, however, that his concept of the

46 Loc. cit. p. 177f.

47 It seems debatable whether the publication of Findlay's: "Hegel..." (see note 36) is the harbinger of such a second period of Hegelianism in the Anglo-Saxon world and whether the European Hegel-Renaissance might have a counter-part in non-European countries. Findlay certainly succeeds in making Hegel palatable to thinkers to whom the atmosphere of European metaphysics is completely alien when he demonstrates in his careful analyses that Hegel is an anti-metaphysician as well as a consistent empiricist. It is worthwhile to quote some of the statements of his final summing-up: "...despite much opinion to the contrary, Hegel's philosophy is one of the most anti-metaphysical of philosophic systems, one that remains most within the pale of ordinary experience, and which accords no place to entities or properties lying beyond experience, or to fact undiscoverable by ordinary methods of investigation. Hegel often speaks the language of a metaphysical theology, but such language, it is plain, is a mere concession to the pictorial mode of religions expression. As a philosopher, Hegel believes in no God and no Absolute except one that is revealed and known in certain experiences of individual human beings, to whose being it is essential to be so revealed and known... For Hegel there can be no absolute, infinite experience which is not also, from another point of view, limited and personal, nor can the Whole appear otherwise than in the perspective of an individual consciousness, stamped with the ineffaceable mark of the Here and the How... If Hegel shows no tendency to go beyond the finite, individual, human consciousness, but merely to give depth to our idea of it, he shows just as little tendency to go beneath the world of natural things in Space and Time, or to undermine what would ordinarily be called their reality... One may likewise hold that Heel shows no tendency to overthrow or undermine the facts, assumptions or methods of the mathematical or natural sciences. To read the treatment of Knowledge at the end of the *L o g i c* is to be clear in this point... The kind of philosophy which Hegel has built up is... plainly one of the permanent types of philosophy..." p. 353 ff.

monad as a system with mapping capacity *representatio mundi* and self-reference (*monas monadum*) anticipated future developments. Developments which led to a new concept of logic by Hegel. [48]

But it is a hardly disputable fact that Leibniz, despite the pre-cognitional character of his system, does not provide a broad enough ontological sustentation for modern science. On the other hand, all systems between him and Hegel represent only transitional stages of a conceptual development initiated by Leibniz. [49] And from Hegel up to the present day no ontological theory of even remotely equal rank and logical relevance has been conceived. With Hegel the grand procession of world-historic systems which developed thematically basic conceptions of reality as guiding stars of man's scientific efforts and understanding of the world has so far ended.

Since Leibniz' ontological conception of reality is in his sense not acceptable any more and Hegel is ignored by modern science in the West the total effect is that Western science develops without any ultimate philosophic foundation and without any unifying principle. The effects of this ontological anemia are becoming more and more visible any day. Physics produce ever increasing experimental results without an adequate theory to cope with them. In symbolic logic a cancerous growth of formulas accumulates for which no ontological interpretations can be found. A striking example is the question with which the present standard work on many-valued logic ends: "Precisely what problems (if any) can be solved by means of many-valued logics ($M > 2$) which cannot be solved by the ordinary two-valued logic?" [50]

Here lies the ultimate difference between the scholar and scientist of the West and his counterpart in the East. The latter is in possession of such a system – the re-interpreted Hegel – and he is capable of confronting the results which all the particular scientific disciplines provide with the ontological background of his philosophic theory. If the Western scholar leaves that relativity and quantum mechanics are after a

48 It has only very recently been recognized that Hegel as logician is the legitimate successor of Leibniz besides modern symbolic logic. Cf. the excellent monograph by Hans Heinz Holz: "Leibniz" (Urban-Bücher, Stuttgart 1958). "Die Deutung logischer Kategorien als Spiegelung ontologischer Sachverhalte, wie Hegel sie in seiner "Wissenschaft der Logik" vollzieht, entspricht dem logisch-ontologischen Doppelaspekt der Leibniz'schen Begriffe. Die Dialektik als Umschlag der Gegensätze ineinander und als Einheit des Widersprüchlichen ist bei Leibniz in verschiedenen Formen vorweggenommen: als Lehre von den Perzeptionen, als Lehre von der Möglichkeit und dem Zusammenmöglichsein, schließlich als die komplizierte Hypothese von der prästabilierten Harmonie. So zeigt sich eine grundsätzliche Verwandtschaft der beiden Systeme, die am Anfang und Ende des deutschen Idealismus stehen." p. 138. (The interpretation of logical categories as mirror-image of ontological data, as Hegel establishes them in his "Science of Logic", corresponds with the logical-ontological double-aspect of Leibniz' terms. The dialectic as conversion of opposites into each other and the unity of the contradictorial is anticipated by Leibniz in various forms: as doctrine of the perceptions, as doctrine of possibility and co-possibility, finally as the complex hypothesis of pre-established harmony. Thus a basic relationship is displayed by the two systems which stand at the beginning and at the end of German Idealism."

49 For the provisional character of Kant's *Critique of Pure Reason* in the ontological evolution from Leibniz (via Lessing) to Hegel see Herder's "Verstand und Vernunft, eine Metakritik zur Kritik der reinen Vernunft" (1799) where Kant's insufficient understanding of the dialectic aspect of logic is pilloried. Similarly J. G. Hamann in his "Rezension".

50 J. B. Rosser and A. R. Turquette: "Many-valued Logics" (Amsterdam 1952) p. 110 f.

harsh ideological struggle finally accepted in the Soviet Union he may feel a smug satisfaction and he knows that he and his Marxist colleague now have a common subject-matter to talk about. What he mostly forgets is that the absorption of Western discoveries and theories into Soviet thinking occurs in two stages. The first stage is that the scientific material is taken over the way it is in order that the Eastern scholar may familiarize himself with it. Then the second stage follows and beyond the Iron Curtain it is considered the more important one. The theory is re-written in terms of dialectic materialism. Or at least a persistent effort is made to do so. From the conventionalistic view-point of the Western scholar this effort is irrelevant. It cannot change the subject-matter the theory is about. It only modifies its representation.

This attitude of the West European or American scholar, however, is wrong. It is, a part from the conventionalistic view-point fortified by the opinion that since the original Hegel is unacceptable as philosophic basis of, let us say, mathematical logic or quantum mechanics his re-interpretation by Marx and Lenin which does not alter the logical structure and relevancy of the system must also be unacceptable.

Two points may be made at this juncture. It is a strange spectacle to see scientists which have been trained in their own fields to cultivate an almost superhuman caution, and precision to pass judgement on a philosophic system they are admittedly ignorant of. If Lenin said of "Das Kapital" by Marx that one could not understand it unless one had studied and digested the whole logic of Hegel one might also say that no none could judge Hegel's value for modern logic, mathematics, and science unless one had read and reasonably understood the "Phänomenologie des Geistes", the "Wissenschaft der Logik", the "Enzyklopädie der philosophischen Wissenschaften" and the "Grundlinien der Philosophie des Rechts" let alone the "Vorlesungen über die Geschichte der Philosophie".

However, whether dialectic materialism as the version of Hegel's system is the philosophy of the future may remain undecided for the time being. In fact we shall, for arguments sake, assume that it provides the logician, mathematician, the natural scientist and the scholar in the social sciences and humanities with a faulty ontology. Even then it should be said that the Marxist-Leninist finds itself principally in an advantageous position compared with his Western opponent. It is an enormous help when the formation of concepts in empirical sciences is continuously confronted with general ontological criteria. Unless a dogmatism, dictated by extraneous, non-scientific interest prevails, ontological principles and particular scientific concepts will mutually correct and modify each other.

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