

SOVIET STUDIES in PHILOSOPHY

A JOURNAL OF TRANSLATIONS

VOL. XVIII NO. 4 SPRING 1980



Soviet Studies in Philosophy

SPRING 1980/VOL. XVIII, NO. 4

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SOVIET STUDIES IN PHILOSOPHY contains unabridged translations of articles chiefly from the following Soviet publications: *Voprosy filosofii* (Problems of Philosophy); *Filosofskie nauki* (Philosophical Sciences); *Vestnik Moskovskogo universiteta, seriia filosofii* (Journal of Moscow University, Philosophy Series); *Vestnik Leningradskogo universiteta, seriia ekonomiki, filosofii i prava* (Journal of Leningrad University, Economics, Philosophy and Law Series).

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Publisher: Myron E. Sharpe

Editorial Director: Arnold C. Tovell

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Four issues per year. Annual subscription rate for institutions, \$105.00; for individuals associated with subscribing institutions, certifying that subscription is for personal use, \$30.00.
(ISSN 0038-5883)

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The articles in this journal are listed in *Current Contents: Behavioral, Social and Educational Sciences* and are included in *The Philosopher's Index: An International Index to Philosophical Periodicals* and the *Philosophy Research Archives*.

G. Kh. Shakhnazarov

THE PROBLEM OF PEACE:
AN ANALYSIS OF BASIC CONCEPTS*

Any attempt to find one's way in the intricacies of contemporary international life, particularly in such a complex problem as that of war and peace, requires, above all, deciphering the basic notions by means of which the essence of the dominant processes in the world arena is more or less adequately expressed. Today these are, above all, peaceful coexistence, the "cold war," and relaxation of international tensions [dé-tente - Translator].

Sometimes peaceful coexistence is interpreted as one of the usual principles of international relations, as a catchall notion incorporating a number of generally accepted norms by which states have to be guided in their relationships. Such an approach omits consideration of both the historical and the theoretical significance of the idea of peaceful coexistence.

We know that the idea itself, advanced by V. I. Lenin immediately after the triumph of the Great October Socialist Revolution, was inspired by the need to define the objective

*From a paper presented at the Eleventh World Congress of the International Political Science Association, Moscow 1979. Russian text © 1979 by "Nauka" Publishers. "Problema mira: analiz osnovnykh poniatii," Voprosy filosofii, 1979, no. 7

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law of development of international relations in the period of revolutionary transition from capitalism to socialism. In other words, what was in question pertained to a phenomenon that had not previously existed in history, to wit, the inevitable simultaneous existence in the world arena, for a more or less lengthy period, of states with different economic structures, social orders, and political systems.

One might say that similar periods had existed in the past, for example, during the transition from feudalism to capitalism. This is true. Any scholar can find many similar features and parallels between the international situation at the end of the eighteenth and the beginning of the nineteenth centuries and in our own day. In this respect, however, one can speak only of partial coincidences and superficial analogies, for in the past the class nature of states belonging to different social orders, one in the process of supplanting the other, was essentially the same.

In the twentieth century we face a phenomenon of a fundamentally different nature: relationships between states with opposing class characteristics. It is exactly for this reason that former notions proved inadequate, and Lenin identified precisely the essence of the new stage that the development of international relations had entered: states belonging to different social systems are compelled to cohabit in the world, for the only alternative to this is war.

Thus, it is wrong to regard peaceful coexistence as one of the traditional principles of international law, similar to such principles as respect for sovereignty and independence, equality, and nonintervention in internal affairs. These traditional democratic principles naturally gained universal recognition and began to be introduced to a decisive degree, more or less consistently, in the practice of international relations, under the influence of socialist foreign policy and thanks to the new relationship of forces in the world. But they do not constitute a phenomenon unique to the modern period. It was simply that this period created the objective possibility of converting them from abstract wishes to reality. But insofar as the principle

of peaceful coexistence is concerned, it is exclusively a phenomenon of our times, a norm of relationships not simply among states with different social systems but specifically between socialist and capitalist states.

A second important factor relates to the scope of the notion of peaceful coexistence. Some hold that one is to take this to mean any state of peace or, more precisely, absence of war (vide the popular expression "A bad peace is better than war."). Some, on the other hand, emphasize the considerably richer content of the notion of peaceful coexistence and properly cite the fact that the USSR and the socialist states understand by this not only an absence of military actions but the existence of broad international cooperation and a certain trust in the relationships among states with different systems.

This, beyond question, is the ideal of peaceful coexistence in its full three dimensions, so to speak. But it is hardly correct to hold that a low level of international cooperation is evidence of the absence of peaceful coexistence. It seems to us that the concept of peaceful coexistence embraces a broad spectrum, one extreme of which is the most elementary state of peace, which might be equated with "cold war," whereas the other is comprehensive international cooperation. And it is precisely the transition from the former extreme to the latter that is the content of the process that developed in the '70s and came to be called *détente*. (1) At least that is how it looks historically. (2)

Responding to questions by a correspondent of Time, L. I. Brezhnev observed:

When we say "relaxation of tension," or simply "*détente*" for short, we mean a state of international relations opposite to a state which is commonly termed "cold war" and which was characterized by permanent tension threatening to develop at any moment into open conflict. In other words, *détente* means a willingness to resolve differences and disputes not by force, by threats or saber-rattling, but by peaceful means, at the negotiating table.

Detente means a certain degree of trust and willingness to reckon with each other's legitimate interests. Such, briefly, is our understanding of détente. (3)

In connection with this, an important elaboration suggests itself. Recognizing that simple absence of military actions, e.g., a "bad peace," may be interpreted as the initial stage of peaceful coexistence, it is necessary to add: on condition that this does not resolve merely to the ordinary breathing space between two wars. After the routing of imperialist intervention, what Soviet Russia won was precisely such a breathing space; but a state of peace of that kind can hardly be termed peaceful coexistence, inasmuch as the ruling circles of the capitalist countries did not abandon their hopes of crushing the young socialist republic by military means and took no particular pains to conceal their calculations. The issue was merely that of accumulating strength for another "crusade" against communism; and the astounding blindness with which bourgeois-democratic governments pursued a policy of "appeasement" of the fascist aggressors is to be explained by the fact that they saw the latter as the shock troops of the imperialist crusaders.

In other words, the condition for a state of peace's being properly called peaceful coexistence is a more or less official abandonment by both systems of attempts to resolve the historical conflict between them by force of arms. Therein lies the quintessence of peaceful coexistence. Naturally, its intensity, its "completeness," depends to a great extent on whether economic ties flourish or stagnate, whether at least a minimal atmosphere of trust exists, and the like. But for all that, abandonment of reliance on war to resolve the debate "capitalism vs. socialism" is the sine qua non of peaceful coexistence. Lacking that abandonment one cannot talk of peaceful coexistence even if the cannons are hooded at the moment.

To rely on war is in flagrant contradiction to the nature of socialism; and if such a choice is made nonetheless, that fact of itself is testimony to the immaturity of socialist social re-

lations and consciousness a result of a certain distortion or deformation of the principles of foreign policy. This is precisely the case with Chinese militarism, whose sources are not rooted in socialism at all, but in Great Han chauvinism and, if one looks upon things from a broader political viewpoint, in bourgeois nationalism.

The Program of the CPSU propounds as one of the communist principles of primary importance "to refrain from war as a means of resolving questions in dispute between states, and to resolve them by negotiations." This principle is embodied in all the other documents of the CPSU and the Soviet government, from Lenin's famous Decree on Peace to the Peace Programs adopted by the Twenty-fourth and Twenty-fifth Congresses of the Party. Finally, the USSR Constitution of 1977 states: "The USSR steadfastly pursues a Leninist policy of peace and stands for strengthening of the security of nations and broad international cooperation." (4)

Analogous principles are enunciated in Party and government documents of all the countries of the socialist community. With regard to their common position, this, too, has invariably resolved to defense of peace and abandonment of the application of force or the threat to employ it. Similar ideas were expressed once again in the declarations of the Political Consultative Committee of the States Members of the Warsaw Pact adopted at the conferences in Bucharest (1976) and in Moscow (1978).

Though documents have their significance, actual historical experience plays the decisive role. The most weighty evidence of the fact that the Soviet Union has been, and continues to be, loyal to the principles of socialist foreign policy is that during the entire postwar period, it has never once waged war against other states.

Thus, a readiness for peaceful coexistence has always been part of socialism. A different situation obtains where imperialism is concerned. The evolution of the foreign policy doctrines of the United States is the best testimony to this. It is well known that the brief nuclear monopoly of the USA gave rise to the strategy of what was termed containment of com-

munism and "massive retaliation." It was frankly calculated to employ nuclear blackmail against the USSR and other socialist countries and, in the final analysis, to establish American supremacy in the world.

Reinhold Niebuhr, one of the founders of the school of theorists to which the term "political realism" came to be attached, asserted in 1950 that the earth would still, for a long time, be an arena of war that would bring it back into the camp of capitalism. From this it was concluded, no less, that the United States had a "moral right" to strike first against the USSR, against the socialist camp: "From the idea of the inevitability of war it is but one logical step to the concept of preventive war; for if it is inevitable that we shall have to fight the Russians, why not choose the time most convenient for us to start the business?" (5)*

In the 1960s the changed relationship of forces compelled U.S. ruling circles to replace the strategy of "massive retaliation" with that of "flexible response." However, the "flexibility" here was quite limited. Essentially its only constraint was refraining from direct nuclear conflict with the Soviet Union, which thenceforth was calculated to be suicidal for the United States. In every other respect; resort to armed force was regarded, as before, to be a totally appropriate means of achieving political goals.

Finally, the 1970s saw yet another reevaluation: recognition of the parity of military might between the USSR and USA impelled American strategists to invent a new foreign policy doctrine, which came to be called "realistic terror." It presumes, first, an increase in strength and, second, the threat to use it, while not actually using it. (6)

This doctrine, too, is now being reexamined, however; and it is typical that discussion of the new strategy is inspired by an effort to make the conditions of coexistence as tough as possible. What is being sought is not so much means of making

*Quotations from sources in English are retranslations from the Russian. — Ed.

peace firm as that farthest line of militarism that would exclude only total nuclear slaughter.

Thus, the concept of "limited nuclear war" (7), formulated in 1974 by U.S. Secretary of Defense James Schlesinger, began to come into fashion. It is a rather complex and cumbersome construct whose components fit each other poorly and are capable of diverse interpretations. Apparently that was the author's intention: to provide "feed" for the hawks that the doves, too, might be tempted to accept. And if one were to strip to its essentials the current intent expressed in American military thinking, its essence resolves to an attempt to "legitimize" the use of nuclear weapons, i.e., it amounts to a step back, to that notorious "retaliation."

True, American experts emphasize that the discussion now pertains only to "limited nuclear options" (8); and they even undertake to prove that this provides a means for more effective control over the course of international conflicts. In their words, a "precisely weighed" nuclear strike will intimidate the opponent and thus prevent a limited encounter from becoming a universal conflict — in brief, something on the order of the use of a small dose of poison so as not to permit the entire organism to be poisoned.

The question, however, is how the "healers" in the Pentagon propose to measure the "saving dose." Differing opinions are expressed on this score. They argue about whether it is sufficient to exterminate 3,000 Soviet people or whether it will be necessary to murder 30 million, in which case they take into account the possibility of a retaliatory strike of equal strength against Americans. Is a strike against some missile base sufficient for the purposes of "intimidation," or is it preferable to wipe out Leningrad, sacrificing Chicago in exchange? And more in the same vein.

One does not have to be a specialist in military-political strategy to draw the conclusion that the sole result of such cannibalistic debates can be a less responsible, more careless attitude toward the threat of nuclear war. That is what Schlesinger and his colleagues are seeking. Refuting them, their

fellow-countryman G. Scoville, Jr., emphasized that starting a nuclear war at any level would be a catastrophe, and that that is probably what will result "if national leaders fool themselves into believing in the possibility of containing the war on a small scale and emerging from it as victor." (9)

Attempts to modify for the worse the military-political strategy of the United States, bellicose as it already is, show how weak and inconsistent the readiness of imperialism for peaceful coexistence still is. The explanation is simple: a policy of peace is not dictated by the nature of the old society, and it is the change in the relationship of forces that is pushing matters in that direction. And every fluctuation in the relative balance (equilibrium, parity) that has not been established, every illusion or instance of self-hypnosis on that score, results in a revision of the doctrines of military policy. Thus, R. Barnet, director of the Institute of Policy Studies in Washington, explains the toughening of U.S. positions after the new administration came to power as follows: the Director of the CIA presented the President with a new estimate of the strong and weak sides of the USSR, on the basis of which the conclusion was drawn that for the United States "there [was] no need to make *détente* the cornerstone of its foreign policy." (10)

In a word, the American side's abandonment of strategic reliance on nuclear weapons is very uncertain. Therefore, peaceful coexistence at the present stage may be compared to a bridge across a river one of whose supports rests in quicksand. Things have not yet gone beyond that stage.

Let us familiarize ourselves now with how peaceful coexistence and relaxation of tensions are interpreted in general by the theorists of international relations in the West. It is not necessary to labor the point that the interpretation of basic concepts by the different sides is of greater importance in matters that concern international relations than in any other area.

To begin with one is struck by the efforts of certain investigators to find an analogy to the process of *détente* in earlier times. An American professor, R. Rosecrance, recalls the

situation in Europe in the 1880s, when a treaty between Germany and Russia was concluded against Austria, and one between Germany and Austria against Russia. Although those alliances were unstable, in Rosecrance's words they made it possible for Bismarck "to maintain good relations with two opposing forces and safeguard them from war." (11)

Of course, one can use the word détente with respect to every improvement in relations among states known to history, but only as a display of erudition. Phony analogies do not help to further a better understanding of the meaning of the unique process pertaining specifically to the 1970s, but, on the contrary, complicate that task. (12)

This is done, moreover, with very definite political intent. For example, K. Eubank (USA) seeks a parallel between today's détente and the policy of "appeasement" of Germany conducted by England and France in the '20s and '30s. The "Dawes Plan," the rewarding of Nazi aggression in Spain and Austria, the Munich conspiracy culminating in the betrayal of Czechoslovakia: all these he classifies as that day's version of "détente for the sake of preserving the peace." Thus, the reader is served the hackneyed anticommunist notion of "similarity" between the foreign policy of Hitlerite Germany and the Soviet Union.

Here is yet another point of view. According to R. Pipes, director of the Russian Research Center of Harvard University, détente has existed several times in history since the October Revolution, and each time precisely when "military weakness or economic difficulties compelled the Soviet Union to seek the aid of capitalist countries." (13) This concept makes even the Peace Treaty of Brest-Litovsk an expression of détente.

A similar interpretation is offered by the director of the Institute of Current History, Walter Laqueur (USA), who holds that in the postwar years, East-West relations have entered the sphere of détente four times: on the death of Stalin; in the Camp David talks of 1959; in the period after the Cuban crisis leading to the prohibition of nuclear testing, in the Geneva Conference of 1965; and during the present period, in which

the range of problems encompassed is the most extensive. (14)

True, unlike his colleague, Laqueur does not stoop to interpreting each period of peace as the result of the crafty intent of the communists to accumulate forces for subsequent aggression. But his interpretation, alas, is not far removed from that: he simply associates the turn toward détente not with occasional "attacks of weakness," but with the fact that the Soviet leadership, in the final analysis, recognized the necessity of peaceful coexistence, having become persuaded of the futility of attempts to impose its way of life upon the world. To this Laqueur adds that the change went only halfway, inasmuch as the Soviet interpretation of détente not only does not eliminate ideological struggle but anticipates its exacerbation.

A concept according to which détente has to include a reduction in, or even cessation of, ideological struggle is what is most widely held in the West; and it is not only theorists but political figures who write from this perspective. It has perhaps been expressed most vividly by U.S. Senator Moynihan, who thinks of himself as a major authority on international relations.

In his opinion, détente can lead in politics, at best, to a "redistribution of tension from the technological sector to the ideological . . . Reduction in expenditures upon military technology will lead to an increase in expenditures on ideological struggle, which the communists regard as no less important and requiring no less attention. Reduction of tension in the one sphere leads more or less automatically to exacerbation of conflict in the other." (15)

It is curious that Moynihan regards the UN resolution of November 1975 declaring Zionism to be a form of racism as an example of this "redistribution" of energy. Strange logic, is it not? One might think that if there had been no détente, such a resolution would have had no chance of materializing, and Zionism would not be regarded as what it actually is.

Moynihan's reasoning reveals the inclination of capitalist theorists to ignore the fundamental differences between politi-

cal and ideological means of struggle. A Canadian professor, N. Naida, states this in so many words: "So long as ideological differences exist, one cannot speak of an end to the 'cold war.' It simply moves from one phase to another, changing forms, methods, and means." (16) If one approaches international relations in this manner, it is impossible to explain why, in some cases, long-term and stable peace among states is possible despite the most serious ideological differences, whereas in others in which there are no ideological differences at all and a veritable idyll exists in the sphere of world view, endless and ferocious wars may still be waged.

With rare exceptions the interpretation of peaceful coexistence by Western political scientists resolves to the following: (a) a struggle between superpowers (or blocs or power centers) is under way in the world; (b) the aggressive side is communism, i.e., the Soviet Union; and it is the West, i.e., the United States, that is on the defensive. Perceived within this model, any action by the socialist states assumes the character of an "assault" against peace, and any action of the imperialist states must automatically be regarded as defense of peace and other values of civilization — freedom above all. This holds even for the U.S. aggression against Vietnam or the CIA-organized coup in Chile.

The American Sovietologist S. Gibert, who undertook to engage in classification, has determined that there are three "schools of détente" in the United States. Here we find the "orthodox" (Nixon, Kissinger, and others), who assert that the USSR has changed from having been a revolutionary force to "a power protecting the status quo"; the "revisionists," in whose opinion détente occurred because the United States abandoned its former aggressive policy; and the "realists" (Henry Jackson, James Schlesinger, and other "hawks"), who hold that there is no détente, and it is no more than a huge political bluff. (17)

Without attempting to judge how precisely the views of various American figures are represented in this typology, one must admit that those whom Gibert calls revisionists are un-

questionably correct — with the amendment that U.S. abandonment of the policy of aggression as regrettable is of an "optional" nature, and with the addition that the real change in the relationship of forces in the world arena is the cause of the revaluation.

Détente and peaceful coexistence assure what is most important for all peoples, for all humanity: prevention of the threat of a global nuclear conflict. So far as social progress is concerned, those who are dissatisfied with the situation can only submit their complaints to history itself, for it alone predetermined the inevitability of the downfall of the capitalist system and the affirmation of socialism. For that matter, historical movement in this direction would have continued, even without détente, albeit under more complicated conditions.

Relaxation of international tension by no means leads automatically to social progress; it only creates the conditions for class struggle to develop more freely. The decisions to make revolutions in Portugal and Greece, Ethiopia and Afghanistan, were not taken in Moscow. This was done by the will of the progressive forces of the peoples of those countries, by their own hands. It is another matter that communists, like all democrats, sympathize with these processes and stand in solidarity with them.

When workers at the Renault plants strike, this is a consequence not of détente, but of dissatisfaction with the payment for their labor and other aspects of their social condition. When each new eruption of the blacks takes place in the United States, this is not a consequence of détente, but of outrage at manifestations of racism. When Iran nationalizes its petroleum industry, it is not détente that is the cause, but the desire of the people of that country to own its national resources.

In other words, no one, even if one so wished, could issue to capital a guarantee of the preservation of its rule. Responding to those who make so bold as to request such guarantees, L. I. Brezhnev emphasized, at the World Congress of Peace Forces:

Lenin, the greatest of revolutionaries, said revolutions are not made to order or by agreement. It might be added that revolution, class struggle, or a liberation movement also cannot be canceled by order or agreement. There is no power on earth that can turn back the inexorable process of renovation of the life of society. Where colonialism exists, there will be struggle for national liberation. Where there is exploitation, there will be struggle for the liberation of labor. Where there is aggression, it will be repulsed. (18)

The means by which such struggle will be waged depends largely on further change in the relationship of forces in the world. It is already clear, however, that in some cases it will assume the character of a military clash; most often it will be political and, nearly always, ideological.

Peaceful coexistence differs from the mere notion of peace in that it is accompanied by ideological struggle. Consequently, the task of maintaining peace in an epoch of transition from one form of society to another is complicated by the need to find additional reserves of strength to overcome negative consequences of ideological debates. Such resources exist. They are, first of all, the objective need for the integration of, and the increasing need for cooperation among, all countries for the sake of solving global problems. It might be said that if, in the past, factors of ideological struggle in the world arena did not manifest themselves very acutely, neither were there such powerful compensating forces on the side of peace as the "narrowing" of political space, the intensification of interdependence, and the pressing need for interaction.

But it would be unwise to place one's hopes solely on objective "compensation." No agreements or treaties, no form of international law and order, is capable of abolishing the conflict of political views and positions existing in today's world, with its complex and contradictory social structure, of preventing people from expressing their points of view regarding the course of events, or of ending the debate on ideas. Moreover,

even if any such possibility existed, it would have to be rejected most forthrightly, for this would signify an attempt to put an end to all progress of the human mind and, in the final analysis, of its social development.

Of course, there is a significant difference between a struggle of ideas and ideological abusiveness, misinformation, and slander. The latter is not a battle of ideas but, one might say, a fist fight. This can and must be avoided. Reference here is to the application of legal norms to assure mutual restraint in relation to: (a) actions doing direct harm to peace (for example, appeals for war, promotion of militarism, violence, racism, aggression, and various forms of ethnic exclusiveness; (b) limiting the struggle specifically to the sphere of ideology and prohibiting anyone from proceeding, under the excuse and cover of ideological discussions, to actual subversive activities, such as sending agents to distribute leaflets with appeals to overthrow the existing government, financing antigovernment activity, or brainwashing the people in a spirit of hostility, an example of which is the misinformation and slander disseminated by Radio Liberty and Radio Free Europe.

Herein lies the significant difference between ideological struggle and "psychological warfare": the former is conducted for the purpose of attaining its goals without war, and the latter, to prepare the best possible positions for oneself in a future war.

"Ideological struggle," said Brezhnev in this connection, "must not grow into 'psychological warfare'; it must not be employed as a means of intervention in the internal affairs of countries and peoples, or lead to political and military confrontation.

"Otherwise, this ideological dispute may end in catastrophe in which not only millions of people would die but these concepts as well." (19)

Therefore, one may say that the legal structure developed after World War II as the result of long struggle and cooperation within the framework of the UN is to a considerable degree the law of peaceful coexistence. Many of its norms are

unique, because they are designed only for the present period, being calculated to facilitate interaction among states with different social systems. They are transient, by that very fact; for the present situation cannot exist forever. But they still have it before them to play their lifesaving role — to serve as a shock absorber in humanity's transition from capitalism to socialism and to help it surmount, with minimal loss, the bumps and ruts inevitable along that road.

There can be no doubt that to our descendants many of today's provisions of international law will seem astounding. They, absorbed totally in the solution of constructive tasks, will be dumbfounded to learn that their forebears expended enormous amounts of time and ingenuity in order to regulate control of wavelengths or to agree on methods of circulating literature. But that is a serious component of the present structure of international relations, and the present structure of peace rests in considerable measure on agreements of this kind.

It is not necessary to state that the drawing of an exact and subtle line of demarcation between "psychological warfare" and ideological struggle is a matter of exceptional complexity, not only because it is by no means a simple matter to draft new articles of law — in fact, a whole new branch thereof — reflecting what is possible during a transitional epoch but also because maximal respect for these norms must be developed, and a particular tradition of political thinking has to take shape and be developed. And all this [must be done] under the complex conditions that accompany any application of the provisions of international law: absence of a force capable of compelling adherence to them, and emphasis on voluntary acts of sovereign states when there are but limited means of exercising any collective influence (the UN, the International Court, the role of public opinion, etc.).

But no matter how complex that task, it has to be resolved, because there is no other road for humanity to follow. To peaceful coexistence there is but a single alternative — war, and in all probability, total war. Peaceful coexistence is not

a matter of choice or something that can be traded off: it is an objective necessity.

This thought has been expressed rather well in the words of one of the leading figures of the Social Democratic Party of Germany, E. Bahr:

Whether I take national or European interests as point of departure, whether I am thinking of the tensions between north and south, or whether I am simply feeling like a citizen of the world and a democrat — as a citizen who would like to form an opinion for himself about the world in the year 2000, or as a democrat who is convinced of the superiority of his system when it functions under conditions of peace — no matter what the situation, I regard détente as the permanent task of the 1980s, to which there is no rational alternative. (20)

Regrettably, in recent years a whole school of politics has taken shape that has advanced as its slogan "to sell détente to the communists at the highest possible price." The birth of that slogan owes much to the vein of commercialism that is an inseparable attribute of the capitalist mode of thought. One of its commandments is that when somebody offers you an agreement of some kind (a deal), it is best to begin by demanding top dollar for your goods, and then see what happens. This was more or less the reasoning of those Western political figures who, in the process of preparing for the Conference of the European States, the United States, and Canada at Helsinki, advanced the formula of "the third basket (or free flow of information) in exchange for security." In plain language that formula meant approximately the following: if you want peace, agree to concessions in ideology.

It is superfluous to say that the authors of such ultimatums have no grounds for advancing them: capitalism has won no victories over socialism that entitle it to demand tribute. On the contrary, it is universally recognized that détente itself and what has thus far been its climactic manifestation, the

Helsinki Conference, were the results of the changing relationship of forces based, *inter alia*, on military equality. It even sounds odd to try to trade in security, a "commodity" that is needed in equal measure by both sides.

But in politics it is not motives and arguments that are chiefly important, but facts. Demands such as those mentioned above were formulated, albeit without any foundation whatever. People undertook to uphold them and, as is common under such conditions, there were many who came seriously to believe that they had the right to "sell" *détente* to the communists. In addition, as time went on, a further and quite influential contingent of theorists and policy-makers of the imperialist powers, those who initially did not want to hear of *détente* of any kind, came to accept the word construed in that way. Having grasped the fact that their earlier frank obscurantism had threatened them with total isolation, these people decided to change their tactics. They announced that they, too, were proponents of *détente*, but in so doing stipulated such conditions for it as would inevitably lead the whole thing into a blind alley and then return the world to the era of the "cold war."

This is how Kissinger's biographers formulate the position of the hawks: "Russia must be forced to pay an additional price for American wheat and Western technology. It is possible to compel her to liberalize her society. If she refuses...there must be no credits, no removal of trade barriers, and, if necessary, no *détente*." (21)

The absurdity of this argument of the opponents of a healthier international climate is obvious. First of all, nobody is requiring the United States and its allies to expand commercial and other ties after they sign agreements with the socialist countries on matters relative to averting the threat of war. The fact is that a mutually advantageous stimulation of economic, scientific-technological, and cultural exchange was a natural consequence of the normalization of international relations. Where there is trade, there are credits. They are not gifts, but a customary means of financing deals in international practice.

The politicians of capitalism understand perfectly well that trade is motivated by commercial calculations. American grain or Western technology is paid for not by *détente*, but by Soviet oil, industrial equipment, and other products of the socialist countries. Consequently, what remains for outright "barter" is *détente* and liberalization. But inasmuch as *détente* is the consequence of an agreement and its further deepening depends also on the good will of all the principal participants in the world community, these gentlemen are trying to sell a commodity that is not theirs to dispose of.

To swing such a deal is not easy in the marketplace, or simple in politics either. In order to make their claims look more or less valid in the eyes of the world public, the adepts of capitalism had to present them as being in the interests of all, not merely of a single class, and to provide them with moral force. The quests conducted in this direction by bourgeois ideology assumed a feverish character in the 1970s. As early as within the various committees preparing the positions of the capitalist states for Helsinki, the decision was hammered out to tie *détente* to what was termed progress in human rights. After the required development and polishing, this dictum became one of the key principles of the contemporary foreign-policy doctrines of imperialism.

"The question of human rights," declares the American Sovietologist Robert Conquest, "is the touchstone in the discussion on establishing a firm and lasting peace. Human rights are the one significant demand we can advance, and the degree to which it is met serves as the only genuine criterion on the road to peace." (22) So that nothing is left unclear as to precisely how this demand is to be met, Conquest explains that he has in mind a "profound reorganization of Soviet political culture" and even "psychological disarmament of the USSR." (23)

David Owen, former Minister of Foreign Affairs in James Callaghan's Labor government, has repeatedly spoken out in the role of one of the apostles of human rights. "We have to make the Soviet Union and its partners understand," he declared, "that our concern with human rights is not a diversion-

ary maneuver, not a campaign of provocation, and not an attempt to sabotage détente. On the contrary, it is an inseparable aspect of the foreign policy we are conducting throughout the world; and if one speaks of relations between East and West, this is a serious and constructive effort to raise détente to a new and higher level." (24)

Finally, it is worth citing the speech of U.S. President Carter on the thirtieth anniversary of the Universal Declaration of Human Rights:

I am trying to make the light of that beacon burn brighter — human rights are the issue — in American foreign policy... Human rights influence the relations of the United States with other countries. The striving to defend these rights is one aspect of broader efforts aimed at placing our power and influence at the service of creating a new world in which people would live under conditions of peace and freedom and their major needs would be properly satisfied. (25)

These quotations express clearly enough the essence of the Western notion of the "linkage" of détente with human rights. But it is evident that this notion cannot withstand the simplest test of logic.

In the first place, one is struck by this attempt to offer their interpretation of human rights as universal. This peculiar bourgeois presumption attains, in some theorists and politicians, such dimensions that it does not even occur to them to assume the possibility that any different approach to the question could exist. Others consciously ignore what it is disadvantageous to mention. It is no accident that American theorists prefer to say nothing about equality, but limit themselves to the cloudy formulation "proper satisfaction of needs."

It is curious that within the "free world" they, too, have not been able to do without usurping the functions of chief arbiter of human rights. As was to be expected, it is the United States that has arrogated these prerogatives to itself. In the speech

quoted above there are the words: "America is the only nation on earth founded on the idea of human rights." And what terms itself "Freedom House" in New York undertakes to inform the world from time to time how many free, unfree, and half-free countries exist at the particular moment. (26) One can only assume that the Supreme Being Himself has assigned that delicate mission to Uncle Sam. And it goes without saying that the United States is certified as the freest of all free countries, whereas the Soviet Union (tied with India) is declared the greatest imperialist nation of our times.

It is ridiculous, of course, to expect impartiality from anti-communist propaganda. But American centers of ideology have gone so far overboard in linking "human rights and relaxation of international tensions" as to have aroused criticisms even from allies of the United States and from NATO. It is not merely that the allies have assumed a more responsible attitude toward what happens to *détente*; of no less importance, in point of fact, has been understanding of the fact that the "propagandistic extremism" of the Yankees might substantially weaken the influence of the ideological campaign that the ruling circles of the capitalist countries regard as being the fire wall they have finally discovered to protect them against the further spread of socialist ideas.

The fact is that even the most politically naïve people could not help but be struck by the notorious absurdities of the situation. Attempts to read moralizing sermons to others and, most important, to undertake various punitive measures against sovereign states as "punishment for bad behavior" appeared all the more hypocritical coming from the imperialist power that had played the role of world gendarme during the entire postwar period.

It was as though official America assumed the role of an innocent virgin as a consequence of a sudden attack of amnesia, having forgotten the innumerable violations in the United States of the rights of the toiling majority of society and the human dignity of members of various minority groups (racial, national, ethnic, intellectual) and having tried to relegate to

limbo its crime against Vietnam. But the administration, the Pentagon, and the CIA continue to go about their usual business of defending the global interests of American imperialism, organizing a fascist coup in Chile, helping the Nicaraguan tyrant Somoza wreak havoc upon his own people, doing everything possible to save the monarchy in Iran, and so forth.

Inasmuch as it would have been difficult to classify all of this under the heading of "concern for human rights," some modifications were made in the initial ideological model. It was recognized, on the one hand, that things were far from ideal with regard to individual rights in the United States itself and in other "model" bourgeois democracies and, on the other hand, that the U.S. government had to give preference to foreign-policy objectives over considerations of morality when a contradiction arose between them.

In a word, it would be valid to state that the campaign conducted under the banner of struggle for human rights has been a classic example of bourgeois hypocrisy.

Although the leading role in carrying out this campaign has been played by overt hawks, one cannot but note that the other political milieu, the camp of bourgeois liberals, has been unable to restrain itself from making statements of a missionary character. Thus, Senator Edward Kennedy explains this by "loyalty to the American tradition of concern for human rights wherever a threat hangs over them." (27) It is appropriate to ask why this highly publicized American tradition, assuming that it exists, reconciles itself to the monstrous mockeries of the idea of human freedoms and rights in which the entire political life of contemporary imperialism abounds.

We pose the question: What would happen if the socialist countries were, for example, to propose, as a condition for normalization of international relations, a demand for an end to apartheid and other manifestations of racism with respect to blacks, abolition of discrimination against Puerto Ricans and other national minorities, equalization of women's pay with that of men, elimination of unemployment, and repeal of various federal or state laws aimed at persecution of commu-

nists, at limiting access of democrats to government posts, curbing, in so many ways, freedom of thought and action? And if to these demands there were to be added the long bill presented to imperialism by the peoples of the former colonial and semicolonial peoples?

Clearly, one would have simply to erect a cross over the grave of détente. It has been able to come into being and can be intensified only on the basis of adherence to the principle of nonintervention in the internal affairs of sovereign states. Put differently, it should be clear that agreements having the object of strengthening peace and security and of expanding mutually advantageous economic cooperation and cultural ties can in no way lead to coexistence in the ideological sphere. Détente means only that the inevitable struggle between two opposing systems shall be confined to nonmilitary channels. This corresponds to the deepest and most pressing interest of all peoples — the interest in peace.

In an article titled "Can We Buy Détente?" the director of the Institute of Soviet and Eastern European Studies at the University of Glasgow, Alec Nove, comments, with respect to those American figures who would tie movement along the road to détente to various conditions: "It is meaningless to demand the impossible if you want to make a deal" (28) — a businesslike remark, expressed, moreover, in language that businessmen understand.

Stubborn opposition to détente on the part of extreme reactionaries or attempts to make it an object of bargaining by comparatively moderate elements in the West testify to the fact that imperialism has not abandoned its hope of regaining the military and political superiority it enjoyed in the past. This has been clearly manifested in the militarist fever that has seized the entire ruling elite of the NATO countries, with minor exceptions.

Nevertheless, one may regard universal recognition of the impermissibility of a world nuclear conflict, its suicidal nature for humanity, as the most fundamental result of the social development and ideological struggle of recent decades.

Clausewitz's classic formula "War is the continuation of politics by other means" is widely known. In the nuclear age, when the sides confronting each other possess means of exterminating each other many times over, along with everyone else, this formula necessarily has to be questioned.

The issue today is that of a stage of development in which the alternatives "peace or war" cease to be historical alternatives in the proper meaning of the word. In the past, both poles, "peace" and "war," were historically equally admissible in international relations as a means of attaining political goals. The choice of one of those poles was possible, for this did not present a threat to the life of entire countries and peoples or to the surrounding natural environment as a whole. Today the alternatives have changed: one of the "poles" is in conflict with the very concept of history; it has gone past the rational bounds of attainment of political goals, beyond the framework of reasonable policy, including military policy. (29)

What is most noteworthy, however, is the fact that today it is not only Marxists who incline toward this belief (30) and not only rational-thinking politicians and theorists of the West such as Senator George McGovern (31) but even representatives of militant elements of imperialism. Among them are such theorists as Hans Morgenthau and Raymond Aron, who have been among the creators of various doctrines of "containment" and "rollback" of communism based on use of military force, including a preventive nuclear attack. Aron, for instance, has expressed the thought that in our time war can no longer be regarded as a continuation of policy because a new world war would mean total slaughter, threatening universal extermination. (32)

Recognition of the impermissibility of war serves thus far as the only basis for possible relaxation of international tensions and affirmation of the principles of peaceful coexistence, and also for the fullest possible realization of these principles.

It must be noted, however, that here we are speaking only of the subjective side of the picture; for all its fundamental importance, in itself this recognition still does not resolve the problem of peace and war.

The fact is that if one approaches policy from an evaluative standpoint, attempts to achieve any goals whatever by means of nuclear war seem senseless. It is as if we advanced the formulation "Death is the continuation of life by other means." A rational policy cannot accept such means of advancement toward a goal in the nuclear age.

But Clausewitz's formulation is by no means evaluative. It identifies the objective state of things, to wit, the effort of the ruling circles of states to attain their goals by any means, including military means. For that matter, politics itself can be suicidal. But even if political objectives were attainable by nuclear war or if one side were victorious, would not such a victory, in any case, be Pyrrhic? All such questions, all appeals to reason do not negate the fact that there are people who are capable, either deliberately or in panic, of pushing the button that launches rockets with nuclear warheads. Who will demonstrate to them, afterward, that war can no longer be regarded as a means of attaining political aims in the nuclear age?

It must not be forgotten that in the past as well, war has by no means always furthered the attainment of the calculations and desires associated with it. That has been so in at least 50 cases in 100, inasmuch as there is always at least one defeated party. This figure increases if one takes into consideration that victory has often been the cause of future defeats. Therein lies the absurdity of the very principle that regards war as a permissible means of attaining political goals. But that is the reality of class society. (33)

In other words, no ideological declarations can abolish the specific social and class interests that continue to exercise a deeper influence on the course of international events than doctrines of one kind or another. Although the latter, in the final analysis, reflect those interests in one way or another, they

have nuances of their own, for they are devised with the public in mind and are therefore smoothed over, "ironed out." This is why it makes sense to compare fundamental social interests, taking them, so to speak, in "pure form," not distorted by that aberration of vision ideological formulation gives them.

* * *

On June 18, in Vienna, Comrade L. I. Brezhnev, Chairman of the Presidium of the Supreme Soviet of the USSR, and J. Carter, President of the United States, signed the Soviet-American Treaty on the Limitation of Strategic Offensive Armaments and other documents formalizing the intention of the parties to continue joint efforts to limit the arms race and avert the danger of nuclear war. As is always the case, the true significance of this event will become clear only when a certain amount of time has passed, in light of subsequent developments in international relations.

Nevertheless, it is already obvious that the very fact of the conclusion of the treaty testifies to the operation of powerful objective factors that imperiously push the states of the two social and political systems to extend détente, to strengthen and deepen peaceful coexistence. And although each step along that path is taken at the cost of a stubborn and difficult struggle against the forces of reaction and militarism (seven years elapsed between SALT I and SALT II!), there are grounds for counting on further advance toward a stable peace and widespread international cooperation.

Notes

1) It is widely held that it began with the Four-Power Agreement on West Berlin, followed by the treaties of socialist countries with West Germany and a series of meetings, negotiations, and agreements with the United States, France, and other capitalist states. Naturally, such dating is arbitrary; for the real bases for modifying international tension were built up over the preceding period. Suffice it to name

the treaties prohibiting nuclear testing in three environments, the nonproliferation treaty, and a number of others. It would be more precise to say that it was in 1972 that détente entered an intensive phase and that the existence of that process became universally recognized.

2) A group of American political scientists, headed by W. Griffith, who have their own interpretation of the entire subject of international relations, has advanced the notion of "minimal" and "maximal" détente in The Soviet Empire: Expansion and Détente, Lexington and Toronto, 1976. But maximal détente is stable peaceful coexistence.

3) Pravda, January 16, 1979.

4) Constitution (Basic Law) of the Union of Soviet Socialist Republics, Moscow, 1977, p. 14.

5) R. Niebuhr, "A Protest Against a Dilemma's Two Horns," World Politics, New Haven, Conn., 1950, vol. 2, p. 338.

6) A detailed analysis of American foreign-policy doctrines may be found in the following books: A. N. Iakovlev, Ideologiya amerikanskoi imperii, Moscow, 1967; Iu. M. Mel'nikov, Vneshnepoliticheskie doktriny SShA, Moscow, 1970; V. F. Petrovskii, Amerikanskaia vneshnepoliticheskaia mysl', Moscow, 1976; N. M. Nikol'skii and A. V. Grishin, Nauchno-tekhnicheskii progress i mezhdunarodnye otnosheniia, Moscow, 1978.

7) On this, see R. Simonian, "V poiskakh 'novoi strategii,'" Pravda, March 19, 1979.

8) L. E. Davis, Limited Nuclear Options. Deterrence and the New American Doctrine, London, 1976.

9) See Foreign Policy, 1974, vol. 14, pp. 175-76.

10) R. Barnet, The Giants: Russia and America, New York, 1977, pp. 174-75.

11) See R. Rosecrance, "Détente or Entente?", Foreign Affairs, 1975, vol. 53, no. 3, p. 466.

12) As justly noted by the Bulgarian professor A. S. Todorov, from this standpoint détente is regarded not as a natural socio-political process and phenomenon distinctive to our time, but merely as a transient appeasement, inspired by various com-

binations of international forces. (See Novo vreme, 1977, no. 11, p. 110.)

13) R. Pipes and G. Urban, "USA-USSR: the Recondition of Détente," Survey, 1975, vol. 21, nos. 1-2, p. 45.

14) See W. Laqueur, "Détente: Western and Soviet Interpretation," Survey, 1973, vol. 19, no. 3, pp. 75-76.

15) See D. Moynihan, "Waging Ideological Conflict," Center Magazine, 1976, III-IV, vol. 9, no. 2, p. 7.

16) See N. Naida, Alliances and Balance of Power, London, 1975, p. 222.

17) See S. Gibert, Soviet Images of America, New York, 1977, p. 18. A critical survey of the argumentation of opponents of détente may be found in V. V. Sheliag, Mir ili voina, Moscow, 1978.

18) L. I. Brezhnev, Leninskim kursom, Moscow, 1974, vol. 4, p. 336.

19) L. I. Brezhnev, O vneshnei politike KPSS i Sovetskogo gosudarstva, Moscow, 1978, p. 647.

20) E. Bahr, The Future of Détente - a Challenge of the Eighties, Georgetown University, November 30, 1978.

21) See M. and B. Kalb, Kissinger, Boston, 1974, p. 442.

22) See Defending America. Toward a New Role in the Post-Détente World, New York, 1977, p. 208.

23) Ibid., p. 212.

24) The New York Times, Sept. 30, 1977.

25) See The New York Times, Dec. 8, 1978.

26) In 1974, for example, 66 countries were declared to be not free, 84 partly free, and 59 free (see Herald Tribune International, Dec. 28-29, 1974).

27) See Foreign Policy, Autumn, 1974.

28) Ibid.

29) N. M. Nikol'skii and A. V. Grishin, Nauchno-tekhnikeskii progress i mezhdunarodnye otnosheniia, pp. 55-56.

30) The argument that war cannot be regarded today as a way of continuing politics by other means is dealt with, for example, in an article by A. Türpe of the GDR (Deutsche Zeitschrift für Philosophie, 1978, no. 3).

31) In his words, the wide use of the term coexistence represented recognition of the fact that competition through war had become senseless in the nuclear age (see McGovern, Détente and the New American Administration, Washington, 1978, p. 37).

32) See Encounter, vol. 47, no. 4, pp. 62-65.

33) "War," writes Sheliag, "must not be a means of attainment of political goals" (V. V. Sheliag, Mir ili voina, p. 90). But, on the other hand: "A slaughter initiated by the imperialists would be in essence a continuation of their criminal policy directed at furthering the interests of the most reactionary forces by any means" (ibid., pp. 88-89). In other words, in the former case it is a moral precept that is under discussion, whereas in the latter it is political reality.

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ON PROBLEMS OF THE EVOLUTION OF LOGIC*

Logic today is a ramified discipline existing on many levels. It is actively pursued by philosophers, mathematicians, and computer specialists. The reason is that it is widely employed to solve a number of problems both in the theory of knowledge (philosophy) and in mathematics and computer science. But the broad spectrum of application of contemporary logic does not change the fact that its basic content has the nature of philosophical methodology. In contemporary logic (as has been the case over the entire history of its existence) it is the forms of thought and the methods of scientific cognition, the modes of organization of scientific knowledge, and the procedures for the introduction of various concepts, abstractions, and idealizations

*Russian text © 1979 by "Nauka" Publishers. "Nekotorye problemy razvitiia logiki," Voprosy filosofii, 1979, no. 6.

This paper was prepared for the Sixth International Congress on the Logic, Methodology, and Philosophy of Science, Hanover, 1979.

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that are studied. This places logic in intimate contact with epistemology and methodology. The distinctiveness of the approach taken by formal logic to this particular subject consists simply of its studying all these procedures pertaining to concrete cognition through the use of special formal languages, of algebraic, topological, and other exact techniques.

What is most significant here are the formalization of reasoning (deductions, proofs) and the construction of logical calculi. The latter, in turn, serve as the apparatus for rigorous logical analysis of other cognitive techniques. Of course, calculi as such are not logics, and cannot exhaust the field of logic. In order for formalization to have a relationship to logic, it must be given a logical content, i.e., the formalization must describe actual cognitive procedures, operations, and propositions capable of being described as true or false. In this connection, questions arise regarding the ontological hypotheses underlying the calculi developed, the initial abstractions and idealizations, the relationship between formal and concrete procedures, and so forth. It is precisely in the solution of such questions that the underlying connection between logic and philosophy stands out in sharpest relief. Despite the distinctive and often particularly mathematical nature of the formalizations of contemporary logic, the struggle among different philosophical concepts on matters of interpretation of its bases and results persists.

It is this peculiar nature of the discipline of logic that explains the fact that both philosophical and mathematical logicians work successfully in the sphere of logic. The most significant results are achieved when a researcher combines in himself a profound knowledge of philosophy and professional mastery of the mathematical apparatus. This is why close contacts between philosophers and mathematicians are necessary in logical research. The cooperation between philosophical and mathematical logicians that is traditional in the Soviet discipline has facilitated its successful development. We owe the establishment of that tradition to V. F. Asmus, A. A. Markov, P. S. Novikov, and S. A. Ianovskaia.

Today, studies in logic are being conducted over a broad front in the following three directions: research in "pure" logic (primarily the theory of deduction), and application of logic to the foundations of mathematics and to the philosophy and methodology of science.

The Theory of Deduction

The most fundamental branch of logic, defining the character and level of development of all other aspects of logical knowledge, is investigation of reasoning procedures. Depending on the initial abstractions and on the nature of the propositions employed, various logical systems are possible: classical, intuitionist, modal, relevant, temporal, etc. With regard to the reasoning procedures of classical and intuitionist logics, this branch has by now been satisfactorily developed and exists in relatively finished form. Formalized systems (predicate calculi) and their semantics have been constructed and thoroughly studied, which in itself is an important factor for further successful advances in the study of other modes of reasoning. Nevertheless, despite the satisfactory development of standard logical systems, research in this sphere is continuing. This is conditioned, on the one hand, by an effort to bring logical formalizations into closer accord with methods of natural reasoning and, on the other hand, by problems associated with the development of computer technology, above all, the task of constructing algorithms for seeking proofs.

To bring logical systems closer to the ways of customary reasoning is an important task from the standpoint of cognition and, in particular, from that of teaching methods. Simplification of the technique of deduction, attainment of simplicity and intuitive transparency, would make it possible to familiarize a broad range of scientists with the fundamentals of logical knowledge in more popular form and would play an important role in designing courses of logic, particularly for the non-mathematical specialties.

In the Soviet Union, particularly in the Logic Sector of the

USSR Academy of Sciences' Philosophy Institute and the chairs in logic at Moscow and Leningrad universities, much work has been done in recent years in studying the techniques of natural deduction (E. K. Voishvillo, O. F. Serebriannikov, and E. A. Sidorenko) and a number of alternative methods (the analytical tables method, Beth tables, and sequential calculi) (V. A. Smirnov). These studies made possible significant simplification in the presentation of the technique of logical deduction and the proof of fundamental theorems. The results of the work of various centers in the Soviet Union on the theory of logical deduction were presented at a USSR-wide symposium (Moscow, 1974) and published in the book Logical Deduction [Logicheskii vyvod]. (1)

Another important emphasis has been work on creating algorithmic procedures for seeking proofs. As we know, the problem of solution is insoluble in the classical predicate calculus. In principle, there is no method by which one can decide whether any formula presented to us is provable or not. Nevertheless, the class of provable formulas in the logic of predicates of the first order, while not appearing soluble, is calculable, which guarantees the existence of a method of search for proof. Such a method has been formulated as a sequential calculus with a tree of search for proofs, but in nontrivial cases it is cumbersome and unproductive. If it is employed, not only a human being but the fastest computer will in many cases be unable to cope with the problem in an acceptable period of time. The introduction of computers into scientific research makes the question of creating sufficiently economical methods of seeking proofs acute. A group of Leningrad logicians at the Mathematics Institute has achieved certain results along this line. The design of such methods proved to be closely associated with solution of the problem of bringing the technique of logic closer to natural reasoning and, particularly, with the task of normalizing such methods. Moreover, elaboration of the technique of natural deduction will open new prospects and provide new means for studying problems of heuristics (O. F. Serebriannikov).

A characteristic feature of the development of logic in the '60s and '70s was recourse to investigation of richer logical structures (in terms of expressive potentials and means of deduction) than the standard classical and intuitionist logics. This tendency arose from both processes occurring within logic itself and the desire to bring its content closer to actual reasoning as pursued in scientific disciplines and natural language. This expansion occurs by incorporating statements of a modal, normative, epistemic nature, with temporal parameters and operators, within the sphere of logical analysis. A very important result was the discovery of common logical structures in the so-called alethic modalities (necessary, possible, impossible), deontic modalities (obligatory, permitted, forbidden), and epistemic and temporal characteristics. All this has made it possible to synthesize diverse systems into one notion of modal logics and to employ common means for studying them. A number of interpretations of such systems that have philosophical significance have been examined by the Soviet logicians A. A. Ivin, V. N. Kostjuk, L. I. Miolishvili, A. A. Starchenko, and others.

It must be emphasized that whereas the development of modern logic was, in its initial period, associated with the needs of but a single area of philosophy, i.e., the philosophy of mathematics, today an analogous and equally important role is beginning to be played by problems of philosophy and methodology arising in other sciences as well. A variety of studies in logic has appeared under the influence of the requirements of linguistics. The development of alethic systems was associated with the need to analyze the philosophical categories "necessity," "possibility," and "accident." The appearance of deontic logic was governed by methodological problems of ethics and the theory of law. Temporal logics came into being as a result of the effort to employ exact methods to analyze the arguments of Diodorus Cronus in defense of fatalism, and also to explicate the Aristotelian understanding of assertions about future random events. Today there has even appeared a special term, "philosophical logic," applying specifically to the realm of log-

ical theories and elaborations that are oriented directly to problems of general methodology.

Of course, problems of the philosophy of mathematics and its foundations continue to stimulate the development of logic and serve as a source for its fundamental ideas. But the influence of other areas of knowledge on the advancing development of logic is constantly increasing, and its sphere of application is widening. The development of logic is proceeding not only in breadth but in depth. Ever newer methods of logical analysis, semantic concepts permitting better understanding of results already attained, the achievement of new generalizations, and advancement to the solution of existing problems are appearing.

Contemporary studies of modalities by the devices of logic began in the 1920s. They became particularly intensive after publication of the studies of Kanger, Kripke, and Hintikka, who proposed a lucid semantics in terms of "possible worlds." (2) Underlying the elaboration of modal logics is a deeper analysis of the central semantic notion — the notion of "truth." Whereas classical logic disregarded many of the characteristics of truth (the relativity of knowledge, its growth and development, the dependence of the truth of statements on temporal parameters, etc.), the construction of semantics for modal systems specifically demanded consideration of these characteristics. Such consideration has genuine philosophical significance, for it refutes the popular opinion that formal logic disregards problems of the development and modification of knowledge.

Further, deeper study of modal and temporal logics is responsible for the appearance, quite recently, not only of the relational (Kripke's semantics) and algebraic semantics of the types of Montague and Beth but of topological interpretations. At the USSR Conference on Intensional and Modal Logics held in Moscow in 1978 (3), possibilities were discovered of employing modal logics for a number of branches of mathematics and even for programming problems. This became particularly obvious following detailed analysis of the connections between certain systems of modal logics, on the one hand,

and intuitionist and superintuitionist logics, on the other.

A characteristic feature of the studies conducted in the area of so-called superintuitionist logics, i.e., systems lying between the well-investigated intuitionist and classical logics, and also the family of modal logics closely related to them, lying between systems S_4 and S_5 (4), is that it is not individual logical systems that are examined, but entire classes thereof. In this area Soviet logicians have achieved interesting and varying results. In particular, it turned out that the class of superintuitionist logics and the set of all expansions of S_4 are non-numerable (continuous). This poses the question of singling out, among these uncountable sets, systems that, on the one hand, possess particular, interesting, formal properties, and on the other, admit of simple and lucid logical interpretation. In this connection it has been demonstrated that among all the superintuitionist logics, only three are pretabular (A. V. Kuznetsov and L. L. Maksimova). There are exactly seven superintuitionist logics for which the well-known interpolation theorem (L. L. Maksimova) holds true; and a finite axiomatizing but finitely unapproximable system (A. V. Kuznetsov) and an axiomatizable insoluble superintuitionist logic (V. B. Shekhtman) have been found. Among all the expansions of S_4 there are only five pretabular logics (L. L. Esakia and V. Iu. Meskhi).

The past two decades have seen the emergence and intensive development of what is termed relevant logic. In its systems a formalization and concrete explication, more adequate than in other logics, of such important notions as logical consequence and conditional connection are attained. These studies were prompted by the fact that the notions of consequence and implication (treated as an analogue of conditional connection) existing in classical logic do not quite correspond to their intuitive employment in the acquisition of scientific knowledge. This is manifested in the well-known "paradoxes of material implication," the cause for whose appearance is provided by the special nature of the interpretation of logical consequence as the truth-value connection between statements, i.e., as rela-

tions of an extensional nature, whereas in the practice of cognition, logical consequence is employed as a connection in terms of content (intensional).

Shortcomings of this kind make themselves felt primarily in an attempt to apply the apparatus of logic to analysis of a number of universal scientific notions of a methodological nature: a natural law, scientific explanation, dispositional predicates, statements contrary to fact, deductive systematization, and a number of others. It has been found that the existing apparatus of logic, precisely by virtue of the specifics of interpretation of logical consequence and implication as extensional connections, is clearly unsuitable in many cases.

The point of departure in constructing relevant logics is the treatment of logical consequence and conditional connection, in a manner corresponding to intuition, as relations of an intensional character. Specifically, according to the laws of relevant logic, "anything you please" does not follow from a contradiction; and this corresponds more closely to the real situation in the gaining of scientific knowledge. Studies in this area open new prospects both for logic and for its applications.

The first system of relevant logic was constructed in the Soviet Union by I. E. Orlov as early as 1927. Present-day research began with the work of Akkerman in 1956. Today intensive research in this sphere is being carried out in a number of countries. The Soviet Union has gained interesting results pertaining both to formal characteristics of these systems and to their concrete interpretation. In particular, a semantics has been designed for the well-known system E (of L. L. Maksimova); formulations of relevant systems in the technique of natural deduction have been provided; a semantics has been proposed on the basis of generalized descriptions of states (E. K. Voishvillo); and the solubility of some systems of relevant logic has been proved (G. E. Mints and V. M. Popov). (5)

In concluding this section it is necessary to point to yet another important direction associated with enrichment of the expressive potentials of languages. It consists of building calculi with new quantors, calculi with so-called formulas of in-

finite length. Many such systems possess satisfactory logical characteristics and are better adapted to exact expression of statements in mathematics and natural sciences than the standard logics. An idea of the nature of the research in progress in this area may be obtained from the papers from the first Soviet-Finnish Colloquium on Theories of Generalized Quantification. (6) The significant results attained in the field of non-standard systems with high expressive capacities and, particularly, the new semantic methods that have been developed for these purposes have brought us to the very verge of creation of a satisfactorily applicable theory of meaning. There are grounds for believing that significant new results will be attained in this area in the near future.

The Philosophy of Mathematics

Historically, contemporary logic was created primarily as an instrument for investigation of the foundations of mathematics. Three major trends in the philosophy of mathematics took shape at the beginning of the century: formalism, logicism, and intuitionism. The formalist program consisted of first formulating all of mathematics, or at least its major branches, in formal sign systems — calculi — and then of investigating these calculi by satisfactorily reliable, finite means. For example, one might hope in this way to establish the noncontradictoriness of large fragments of classical mathematics by finite means. From the standpoint of intuitionism, it was considerably more important to reorganize the entire practice of mathematics systematically in such a fashion as to exclude from it the use of abstractions to which philosophical objection could be raised, particularly the abstraction actual infinity and certain modes of reasoning associated with it. In this connection it is precisely concrete finite-modes of consideration that are given highest value, a subordinate role being assigned to formal systems. The program of logicism defends the priority of logic over mathematics and proposes to find a basis for mathematics by reducing it to logic.

The divergence of views with respect to problems of a basis for mathematics led to wide discussions and gave rise to greater interest in this problem and more intense research in this area. By now the significance and role of all three trends have, to a considerable degree, become clear. It may be stated that today a synthesis of all points of view at a somewhat higher level has occurred. No one of the trends is capable alone of performing the tasks it faces. For example, as Gödel's well-known theorems demonstrate, it is impossible to construct a complete standard formalization of fairly rich mathematical theories, and it is impossible to establish the noncontradictoriness of these theories by finite means. A real necessity arises to break out of the limits of narrowly finite modes of reasoning, but at the same time to remain in a region that is satisfactorily reliable from a philosophical point of view. It is specifically intuitionist notions and means of reasoning that often prove to suit this objective. On the other hand, analysis of intuitionist concepts, which can be quite complex, is impossible as a practical matter without prior formalization of the theories being investigated. Modern methods in the theory of proof permit identification of quite subtle interconnections among various classical and intuitionist theories (A. G. Dragalin and his pupils).

The Soviet school of mathematical logic has always been marked by considerable attention to problems of the foundations of mathematics. A large school of constructivist mathematics, led by Professor A. A. Markov, Associate Member of the USSR Academy of Sciences, is functioning fruitfully in our country. The work conducted by that school is proceeding chiefly in the following two directions.

In the first place, the task is posed of systematic construction of mathematics on the basis of constructivism, with abandonment of the abstraction of actual infinity. The carrying out of this program will make it possible to provide a constructivist meaning to many important mathematical assertions and to discover the difference in principle between effective methods and so-called pure theorems of existence. The creation of

constructivist analysis demanded highly nontrivial algorithmic reorganization of many branches of mathematics. Very subtle mathematical findings without classical analogues were achieved here, for example, the Markov-Tsetin theorem on the continuity of every tangible constructivist function, and I. D. Zaslavskii's examples of constructivist functions that are continuous, not limited within a segment. Through the efforts of this school, constructivist mathematical analysis was worked out in detail, and many branches of mathematics were consistently developed in this direction.

Secondly, the goal of the school of constructivist mathematics is the development of a semantics of constructivist logic. Recent studies demonstrate that different levels of constructivity are possible, reflecting the ways in which notions come to be formed. A current task is systematic development of various concepts of constructivity capable of serving as a dependable base both for the development of constructivist analysis and as a validation of classical mathematics. A. A. Markov has created a variant of constructivist semantics called "the stepwise semantic system." This semantics provides a natural validation of the so-called Markov principle — a mode of reasoning widely employed in the practice of constructivist analysis. Furthermore, this semantics has proved to be complete with respect to the classical predicate calculus, and may thus serve as a convenient base for studies providing a foundation for classical mathematics. Hence, Markov's principle has been carefully studied in the works of members of that school.

Another approach to the design of a semantics of constructivist logic from the standpoint of a narrower ontological base was proposed by N. A. Shanin. Shanin's semantics was based on syntactic approximation of more complex to simpler propositions. As shown by G. E. Mints, this process of approximation of propositions brings about effective convergence at least of deducible arithmetic propositions. Thus, Shanin's semantics proves to be an adequate research tool for a broad class of constructivist propositions.

The techniques of the contemporary theory of proof have

found new and fruitful application also in the examination of intuitionist concepts, in the broad meaning of that term. By now a number of formalized theories have been developed that provide natural descriptions of the practices of various kinds of intuitionist mathematics. In this respect it has turned out that one may find in intuitionism a rich spectrum of different, nonequivalent concepts. Specifically, the ideas of constructivity also find a natural place therein. It is also possible for mutually contradictory intuitionist theories to appear (but it goes without saying that each theory is internally noncontradictory). It may be said without exaggeration that employment of exact methods to study the theory of proof of complex intuitionist concepts has opened new prospects in the foundations of mathematics. The opportunity for intuitionist interpretation of very powerful classical theories has appeared, for example, the theory of types and the Tsermelo-Frenkel' system'. Furthermore, it has become possible to introduce distinctive new targets of research into mathematical reasoning, such as intuitionistically freely arising consequences of various kinds, specially adapted to analysis of effectiveness in mathematics under conditions of incomplete information.

Current classical mathematics is primarily within the framework of set theory. The obvious paradoxes of set theory created the need to formulate axiomatic systems broad enough to reflect existing practices in mathematical set theory and, at the same time, not permit the known paradoxes to arise. The methods of building such systems may be divided into three basic groups: certain limits are placed either on the language of theory as, for example, in the axiomatic theory of types, or on methods of forming sets (the widely employed axiomatic theory of Tsermelo-Frenkel', for example, is built on that principle), or, finally, it proves possible to change the logic itself. The last of these alternatives was proposed by D. A. Bochvar, and is being developed by his pupils (V. N. Grishin, V. K. Finn, and others).

Studies in the foundations of mathematics and the theory of proofs shed light on a number of fundamental philosophical

problems such as the nature of mathematical knowledge and its relation to reality, the character of infinity, the status of existence and constructivity in mathematics. These studies are aimed at the relationships between the subjective and the objective in human consciousness, and make for a deepened understanding of the dialectics of knowledge. It may be noted with satisfaction that in the study of the philosophy of mathematics in the broad sense, there is fruitful contact between philosopher logicians and mathematicians specializing in mathematical logic.

A number of philosophical works contain a deep dialectical-materialist analysis of problems of the foundations of mathematics, and the connection between these problems and the subject area of philosophy in general has been disclosed. A major contribution to the treatment of these questions has been made by the methodological investigations of the foundations of mathematics carried out by S. A. Ianovskaia. The works of V. F. Asmus, particularly his book Problems of Intuition in Philosophy and Mathematics [Problemy intuitsii v filosofii i matematike], have had a significant influence on the philosophical interpretation of the foundations of mathematics. One may also take note of the book Philosophy and Logic [Filosofii i logika], prepared by the Logic Sector of the Philosophy Institute of the USSR Academy of Sciences. (7)

The Application of Logic to Mathematics

An exact semantics for classical logic was developed as early as the 1930s. This served as the basis for formulation of such rather simple but important notions in the methodology of the deductive sciences as theory, its completeness, non-contradictoriness, axiomatizability, solubility, and a model of theory. A. Tarski and A. Mal'tsev applied this conceptual apparatus to the study of concrete mathematical theories and showed that it is a good means of solving not only problems of the philosophy of mathematics but problems in mathematics itself, algebra above all. The most interesting result in this

area is solution of the problem of the completeness and solubility of concrete mathematical theories. Thus, for example, A. Tarski demonstrated the solubility of the first-order theory of closed fields of matter. This means that, for example, school geometry (without the axiom of continuity) is soluble, i.e., that each of its theorems can be proved automatically. In the Soviet Union intensive studies in this sphere are conducted by the Novosibirsk school. An important result has also been achieved by Iu. L. Ershov: he has established the solubility of the first-order theory of p-adic numbers. A no less important range of problems is establishment of the connection between the properties of a class of mathematical systems and the possibility of describing them by various means in first-order language. S. R. Kochalovskii has obtained an interesting result regarding the criteria for characterizability of a class of mathematical systems axiomatized by a set of propositions.

Problems of proof of insolubility of certain old fundamental problems of mathematics have proved to be exceptionally difficult. S. I. Adian has now obtained interesting results testifying to the insolubility of a number of mass-scale problems in the theory of groups. Iu. V. Matiiasevich has proved the insolubility of D. Hilbert's tenth problem.

Logic is a very abstract field that sometimes, however, has unanticipated consequences in practical technical applications. The theory of recursiveness and calculability may serve as an example. Having arisen as a means of solving deep theoretical problems in proof theory, it has found application in programming and in evaluations of the complexity of computations. Of course, it continues to this day to retain its specific theoretical and philosophical importance. The scientific community is widely familiar with technical applications of the propositional calculus. Today logic is employed in a number of scientific institutions (the Institute of Applied Mathematics, the Institute of Cybernetics of the Academy of Sciences of the Ukrainian SSR, and many others) for intensive elaboration of problems of synthesis of systems of computation, theoretical programming, the theory of automatic equipment, and the construction of

information-retrieval systems.

Application of Logic to Problems in the
Methodology and Philosophy of Science

In Marxist epistemology, founded on the theory of reflection and dialectics, every possible emphasis is placed on the active role of the subject and the abstractions and idealizations this subject has created in the study of reality, as distinct from rationalist (a priori) theories of knowledge, in which questions of deduction are given priority, from empirical epistemology, in which inductive methods of perception are given priority, or, finally, from irrationalist theories, in which the role of logic is reduced to zero. In Marxist philosophy, logic, in all its aspects, has always been accorded great importance.

Logic employs rigorous and precise means of studying not only reasoning but other methods of cognition: techniques for introducing concepts; methods of abstraction and idealization; operations of measurement, classification, and identification; and scientific procedures of description, explanation, forecasting, and the like. Therefore, on the one hand, logic itself, in developing the apparatus of perception, plays a role of exceptional importance to methodology in scientific research while, on the other hand, it can be, and is, applied to analysis of a number of questions of an epistemological and methodological nature.

In our country, studies in the application of logic to the methodology and philosophy of science are being carried out on the basis of the fundamental principles of dialectical materialism and are accompanied by forthright criticism of contemporary positivism (writings by I. S. Narskii, B. S. Griaznov, V. S. Shvyrev, and others).

Verificationist principles of meaning, conventionalist interpretations of theoretical knowledge, and positivist concepts of reductionism have been subjected to criticism. This criticism has helped to undermine the prestige of logical positivism in philosophy throughout the world.

The team-written works Problems in the Logic of Scientific Perception [Problemy logiki nauchnogo posnaniia] and The Logic of Scientific Research [Logika nauchnogo issledovaniia] (8) have formulated a program for the development of the logic and methodology of scientific cognition. In recent years this has achieved concrete implementation. Contrary to the positivist program, this one is based on recognition of the active interaction of the cognizing subject with the cognized object and on consideration of the historically social nature of perception. On the basis of these principles, Soviet scientists have carefully analyzed the role and significance of symbolic logic in their analysis of the process of cognition. Let us mention certain themes and directions in the application of logic to the methodology and philosophy of science.

Central to the attention of a number of Soviet logicians who are methodologists of science have been studies of the structure of theories of mathematics and natural science. It is possible and necessary to study their logic and methodology in addition to their content and history. This is based on the achievements recorded in logical semantics and the philosophy of mathematics.

Today the features of deductive theories have been investigated in detail, and continue to be studied. A detailed methodology of the deductive disciplines has been created. Studies in theories of natural science encounter a number of difficulties, however. For example, debates are still in progress about the interconnection of successive scientific theories. Notions defending the idea of pluralism of theories, their incommensurability and, consequently, the absence of progressive accumulation of positive knowledge are counterposed by Soviet methodologists to the materialist theory of the objectivity of our knowledge and the dialectics of the relation between absolute and relative truth. Today, in detailed analysis of these problems, the need for them to be reformulated and rendered more precise in the terms of logic is acutely felt. This is attainable by axiomatization of theories in natural science, the construction of correct semantics for them, and the application to these

rigorously described theories of the full power of deductive and semantic research techniques of modern logic. This is why axiomatization of theories in physics and a number of other natural sciences, as well as the construction of adequate semantics for them, remains one of the fundamental tasks of logic and methodology. Of late, the axiomatic method is being more and more widely employed in study of the structure of theories of natural science (L. B. Bazhenov and V. N. Sadovskii). An interesting attempt to present the development of physical knowledge in the form of a replacement of axiomatized scientific theories has also been undertaken (M. E. Omel'ianovskii).

Considerable attention is being given to problems in the relationship between empirical and theoretical levels of knowledge, particularly in connection with the rising possibility of applying the devices of logic to their solution. On the logical level, the problem of theoretical and empirical levels of knowledge can be broken down into two subproblems: the relationship between empirical and theoretical notions, and the relationship of assertions that describe facts to those that express laws.

By now a sufficiently strong apparatus of theories of determinability has been worked out in logic, permitting analysis of the expressive potentials of precisely constructed languages and opening up prospects for applying this apparatus to clarifying the status of theoretical terms. The efforts of a number of Soviet logicians have been focused on analysis of dispositional predicates and reduction propositions (V. A. Smirnov and V. N. Karpovich). Recently it has been shown, on the basis of the theory of determinability, that reduction propositions are not definitions in themselves; and the conditions under which they perform the role of definitions of the concepts introduced have been discovered. To clarify the role of theoretical terms, great importance attaches to Craig's well-known theorem according to which every first-order theory having theoretical terms may be employed to construct another theory lacking theoretical terms, with respect to which the former would be a conservative broadening of the latter. In other words, every

proposition containing only empirical terms will be provable in a theory with theoretical terms when, and only when, it is provable in a theory without theoretical terms.

The importance of this theorem for epistemology has been uncovered in the Soviet logical literature, and a detailed critique of instrumentalism has been provided (E. E. Lednikov, V. S. Mes'kov). The fact must be singled out and emphasized that S. A. Ianovskaia long ago pointed out that elimination of theoretical terms is one means of validating theoretical knowledge and by no means testimony that [such terms] are artificial and unnecessary. Soviet logicians have noted that scientific theories employing theoretical terms perform the function not only of deductive systematization but of explanation, forecasting, and inductive systematization, in which theoretical terms have a specific role to play. Moreover, considerable attention has been given in Soviet logical and philosophical literature to study of theoretical notions as the result of fairly complex processes of abstraction and idealization (S. A. Ianovskaia and D. P. Gorskii). Today there is a revival of study of the structure of quantitative notions and procedures of measurement, which are very important for knowledge in natural science.

One of the basic problems in epistemology is analysis of the category law. The logical aspect of this problem is formulated as the task of rendering precise the logical form of a statement expressing a law, as distinct from fact-fixing sentences. Hitherto no exact criteria have been found for making this distinction, even for limited formal languages, but considerable progress has recently been observed in this direction. The elaboration and, particularly, semantic validation of intensional languages, especially languages of modal and temporal logics and of systems of strong and relevant implication, permit the hope that this problem will be solved. The logical results obtained in this area, and noted in the first part of this article, have created the basis and apparatus for serious logical treatment of problems of nomological sentences.

Procedures of logical analysis have proved useful not only in studying reasoning and methods of introducing notions (ab-

stractions and idealizations) but also for analysis of classification, measurement, generalization, analogy, and modeling, and also for such important cognitive procedures as description, prediction, and explanation. In particular, the Hempel and Oppenheimer models of explanation have been analyzed and their logical defects uncovered (E. P. Nikitin). Recently, various models of explanation, constructed on the basis of relevant logics, have been studied.

Justification of the correctness of judgments in logic rests on the notion of truth developed in the theory of knowledge. However, the question of truth also arises in association with the problem of analytical and synthetic propositions. Through refinement of the basic notions of semantics and of the semantic theory of information, it has been demonstrated (contrary to the assertions of logical positivism and linguistic philosophy) that not only the statements of concrete theories but the laws of logic convey certain information about reality (E. D. Smirnova and E. K. Voishvillo).

The question of ontological suppositions is associated with the nature of analytical truths. The employment of one or another language, one or another logic, compels us to make certain suppositions with respect to the objects being cognized. One of the tasks of the philosophy of logic consists of establishing the connection between logical means of expression and reasoning, on the one hand, and assumptions about the objects of reasoning, on the other. For standard systems of logic these questions are decided on the basis of the criteria of Quine and Church. These criteria have been attentively studied by Soviet logicians and philosophers, particularly with respect to the possibility of applying them to nonstandard logical systems (Iu. G. Gladkikh).

Study of languages with richer potentials for expression assumes deep philosophical analysis of such categories as necessity, possibility, accident, causality, etc. In turn, the logical apparatus constructed makes possible more detailed investigation of these categories themselves. Much work has been done in this direction, and rather subtle epistemological and onto-

logical factors have been discovered. Of late, in connection with study of the meaning of quantification and modal contexts, interest in the philosophical category essence has revived. Certain directions have been outlined for solution of this problem, and some results have been obtained.

It is particularly desirable to emphasize that logics have always been interested in the relationship between the levels of form and content of knowledge, and thus have always touched on these categories in one way or another. Today, rich and new material on this problem has been accumulated in logic, on the one hand, in connection with further and deeper analysis of the notion of logical form and its informational character, and on the other, in connection with study of the limiting theorems of Gödel and Tarski, and criticism of the formalist program for validation of mathematics propounded by Hilbert. The place, significance, and limits of formalization in science have been clarified in a number of writings. Nevertheless, works by Soviet logicians on the axiomatic method have noted the limited nature of purely content-oriented methods of acquiring knowledge, i.e., the fact that when things are approached strictly in terms of their content, part of the important information goes undetected. This has made it possible for Soviet logicians to pose in concrete fashion the question of the insoluble unity and interdependence of form and content in the cognitive process.

Today's logic is the heir of the old traditional logic. The problems dealt with by the latter are not merely matters for history: they enter directly into the fabric of the discipline today. Therefore, the present stage of development of logic is characterized by greater attention to its history and to the history of philosophical thought. Many of its branches (temporal and modal logic) arose as a result of analysis of philosophical concepts of antiquity, the middle ages, and modern times. Both abroad and in the Soviet Union one can observe a revival of research into the history of logic (B. V. Biriukov, V. A. Bocharov, N. I. Brodskii, Z. N. Mikeladze, M. V. Popovich, N. I. Stiazhkin, and others). Considerable interest is displayed

in logical analysis of many philosophical concepts of the past that often serve as sources of new logical ideas. It is also necessary to note the feedback influence of logic on analysis of philosophical concepts of the past. Contemporary logic makes possible more subtle analysis of the views of individual philosophers and disclosure of deep-seated factors in concepts of the past.

The application of logic to methodology involves many difficulties. Progress in the solution of a number of questions is slow. These circumstances have driven some philosophers, particularly those abroad, away from the study of certain methodological questions with the aid of exact logical methods. The collapse of logical positivism, which took false methodological principles as its point of departure, is often perceived by these philosophers as an "indicator" of the failure or limited nature of logical methods. However, an irony of fate lies in the fact that, in negating the application of logical methods, they often share more reactionary and unscientific principles. The rationalist conventionalism of logical positivism is, for all practical purposes, replaced by irrationalism. The attempt by positivism to found all knowledge on experience, narrowly understood, is countered by a thesis holding that "knowledge is no more than a social organizing factor."

Of course, recognition of the social nature of knowledge does not contradict the understanding of knowledge as describing objective reality in a manner that is constantly more complete and exact; and consideration of change in knowledge, the replacement of one conceptual system by another, does not repeal either rationality or logic. On the contrary, the development of new branches of logic, which was discussed above, makes possible rational interpretation and description of scientific knowledge.

It seems to us that the real road to rationality in science is not the counterposing of historical studies to logical ones, but their interconnection and interaction. Logic does not replace either epistemology, philosophy, or any other discipline, any more than the latter displace or replace logic; but close inter-

action among the various disciplines dealing with scientific knowledge is a necessary condition for progress.

Notes

- 1) Logicheskii vyvod, Moscow, 1979.
- 2) Leibniz was the first to introduce this notion into philosophical studies; and this enabled him to explicate, to a certain extent, the modal categories of possibility and necessity.
- 3) See survey in Voprosy filosofii, 1979, no. 4.
- 4) The S_4 and S_5 systems of alethic modal logic come within the set of systems constructed by Clarence I. Lewis for solution of problems of logical implication.
- 5) See Modal'nye i intensional'nye logiki, Moscow, 1978; Logicheskii vyvod, Moscow, 1979.
- 6) Essays on Mathematical and Philosophical Logic, Synthese Library, vol. 122, Dordrecht, 1979.
- 7) V. F. Asmus, Problemy intuitsii v filosofii i matematike, Moscow, 1965; Filosofia i logika, Moscow, 1974.
- 8) Problemy logiki nauchnogo poznaniia, Moscow, 1964; Logika nauchnogo issledovaniia, Kiev, 1964.

I. S. Narskii

THE PHILOSOPHY OF THE LATE KARL POPPER*

Today it is well known that the philosophical and methodological concepts of K. Popper, which became the basis for the latest theories in the logic of science, constituted, at one stage in their evolution, an attempt to save neopositivism under the pretense of criticizing it. The militant anti-Marxist nature of Popper's sociological views and his intense anticommunism created considerable popularity for him in reactionary circles not only as a sociologist and political scientist but as a philosopher. British Conservatives and German right-wing Social Democrats, who previously had had nothing to do with his methodology of science, now flaunted it. Ultimately, the opinion of I. Lakatos that Popper's methodology is the most significant phenomenon in twentieth-century philosophy found many proponents, and was applied to Popper's philosophy of history as well (see Imre Lakatos, "Popper zum Abgrenzungs- und Induktionsproblem," in Theorien der Wissenschaftsgeschichte, edited by von H. Lenk, Frankfurt am Main, 1974, p. 75). In 1965 Karl Popper was elevated to knighthood, and the teaching of Sir Karl became the world-view doctrine of the right wing of

*Russian text © 1979 by Filozofskie nauki. "Filosofia pozdnego K. Poppera," Filozofskie nauki, 1979, no. 4.

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the German Social Democrats. His methodology was taken into the arsenal of many anticommunists of the West. Popper is hailed as "the most influential" of the philosophers of our day.

1. The Stages of Popper's Philosophizing
and His Pseudorationalism

Lakatos distinguished three variants (in two stages of development) of Popper's methodology, singling out primarily "dogmatic" or "naturalist" falsificationism, according to which a single refuted fact suffices to require any given scientific theory to be discarded as worthless. However, it was not Popper himself who was chiefly guilty of this, but A. Ayer, who coarsened his teaching in the heat of argument. In Lakatos's opinion, Popper is responsible only for the two other variants of his teaching. Reference is to the initially "naïve," but by the end of the '50s "sophisticated," falsificationism. The former was limited to the hypothesis that it was necessary to modify theories not in consequence of the very first fact found to contradict them and therefore shake them, i.e., render them false, but only when "strong" (?) facts arose and, moreover, when this occurred repeatedly. In other words, not every "disproof" immediately means "rejection" of a theory. However, the new theory taking the place of the previous one deals with the same subject-matter. "Sophisticated" falsificationism went farther and began to hypothesize versions of theories that, after their falsification, i.e., refutation, led to substantial changes in the entire range of problems with which they dealt.

In contrast to Lakatos, we hold that there is no reason to speak of different versions of Popper's methodology; we are dealing with changes affecting parts of one and the same concept. In the 1958 introduction to the enlarged English edition of his principal philosophical work, The Logic of Research [Logik der Forschung, 1934], Popper begins to stress the idea, formerly on the fringes of his writings, of "growth of knowledge." But this idea, which he was compelled to accept under the pressure of criticism, although it contradicts the extreme

relativism and skepticism so characteristic of him, he completely emasculated himself, as it turned out. Popper is the originator of "naïve" (read: conventionalist and agnostic, despite all his attacks on conventionalism and agnosticism), falsificationism, whose difference from the "dogmatic" version is quite insignificant; and its further evolution did not change its essence. By falsificationism we mean Popper's demand that the principle of verifiability be replaced by the principle of falsifiability, i.e., the theoretical possibility of pointing to empirical facts in conflict with given theories, which therefore lead to discarding them and replacing them with new theories (for Popper's theory of falsification, see the book Current Bourgeois Philosophy [Sovremenniaia burzhuznaia filosofiiia], Moscow, 1978, pp. 132-33).

In the 1960s Popper declared his theory to be "critical rationalism" and, to explain this term, pointed to the fact that he was a proponent of "rational" solutions to all problems, and that in moving toward such solutions he made use of the "critically" effective technique of falsificationism. Thus, Popper's falsificationism is evident in epistemology, and "critical rationalism," in world view and method in general. The later stage in Popper's work began in about 1966-1968; and his paper at the Fourteenth World Congress of Philosophy on the "three worlds," from the standpoint of "critical rationalism," may be regarded as the most obvious turning point.

Behind the term critical rationalism, which Popper gave to the methodological aspect of his later concept, there stands a whole stage in the history of twentieth-century bourgeois philosophy. And whereas some of its representatives quickly cast themselves into the slough of irrationalism, others, on the contrary, sounded the alarm and displayed persistence in restoring its former rationalist aspect. Bourgeois philosophy had long since parted company with the "natural light" of Descartes's cognizing reason, with the "reasonableness" of the laws of nature as understood by the men of the French Enlightenment, and with the faith in the dialectical progress of "world reason" enunciated by the classical German idealists.

It is no accident that present-day bourgeois philosophers so fiercely advertise the pseudorationalism of neo-Thomist theory and, even more, the notorious "scientific" rationalism of neopositivism.

Popper's apologists emphasize that his "quality of criticism" consists of denying the "reliability" of all knowledge and, moreover, of outright "refutation of classical rationalism" (H. Albert, Traktat über kritische Vernunft (3rd ed.), Tübingen, 1975, p. 189). This "critical quality," in their opinion, consists of Popper's denial of any "assertiveness" in the sciences and of "bloody" revolutionism in politics; and the "rationalism" in his "criticality" is akin to the negative dialectics of the Eleatic school and to the conception of "rationality" held by the sociologist of knowledge, Max Weber. Underlying all reasoning of this kind is a covert attempt to glue bourgeois scientism to a pseudohumanism and clear its skirts of irrationalism while preserving all the reactionary aspects of Popper's philosophizing. To be sure, he himself, claiming to be "revolutionary" in epistemology, allegedly in consequence of his invention of "falsificationism," is even ready to recognize the existence of lack of harmony between his social reformism and the epistemological "revolutionism" that presumably characterizes him. We find rationalizations along this line in his 1970 article "Reason or Revolution?." But in reality, Popper's pseudo-critical pseudorationalism is in total agreement with his reactionary political convictions. There is more than enough of irrationalism in his method and theory of knowledge. We find it in his characteristic elevation of the method of trial and error to an absolute and in his concept of "decisions" in the sense of the irrational arbitrariness he avowed in scientists' selection of methodological rules, hypotheses, and basic scientific propositions (see K. R. Popper, The Logic of Scientific Discovery, New York, 1961, pp. 108 ff.). Furthermore, Popper expressed himself in favor of an "intuitive understanding of reality" (K. R. Popper, "On the Theory of the Objective Mind," in Akten des XIV. Internationalen Kongresses für Philosophie, Vienna, 1968, vol. I, p. 47). In his article "Forecasts and Pre-

diction in the Social Sciences," and in his autobiography, he writes that he conceived of his "critical rationalism" from the outset as the opposite of Marxism. Earlier he had preferred to picture things as if his methodology and philosophy had arisen only as a challenge to logical positivism, reductionism, and inductivism, i.e., had purely academic premises. Let us recall, however, that he raised the banner of anticommunism during World War II, which was far from being a contribution to the unity of the allies in the struggle against fascism.

Attacks by Popper on inductive reasoning and the neopositivist principle of verification were more than numerous (1), although in reality he was unable to move a step without induction and without verification (empirical checking having a positive outcome) in his concept of falsifiability (refutability). Moreover, Popper's attempts to counterpose the problem of demarcation, i.e., delimitation between scientific and extrascientific assertions, to the neopositivist differentiation between interpretability and noninterpretability are equally false (see K. R. Popper, Conjectures and Refutations. The Growth of Scientific Knowledge, New York and London, 1962, p. 258. Compare his The Logic of Scientific Discovery, p. 311). (In fact, here there is merely a different terminological expression of the very neopositivist thesis!)

Today bourgeois historians of philosophy are speaking and writing again about the "second" Popper, i.e., about changes, as has been stated above, starting at about the beginning of the latter half of the 1960s, in his views on the nature and character of perception and knowledge. This talk was associated primarily with the appearance of his notorious concept of the "three worlds" of ontology and epistemology. This concept arose somewhat under the influence of Lakatos and received programmatic expression in the article "Epistemology Without a Cognizing Subject," 1967, and in his paper "On the Theory of the Objective Mind" at the Fourteenth International Congress of Philosophy in Vienna, 1968. In the period of the revolution in science and technology it was no longer possible for Popper to hope for retention of his wide influence on the minds of the

bourgeois intelligentsia, even by advertising his anticommunism, without making some corrections in his total agnosticism.

In any case, how extensive and significant are these correctives and novelties? And what relationship do they bear to Popper's positivist teachings on falsifiability?

Popper was compelled to recognize that his extreme counterposing of falsification and verification had suffered a fiasco. In his article "Three Requirements for Human Knowledge," 1962, he declared: "Previously I asserted that science would stagnate and lose its empirical character if we did not look for refutations. Today we see that, on the same grounds, science will stagnate and lose its empirical character if we cease to strive for verification of new forecasts . . ." (K. R. Popper, Conjectures and Refutations, p. 244). But the matter was not confined to this retreat. Earlier Popper had condemned open conventionalism, but at the same time had unwillingly recognized that he was close to conventionalist themes in the pragmatist, C. S. Peirce, and the agnostic, David Hume. Now Kantian tones became stronger in his works, and he began to write explicitly about Kant. In The Logic of Scientific Discovery, he spoke vaguely of "the scientific instinct" (see K. R. Popper, The Logic of Scientific Discovery, p. 76); and in Objective Knowledge he proclaimed the presence in the human brain of certain "reactive dispositions" of the method of perception and its a priori premises. We Marxists do not deny the existence of anatomical-physiological predispositions developed in a process of lengthy phylogenesis and, consequently, the inheritance of the experience of the generations in one or another form (see Problems of Logic and Epistemology [Problemy logiki i teorii poznaniia], Moscow, 1968, p. 73). These predispositions, in the form of unconditioned reflexes, instincts, and abilities, do exist; but they are neither inborn knowledge nor a priori forms of knowledge. It is precisely this that has been demonstrated by the new studies of Soviet psychologists. But it was apriorism that emerged in the views of the late Popper, in the form of assertions of the existence of allegedly pre-empirical methodological knowledge, independent in both

form and content of any individual person, and also in the form of assertions of the existence of knowledge in general, independent of any empirical subjects whatever.

The status of this kind of knowledge is reminiscent in one way of the ideas of Plato and Bolzano, or again of Hegel's "Absolute Spirit"; Popper himself does not deny these analogies. Kant turns out to be the point of departure for Popper's methodological quests; and Plato and Hegel, whom he had so condemned for idealism and dogmatism in his book The Open Society and Its Enemies and later as well, became the next port of call in his wanderings. The idealist returns to his own. The idealism of Plato and Hegel, deprived of dialectics, was now confused by him with the neo-Hegelianism of R. Collingwood, who had, as early as 1939, written of the "absolute premises" of knowledge. At the same time, Popper preserved his falsificationism, which had its origins in the so-called fallibilism of Peirce and a number of arguments of H. Bashliar [?], who had written in the 1930s of "discontinuities" in the development of human knowledge. The result was an eclectic concept in the full meaning of that word: a rather chaotic mixture of neo-positivism, pragmatism, platonism, and neo-Hegelianism arose.

Popper sometimes made a special point of stressing the allegedly purely English sources of his philosophizing. But it was hardly the English neo-Hegelian Collingwood who exercised the strongest influence on him, just as it was hardly Winston Churchill (who was never a philosopher) who strengthened Popper in his "realistic" views. Yet Popper quotes them at length (see K. R. Popper, "On the Theory of the Objective Mind," pp. 45-46 ff.; also Objective Knowledge. An Evolutionary Approach, Oxford, 1972, pp. 42 ff.). Why was this done? Apparently, for the purpose of reinforcing his naturalization as a Briton, which means in order to create the most favored climate for himself in bourgeois literature in the English language.

Popper himself was naturally concerned with somehow harmonizing his favorite trial-and-error method, painted in conventionalist colors, with apriorism. For example, he regarded

as a priori his criteria for comparative evaluation of theories by richness of content, improbability, and simplicity; and the trial-and-error method had the purpose, as he conceived it, of adding to these criteria the feature of conventionalist lability, which would have made it possible to vary their application. He declared that 99.9 percent of an organism's knowledge was innate and 0.1 percent accounted for by some modifications of the a priori makeup of knowledge (see Objective Knowledge, p. 71). Popper is very sloppy in explaining the exact meaning of "innateness" and employs the terms innate knowledge, the a priori approach, and the disposition to theoretical universals interchangeably. The difference among the notions now underlying these terms, in science and philosophy, is considerable. It would seem that we are dealing with a deliberate lack of clarity, which helps Popper to wriggle away from criticism.

Here are the two "fundamental theorems" of the late Popper;

1. "All our acquired knowledge, all the fruits of education consist of modifications (and perhaps negations) of certain forms of knowledge or dispositions, which — to begin with and in the final analysis — are innate dispositions" (ibid.).
2. People strive to perfect their knowledge, nurturing the hope of "approximating" truth; but this hope is vain: truth as such, i.e., as the complete class of all absolutely true propositions, is unattainable by human beings.

We are faced with a set of ambiguities: identification of knowledge and dispositions, interpretation of negations as "modifications" of innate knowledge, and sharp differentiation between perceptions and genuine knowledge, which allegedly exist in two spheres not in communication with each other — the activity of subjects and the existence of truth. What occurs in the first sphere is the historical development of perception, which is something greater than mere discarding of one set of theories and replacement by another. As early as in the article "Three Requirements for Human Knowledge," published in Conjectures and Refutations, Popper began, in the spirit of Lakatos, to express himself regarding shifts in knowledge toward more "progressive" degrees and levels (see, for example, K. R.

Popper, Conjectures and Refutations, pp. 241, 245 ff.). In the second sphere he now affirms the existence of absolutely true knowledge as such, i.e., as a set of all true propositions. This absolute truth would seem to be incapable of further development. Nevertheless, according to Popper, there are, along with it, for some reason, as-yet unresolved "problems." Then where is this truth to be found?

Popper introduced some "refinements"; but it turned out that they only confused the whole thing even more: the spheres he had begun to call "worlds" turned out to be three, and the relationships among them remained unclear and contradictory.

2. The Concept of the "Three Worlds"

The "first world" is the "physical" world, i.e., observable nature; "the second" is the realm of human cognition and the mental processes occurring in human heads; and the "third world" is primarily the world of truth, although, as we shall see, there is something else there as well. It would appear that what we are dealing with is merely an eclectic combination of something like the materialism of natural science with Platonism, and in 1970 Popper even called it "metaphysical realism"; but the fact is that Popper's eclecticism is even more imitative than that.

In the introduction to Objective Knowledge, Popper declared that he was breaking in the most decisive manner with the earlier "subjectivist" tradition in the history of philosophy, in which he places not only Berkeley and Reid but also Descartes, Hobbes, and Locke. Thus, he classed not only idealists but materialists of the past among the authors of subjectivist concepts. Now he apparently regards his own great contribution to have been recognition of the existence of "the physical" world. But how is his "physicality" to be understood? Popper pushes materialism aside. He is more impressed by neopositivist physicalism, and therefore in his hands the "first world" proved to be a combination of sense perceptions understood in some half-positivist, half-realist way. (2) Does the "second world," i.e.,

the mental, reflect physical nature? Is people's consciousness itself a product of that nature? Popper gives a negative answer to the first question and tries to evade the second (*ibid.*, pp. 65-66). Attacking Locke's theory, he attempts to discredit his idea of reflection by refuting the notion of a tabula rasa.

Perhaps we shall gain clarity on the matter if we analyze Popper's understanding of the "third world"? But here, too, the results that emerge are equally mixed up and chaotic. In the "third world" Popper includes not only truths as such but problems, conjectures, and their negation, which means, as he himself grants, false theories as well — and not merely the idea of "the lie in general," as might have been the case had he been more faithful to Plato. True, he cites not only Plato but Leibniz, Bolzano, and Frege. Sometimes he finds a kinship between the theory of the "third world" and Hegel's concept of the development of objectivized knowledge, so that the content of this "world" expands to include "all possible objects of thought" ("On the Theory of the Objective Mind," p. 26), which will include not only notions, i.e., ideas, but both true and false propositions and entire hypothetical theories. "The postulating of the region of mental existence as a 'third world' testifies to the fact that Popper had revised his attitude toward German idealism and contemporary ontology. Such thoughts, based on Hegel, Schelling, N. Hartmann, M. Scheler, or Whitehead, would have previously appeared inimical to one who based himself only on Kant and Hume" (G. F. Toben, Die Falsifikationstheorie von Ch. S. Peirce und die Falsifikationstheorie von K. R. Popper. Untersuchung ihres Zusammenhangs, Stuttgart, 1977, a dissertation, p. 63). Here the range of borrowings is somewhat expanded, and this truly corresponds to the fact that Popper includes in the "third world" books as such, and teachings as such, including false teachings, problematic situations as such, argumentation as such, and all "potentialities" in general (see Objective Knowledge, pp. 116-18). It is also possible to find the following kind of clarification pertaining to the content of the "third world": it consists of "theories in journals, books in libraries, discussions of theories, diffi-

culties and problems" (ibid., p. 73), and also values, social institutions, and works of art, all these being the fruits of human language and thought, i.e., the historical, man-made product of the "second world" (see K. R. Popper and J. C. Eccles, The Self and Its Brain, Berlin and Heidelberg, 1977, pp. 38, 144, 449).

What emerges as a result is a crying contradiction among the various meanings of the term objectivity in the densely and variously populated — by Popper's will — notion of "the world of objective knowledge." The first of these is intersubjective verifiability (The Logic of Scientific Discovery, p. 44). The second meaning is the distinction between preexisting knowledge and its genesis in the cognizing activity of the subject. Popper declares that genuinely objective knowledge exists where there is no cognizing subject and, consequently, no medium in which it operates, i.e., no empirical reality.

Popper thus arrives at a new dualism of perception and knowledge: subjective perception (and pseudoknowledge) is merely a set of "organismic dispositions," and objective knowledge is some kind of independent "logical content" of the genetic code and our theoretical quests (see Objective Knowledge, p. 73). Bayertz justly comments that "Popper is too dedicated to everyday common sense for him to deny reality independent of consciousness; but on the other hand, he is too much the positivist to accept realism in its epistemological relationship (K. Bayertz and J. Schleifstein, Mythologie der "kritischen Vernunft." Zur Kritik der Erkenntnis- und Geschichtstheorie Karl Poppers, Cologne, 1977, p. 79).

Unlike Kantian dualism, the dualistic boundary in Popper is drawn within knowledge itself. And unlike the epistemological principles of the Vienna Circle, he no longer discards the process of development of knowledge outside the bounds of the basic conception, but looks upon preexisting knowledge as some kind of logical "essence" combined with organic psychological activity. A contradiction takes shape between Popper's judgments on "objective" knowledge, which is allegedly outside the bounds of perception, and his unending criticism of "essential-

ism," i.e., any theories about the existence of essence, whose authors he takes to be Plato, Hegel, and Marx. At the same time, a contradiction arises between the customary nihilist criticism of psychologism by Popper and the attempts later appearing in him to provide a biological basis for cognitive processes. But on the whole, the contradiction between the retained nihilism of the principle of falsification with respect to past stages of science and recognition of the physical principle of correspondence, i.e., the incorporation of past knowledge in new knowledge in a form subordinated to the latter (The Logic of Scientific Discovery, p. 252), grows and widens. All in all, the contradiction between Popper's "traditional" agnosticism and his new "realistic metaphysics" of objective knowledge also grows and widens. "A mutual isolation of science and reality proves to be a constitutive moment in Popper's theory of knowledge" (Bayertz and Schleifstein, op. cit., p. 76).

And here a third meaning of the term objective makes its appearance, a meaning similar to that of simplified and sometimes vulgar materialism. (3) The "world" of objective knowledge is the tangibly objectivized (identified) world of written and printed signs. A bird's nest remains a nest even when the bird has flown from it; books as bearers of knowledge retain that quality even when neither their writers nor readers exist any longer (see Objective Knowledge, pp. 59, 116). Popper clearly "stumbles into" materialism when he recognizes that should civilized humanity and all libraries perish, millennia would pass before civilization could be reborn (ibid., p. 108). In that case, what is the sense of his notions about the profound "independence" of the "third world" (ibid., pp. 110, 116, 118)? Popper classes as belonging to that world not only the invariant structure of our knowledge in logic and mathematics and the logical structure of other knowledge but also the logical expression of any knowledge and quests for paths toward it and, in some manner, all the content of knowledge in general, including even "theorems" no human being will ever discover. He declares, further, that that "third world" "casts light" on the "second," i.e., on the realm of human mental activity, but never

vice versa. Apparently, the "meaning" of the theory of the "second world" basically remains that of Plato and Bolzano; but there is evident a hopeless eclecticism in which it is useless to search for any uncommon "profundity." Popper simply was unable to tie loose ends together and did not want to see, for example, that there was a material source of the elementary notions of mathematics.

The question of the relationships among the three "worlds" is extremely confused by Popper. Sometimes he provides the "simple" answer that the "second world" (subject) "sees" (with its eyes) "the first world" (physical things) and "sees" (with its brain, i.e., experiences) "the third world." This is trivial; and at the same time we, remaining within the bounds of the everyday view, are immobilized at the threshold of a theoretical problem that still remains to be solved. References to Plato hinder the path to its resolution. If one were to ascribe any rational meaning to the grain of truth in these ruminations of Popper's, the only acceptable answer could be the following: "The first world" is reflected in "the second"; and the objective content of this reflection, being abstracted from its subjective form, might be called the "third world," as a convention.

As is known, we Marxists certainly do not equate the three realms of reality — nature, thought, and society — although society is far from reducible to any of Popper's "worlds." Thought itself becomes an object of cognition, and actual objective knowledge exists only when subjects think it, although the content of objective truth does not depend upon man, but is "stored" in tangible structures in the form of its signs. Causally, the "second" and "third" worlds are secondary relative to the "first world"; but they arise only in society, for knowledge is a part of social life as well as a factor in the preconditions for it and a consequence of the objective laws of its development.

Total confusion is plainly evident in Popper: we have already noted that the "third world" makes it possible to understand "the second world," but "the second world" does not reveal the "third world." Furthermore, Popper declares that between

the "second" and "first" worlds an analogy exists, consisting in the presence of growth and of biological evolution (*ibid.*, p. 111). All "three worlds" contain something "linguistic," and "the activity of the mind consists essentially of operating with objects in the 'third world'" ("On the Theory of the Objective Mind," p. 32). Furthermore, we read that "the third world" is an "unintended and unanticipated product (?) of human activity" (*ibid.*, p. 29. Our emphasis — I. N.). Here we learn, surprisingly, that the "second world" arose out of the "first" and that "what might be termed the second world — the world of the mind — increasingly becomes, at the human level, a link between the first and third worlds: all our actions in the first world are determined by what our second world grasps from the third world"; but at the same time, "the third world bears no similarity to human consciousness ..." (*ibid.*, p. 126). Popper declares, however: "I regard the third world as a significant product of the human mind. It is we who created the entities of the third world" (P. A. Schilpp, ed., The Philosophy of Karl Popper, 1974, Vol. I. p. 148), because "entities" have, "at least" (?), a linguistic "base" ("On the Theory of the Objective Mind," p. 32). This kind of confusion demonstrates the very low theoretical level of Sir Karl's own philosophical thinking.

3. Growth of Human Knowledge, and Pseudobiologism

The later Popper flits back and forth in his schema of the growth of human knowledge, ascribing it now to the "second" and then to the "third world." His notation is very simple: $P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$. P_1 represents a problem, TT is the "tentative theory" (4) proposed as a solution, EE is "error elimination" refuting criticism of this hypothesis, and P_2 is the new problem situation, i.e., the initial problem, now changed ("shifted," in Lakatos's terminology), sometimes refined in part or whole, and understood more deeply than before. Popper depicts science as the history of a sequence of problem situations that come to be understood and rendered more precise

thanks to theorists' penetration into their "background," which lies in the "third world" (see "On the Theory of the Objective Mind," pp. 34-36). But are they solved?

Popper offers no clear answer. In general, he holds that every approximate solution of a problem may be "convenient" or "useful" for the given moment; but from the standpoint of genuine truth, which remains in the "third world," it is false. To state all this quite definitely with regard to the general schema for solution of problems so widely advertised by Popper would mean to devalue it totally, and he prefers the technique of evasive half-statements. He adheres to this technique when the question arises as to what each problem situation in science begins with: if with "error elimination" within the preceding scientific problem, then where did the first problems arise? When science did not yet exist, in the strict meaning of the word?

We know that that primeval source was human experience, which breaks the "vicious circle" of interdependence of problems, theories, and their refutations, just as it breaks the analogous circle of interrelations between deduction and induction. But Popper's attitude toward the tangible experience of humanity in social history is one of contempt. He tries to solve the problem of deduction and induction by chatter about the a priori "psychological" and "genetic." He resolves the question of problems, hypotheses, and their refutation in approximately the same way, "I think," he writes, "that science arises out of problems (rather than out of observations or even theories, although, let us add, the 'background' of a problem consists of theories and myths)" (ibid., p. 40). No matter what one does with it, no real historical development of knowledge arises when it is thus interpreted: the chain each link of which consists of a problem (P_1), a hypothesis (TT), its falsification (EE), and the "shifted" problem (P_2) symbolizes change in our knowledge; but there is a great distance in theory of knowledge between recognition of change and explanation of development.

Advertising his formula for the "shift" in problems, Popper writes that it depicts both the process of growth of knowledge

and the path for "rational criticism" thereof over the entire course of that process (see Objective Knowledge, p. 121). Inasmuch as problems arise when there is recognition of some contradiction in the existing theory, the thesis "Science begins with problems and ends with problems" (ibid., p. 105) may also be interpreted to mean that science begins and ends with contradictions. Therein Popper finds some analogy between his views and Hegel's, but he refuses to have anything to do with dialectics. He merely recognizes that new ideas arise in logical or "dialectical contexts" (ibid., p. 297). And inasmuch as that is so, his formula is allegedly an "improvement and rationalization" (?) of Hegel's epistemology. In these words the motif of return to objective idealism appears once again.

Actually, Popper's formula is a parody of Hegelian dialectics. In the understanding of the great German thinker, science develops through contradictions in perception but culminates in achievement of knowledge. Of course, the ideal of perfect, absolute truth is unattainable, and in this regard Hegel fell into an idealist illusion. It is well known that the development of science proceeds without end, in an unending cycle of solution of newer problems, discovery of new contradictions constituting problems, followed by their solution. But the highroad of development of science, connecting the different links in a process proceeding cyclically, is essentially not only a sequence of problems and theories but specifically an increment of new knowledge upon that previously existing or, more precisely, an incremental transformation of knowledge. Science begins with experience, which acquires theoretical interpretation in the course of the practical activity of human beings; it never ends, but progresses through the metamorphoses of ever more perfected theories. In Popper, however, the contradictions in knowledge are never resolved, essentially, through genuine progress in science, but are merely discarded along with the preceding theories (hypotheses) in which they arose.

Popper's early epistemological concept was marked by the "catastrophism" of destruction of previous theories by the weapon of refutations, the introduction of absolutely new theo-

ries and their destruction. In the epistemological oversimplifications of the late Popper it was only an appearance of "anti-catastrophism" that showed up, i.e., concessions to cumulativist views: theories do yield answers to problems, but the answers prove unsatisfactory, and therefore relatively new problems are posed, the answers to which will later be revealed to be in error and discarded. Instead of the actual development of theories, he directs attention to changes in the problems, offering merely a variation on Lakatos's theme. Instead of Hegel's discovery of the dialectical nature of contradictory situations in cognition and the discovery, by dialectical materialism, of the manner in which problem situations as such reflect contradictions in objective reality itself, while not being identical with them, Popper seeks to persuade his readers that contradictions in perceptions are purely negative and destructive in the role they play (see V. O. Lobovikov, "The Logic of the Relation Between Contradictions and Problems in Scientific Cognition" [*Logika sootnosheniia protivorechii i problem v nauchnom poznanii*], *Filosofskie nauki*, 1976, no. 4). After this, the methodological rules of perception remain the same in the late Popper as they were in the early Popper, i.e., conventionally a priori "rules of the game of empirical science" (The Logic of Scientific Discovery, p. 53; compare The Philosophy of Karl Popper, vol. I, p. 243).

Popper provided yet another interpretation, this time biological, of his notorious formula for the "shift" of problems. This is not a matter of the literal "biologization" of the process of cognition engaged in at one time by Nietzsche and the pragmatists, but of the drawing by Popper of a number of parallels and analogies, having the function of allegedly "clarifying" his real understanding of problems of epistemology and method. He had then begun to write eagerly about Darwin and "Darwinism" in epistemology. This subject is dealt with in V. I. Metlov's article "A Critical Analysis of K. Popper's Evolutionary Approach to Epistemology" [*Kriticheskii analiz evoliutsionnogo podkhoda k teorii poznaniia K. Poppera*], *Voprosy filosofii*, 1979, no. 2). But it was "turned around" by the author

to an analysis of Popper's views on biological processes as such. Popper was followed by S. Toulmin and some other representatives of the social-psychology school in the logic of science, depicting this mode as a reliable safeguard against any and all teleology.

Popper's "Darwinist" reasoning on the "natural selection" of theories, according to which certain theories die off and others that are viable survive for a time, only to be displaced subsequently by others and die in turn, accords with his idea of the complete discarding of all prior knowledge. And the fact that it was precisely the late Popper who arrived at this reasoning is notable, for it is clear that he retained his former conviction that previous knowledge is replaced by new hypotheses. One might agree that Popper's epistemology is similar in some degree to extremely primitivized Darwinism, which is reduced only to the notion of "survival of the fittest." More precisely, there is no longer any Darwinism in this, but merely Darwinist phraseology. By applying this, one might just as easily declare that in the process of seeking answers, i.e., solutions, to an algebraic system of equations of the n^{th} power, "natural selection" occurs, and the false answers are weeded out, "perish." But such verbal exercises gain us no knowledge. Lenin in his day wrote of the pseudobiological phraseology of Herbert Spencer, A. Bogdanov, and others like them: "There is nothing easier than to paste 'energy' or 'biological-sociological' labels on phenomena such as crises, revolutions, class struggle, etc.; but there is also nothing more fruitless, academic, and dead than that occupation" (V. I. Lenin, Complete Works [Poln. sobr. soch.], vol. 18, p. 348). The same must be said with respect to phenomena in the process of acquisition of knowledge. (5)

Popper, citing the "post-Darwinist" epistemology of Donald T. Campbell, revives the "evolutionary epistemology" of M. Baldwin, Lloyd-Morgan, and H. Jennings (see K. R. Popper, Objective Knowledge, p. 67) and directly cites Spencer (*ibid.*, p. 263). But Popper does not like to advertise his dependence on other philosophers. The most that he condescendingly recog-

nizes is that they had "anticipated" him "in part." And he declares Darwinism to have been the forerunner of his method of trial and error (ibid., p. 70; also compare pp. 135-36). However, the emasculated "Darwinism" with which Popper operates can be made to suit any purpose whatever and, as Popper himself writes "'stimulates' not only Lamarckism but even Bergson's vitalism" (ibid., p. 284). Comment is, as they say, superfluous.

Popper was unable even to formulate the idea of survival of the fittest in Darwinian fashion, for according to Darwin it is not all species that die off in that struggle but transitional types, whereas all extreme branches deriving from repeated divergence develop further; progressive change of one species into another and the "death" of a species are far from one and the same thing. Today we are familiar with some dozens of kinds of natural selection. Moreover, the relationship of the life of separate individuals to the existence of the species as a whole does not reduce to struggle and differs significantly from the relation of parts and elements of a concept to an integrated theory; and the "competition" among closely related species and the conflict among different hypotheses regarding an identical object of cognition are entirely different in structure. All this testifies to the extreme artificiality of Popper's pseudo-Darwinist analogies in epistemology and methodology.

4. From Philosophy to Politics

Now let us attempt to discover the sociopolitical and sociological application Popper found for his epistemology. The connection between Popper's epistemology and his theory of society is beyond dispute. His "ontological cognition in social philosophy and the philosophy of history corresponds to methodological positions in epistemology (individualism, decisionism [i.e., reliance upon arbitrary, conventionalist solutions despite all his declarations against conventionalism — I. N.], and conventionalism)" (J. Kahl, Positivismus als Konservatismus. Eine philosophische Studie zu Struktur und Funktion

der positivistischen Denkweise am Beispiel Ernst Topitsch, Cologne, 1976, p. 60). The fact that Popper himself occasionally, for example, in his article "Reason or Revolution"? (1970), declared that his social reformism "contrasts sharply" with his falsificationism as a method for revolutions in science is something else again.

Even in his youth, in the first revolutionary years in Europe after the First Imperialist War of 1914-1918, Popper, as he acknowledges in Schilpp's collection and in his autobiography entitled Endless Quests (1976), dreamed of developing a concept capable of discrediting Marx's theory as "savage mythology." Popper did not succeed in discrediting Marxism, but he did prove capable of putting together a concept possessing the features of anti-Marxist attractiveness for a bourgeois public. The English bourgeoisie was impressed by Popper's stance, that of a "moderate liberal" and reformist. West German Social-Democrats liked the fact that his methodology was reminiscent of German neo-Kantian pluralism. They were all attracted by the seeming relationship between his concept and the methodological requirements of the revolution in science and technology.

Popper's doctrine of "critical rationalism" was associated primarily with his "social engineering" and anti-Marxist sociology, by means of a number of mediating links in theory and methodology. In the first place, one must note that Popper transferred his principal teaching, that of falsifiability and falsification, to the social sciences. This teaching was directed against the meaningfulness of general scientific laws, preeminently those of social science. Here Popper's falsificationism and anti-inductivism work together. He adhered directly to the neo-Kantian Rickert, with his thesis that theoretical generalizations are impossible in social science. Rickert wrote of the "individualizing method," and Popper, of "individualism in method" (as we see, there is no great difference). Popper applied his "situational logic" (a "respectable" title for the trial-and-error method) to sociology in the form of norms for study of the diverse attempts people have made to emerge from a

variety of narrowly concrete situations, in which all these "attempts are treated as individual and "atomary" acts. "People act more or less rationally, and by virtue of this the possibility arises of constructing rather simple models of their acts" (The Philosophy of Karl Popper, vol. I, p. 93). The meaning of this kind of reasoning diminishes within the confines of bourgeois empirical sociology: the discussion is of "models" of behavior whose agents are guided only by immediate utilitarian motivations. Popper places a taboo on certain broad sociological conclusions from "models": "There is no law of historical development that can assure further progress . . ." (K. R. Popper, "Selbstbefreiung durch das Wissen," in Der Sinn der Geschichte, Munich, 1967, p. 110). Nor, according to Popper, is there a theory of progress; so he recommends that one engage only in microscopic reforms, which have nothing in common with the fundamental transformation of social relationships. All in all, "rationalism," from his point of view, is incompatible with force and revolutionary action of any kind (see the collection Utopie, edited by A. Neususs, Neuwied and Berlin, 1968, p. 314).

Nevertheless, Popper did not remain at the level of empirical sociology. His philosophy of history is a speculative pattern of struggle between "closed" and "open" societies. This model cannot be confirmed, and very quickly refutes itself. Popper reiterates over and over again the argument that the theory of historical necessity is merely superstition (see, for example, K. R. Popper, The Logic of Scientific Discovery, p. 438). But in developing his speculative model, he still speaks of the victory of "open" societies (read: capitalist), and would like to see that victory provided with a determinist groundwork.

In an interview in the Vienna magazine Die Press, Sept. 6-7, 1975, Popper stressed that the aim of his Logic of Scientific Discovery and, specifically, of its principle of falsifiability, was to deny the scientific character of Marxism and to justify the politics of bourgeois reformism. Popper constructed his entire notion of "demarcation" from the outset in the hope of employing it to undermine the ideas of scientific communism,

as is correctly emphasized by C. Gutzmore in "Science and Pseudoscience: Aspects of the Class Struggle in the Sphere of Philosophy," Marxism Today, London, September 1972, p. 267. The fact that Popper's entire argumentation against "essentialism," "holism," and "historicism" serves specifically this goal has been explained by M. Cornforth (Open Philosophy and the Open Society. A Response to Dr. Karl Popper's Refutation of Marxism [Russian edition, *Otkrytaia filosofii i otkrytoe obshchestvo. Otvét d-ru Karlu Popperu na ego oproverzhenie marksizma*], Moscow, 1972, pp. 124-31, 174-79, 215). Incidentally, this is not denied by Popperians themselves.

Let us draw some conclusions. "We do not know, but only suppose" (The Logic of Scientific Discovery, p. 278), writes Popper; yet this does not prevent him from engaging in peremptory imposition of his falsificationism upon scientists and politicians. To Popper, reason is a "powerless fiction" (A. Wellmer, Methodologie als Erkenntnistheorie. Zur Wissenschaftslehre Karl R. Poppers, Frankfurt am Main, 1977, p. 8). He makes a categorical claim to the place of leader of "modern rationalism," appeals for logical precision and consistency, but at the same time descends to extreme eclecticism and a contradiction between falsificationism and the theory of "verisimilitude." On this, A. Ayer observed, quite appropriately, that Popper, in his theory of "confirmation," had not only returned to the principle of verification, with a total rejection of which he had begun his career in theory, but had undermined his principle of falsifiability by appeals to seek "verisimilitude," inasmuch as the latter was already applicable, in his theory, only to falsified hypotheses (see The Philosophy of Karl Popper, vol. II, p. 691).

Popper attacks conventionalism, accusing it of seeking to "save" any and all constructs, which cancels the principle of demarcation (see The Logic of Scientific Discovery, p. 81), although he is totally dependent on conventionalism, using a number of conventionalist contrivances to rescue neopositivism. Popper's very criterion of "demarcation" is a convention, as are other methodological rules (*ibid.*, pp. 37, 53, 254). It is

precisely with the weapon of conventionalism that Popper attempts to destroy materialism, presenting it in the article "Three Requirements for Human Knowledge" under the label "essentialism." J. Agassiz correctly notes that, in The Open Society and Its Enemies, Popper "offers a modified conventionalism as a basis for reformist social philosophy" (The Philosophy of Karl Popper, vol. II, p. 693). In Popper's wake, his entire school of the logic of science remains within the confines of conventionalism: all its members, in their enmity toward materialism, do not distinguish between a true explanation of facts and artificial interpretation thereof, no matter how much they may publicly declare that it is precisely that difference which is one of the fundamental goals of their philosophizing about the lessons of history and the theory of knowledge. Popper has not overcome the subjective idealism of the "Vienna Circle." On the contrary, he has aggravated it further. It is not for nothing that H. Albert dubs Popper a "theoretical pluralist," associating this with his social position of seeking reformist alternatives (see H. Albert, *op. cit.*, p. 49).

Popper's epistemology and methodology are deeply permeated with metaphysics. Methodologically all the twists and turns in his theoretical ideation are the answers of a convinced metaphysician to the dialectical problems he himself uncovered at an earlier time. The very elevation to an absolute of the epistemological function of refutations, artificially counterposed, in The Logic of Scientific Discovery, to verification terminating in a positive result, is metaphysical. But the fact is that science learns not only from its mistakes, which are a consequence of uncritical confidence that single findings in confirmation of a theory of whatever nature can demonstrate its total correctness, but also from the literally practical successes and triumphs of its theories. The idea of "demarkation" as a line sharply drawn is metaphysical. Popper's attitude toward the principle of causality is metaphysical: inasmuch as linear single-valued causality is unsuited to contemporary science, this means, in his opinion, that causality has to be expelled totally from science (The Logic of Scientific

Discovery, p. 61). Popper's anticumulativism is deeply metaphysical as well.

Thus, both idealism and metaphysics are characteristic of Popper, but they are contrary to science. Nevertheless, it is precisely these features of Popper's world view and method that have been carried over by him to his reactionary social philosophy, which is also contrary to science. A detailed analysis of the latter, however, is a subject for future articles.

Notes

1) With respect to Popper's critique of inductivism, see, for example, E. B. Kuzina, "Antiinduktivizm v epistemologii Karla Poppera," Filosofskie nauki, 1978, no. 3. These questions have also been dealt with in the writings of E. A. Mamchur, V. S. Shvyrev, G. I. Ruzavin, I. S. Narskii, and other Soviet scholars.

2) According to Popper, "our anticipation of waking up when we fall asleep" flows not from the "physical" world, but only from the "autonomous" theories of the "third world" (K. R. Popper, Objective Knowledge, p. 75).

3) In the book The Self and Its Brain, 1977, written jointly with the psychophysicologist John Eccles, who, unlike Popper, took a frankly religious position, Popper comes out simultaneously for Cartesian "interactionist dualism" and a primitive materialist understanding of the "first world" (see K. R. Popper and J. C. Eccles, op. cit., pp. 10, 539, 554). At the Sixteenth World Congress of Philosophy, 1978, the author of these lines had occasion to deliver a criticism of Popper's theory of the "three worlds," which had been utilized by Eccles specifically in the interests of psychophysical dualism.

4) In the book Objective Knowledge, Popper introduces several parallel variants of TT into the system, having the existence of a number of concurrent "trial theories" in mind (see K. R. Popper, Objective Knowledge, p. 287).

5) We know that Stanislaus Lem, in his Summy tekhnologii, finds a distant analogy between the biological evolution of

species and the destiny of technical inventions; and the founder of modern ethology, K. Lorenz, in his book The Other Side of the Mirror, finds an analogy between the properties of general biological phylogenesis and the unity of inheritance, on the one hand, and new developments in the progress of information reflex equipment. But these ideas have nothing in common with Popper's abstract construct.

V. A. Lektorskii

**LENIN'S MATERIALISM AND EMPIRIO-CRITICISM
AND CONTEMPORARY THEORY OF KNOWLEDGE**

On the anniversary of Lenin's work of genius, the significance of this book for Marxist philosophy as a whole and, particularly, for the dialectical materialist theory of knowledge can be understood especially clearly. Turning today to the history of Marxist-Leninist thought in the twentieth century, we comprehend fully the enormous role played both by Lenin's defense of the principal propositions of dialectical materialism against revisionists and open enemies of Marxism dabbling in philosophy and his creative development of the underlying foundations of Marxist theory — those foundations that, in the final analysis, determine both the manner of posing and the method of resolving all other problems in Marxism, not just those of a theoretical nature but those of a practical political nature as well. Many questions elaborated in Lenin's work of genius acquire particular timeliness for Marxist-Leninist philosophy specifically at the present stage in the development of science and under current conditions in the ideological struggle. In the present article we shall deal with the significance of Material-

*Russian text © 1979 by "Nauka" Publishers. "'Materializm i empirokrititsizm' i sovremennye problemy teorii poznaniia," Voprosy filosofii, 1979, no. 5.

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ism and Empirio-Criticism for the interpretation of certain pressing problems of the Marxist-Leninist theory of knowledge.

Theory of Reflection, Theory of Knowledge,
Theory of Dialectics

In treating questions in the Marxist theory of knowledge as the theory of reflection, Lenin emphasized that reflection is the fundamental and determining characteristic of all cognition. It is entirely proper to refer to Lenin's contribution to the development of the theory of knowledge as the Leninist theory of reflection.

What is the relationship between the theory of reflection and epistemology? Of course, to the degree that the discussion is of philosophical investigation of processes of reflection at the precognitive level, in inanimate and animate nature (and our philosophers, on the basis of Lenin's understanding of reflection as a universal property of matter and making use of the data of cybernetics, information theory, biology, and other special sciences, have done a good deal in this sphere in the past twenty years), the theory of reflection proves to be somewhat broader than epistemology in the strict meaning of the word. It is more important, however, to emphasize something else: the theory of reflection is not some special branch of dialectical materialism that parallels the theory of knowledge. In the theory of knowledge, questions of reflection are not some "part" (even if a fundamental one) of its problem area. The dialectical materialist theory of knowledge is, from beginning to end, the theory of reflection; in other words, it is investigation of the basic characteristics of the process of reflection in the form in which it occurs at the cognitive level, the level characteristic of a human subject.

Of course, a major place in the theory of knowledge is occupied by study of the various forms and modes of reflection, of subjective cognitive acts, and of complex systems of mediation of the relationship of knowledge to the actual object. But reflection is not a kind of characteristic of knowledge and cog-

tion that simply exists along with its other features: it is precisely the understanding of cognition as reflection that provides the key to interpretation of all the riches of its meaning. If one considers, however, that according to Lenin's basic thesis, developed subsequently in the Philosophical Notebooks (but already implicit in Materialism and Empirio-Criticism), the epistemology of Marxism coincides with dialectics and logic, and that "dialectics is the theory of knowledge (of Hegel and) Marxism..." (1), the conclusion must be drawn that the theory of materialist dialectics and Marxist-Leninist dialectical logic are based on the Leninist theory of reflection.

And in point of fact it is impossible to determine the specific features of the process of reflection at the human level without study of the real dialectics of the cognitive process, without study of the role and functions of categories of materialist dialectics in the process of acquisition of new knowledge.

There is a view that in Materialism and Empirio-Criticism Lenin treated problems of Marxist philosophical materialism and theory of reflection whereas in the Philosophical Notebooks he developed the theory of materialist dialectics. Any such notion is very inaccurate. Of course, there were changes in Lenin's emphases in treating philosophical subject-matter, depending on changes in the historical situation; but his philosophical thought became more profound and developed. Nevertheless, a fundamental unity and continuity were retained in the course of this development. Problems of the theory of knowledge as the theory of reflection are dealt with in Materialism and Empirio-Criticism from dialectical positions as problems associated with the dialectical development of knowledge, the transition from not-knowing to knowing. Therefore, Lenin's research, in the Philosophical Notebooks, on the dialectics of categories was a further enrichment and development of the theory of reflection itself.

It must be noted that for all the importance and necessity of further study of processes of reflection in inanimate and animate nature, at the prehuman level the development of problems of the Leninist theory of reflection is today associated

primarily with study of the specific features of human, cognitive reflection. This turns out to be a more complicated matter. Success in solving this problem presumes analysis of the real dialectics of cognition, i.e., elaboration of the theory of materialist dialectics, of dialectical logic, and of the methodology of scientific cognition. In turn, research on problems of the theory of the dialectic and of dialectical logic is possible only on the basis of the dialectical materialist principle of reflection.

The Dialectics of Relative and Absolute Truth
and the Problem of the "Ontological Status"
of Theoretical Entities

Under contemporary conditions the theory of the dialectics of objective, relative, and absolute truth developed by Lenin is particularly timely. Lenin's fundamental ideas on this question play an important role in solving a whole range of problems that not only concern specialists in the theory of knowledge and the methodology of science but that are being intensively studied in the literature of the philosophy and history of science. In this connection it is important to note that today the problem of truth reveals, to a greater extent than ever before, its profound character in terms of world view and displays the most direct connection with various solutions of intensively discussed questions on the place of cognition in general, and of scientific, theoretical cognition in particular, within the system of culture, the nature and prospects of development of science, and the revolution in science and technology.

Lenin evolved the dialectical materialist theory of truth, developed the understanding of truth as reflection of the objectively real state of things, independent of man and mankind, and simultaneously as a dialectical process in indissoluble connection with the criticism of Russian and foreign Machism. The latter, as we know, denied the objectively real meaning of theoretical constructs, regarding the entire theoretical superstructure in science as merely a convenient way of describing "sense data" ("elements of the world" in Mach's terminology). Funda-

mentally, the same basic position in epistemology, with some modifications, was adhered to in logical positivism, which replaced Machian thought and has been dominant in Western "philosophy of science" until very recently. From this point of view it is meaningless to talk of the truthfulness (or falseness) of theoretical constructs and of the presence of real referents (things) corresponding to theoretical terms. Lenin subjected this subjectivist philosophical concept to criticism, counterposing the position of dialectical materialism to it.

It must be noted, however, that the Machians and logical positivists nonetheless emphasized the need for theoretical constructs to accord with "empirical reality," although they understood the latter in a subjective, idealist spirit (one may even say that the Machian theory of "elements" was a peculiar sort of ontology to which the neorealist concept of "sense data," formulated subsequently, has a certain relationship). The various postpositivist schools in Western "philosophy of science," which have come to replace logical positivism, and which justly criticize logical positivism for its narrow empiricism, taking note of the existence, in advanced science, of the fact of a "theoretical overload" of empirical notions, are at the same time marked by a considerable intensification of relativism in the theory of knowledge. Emphasizing the presence of "discontinuities" in the development of theoretical knowledge and taking note of the important role of scientific revolutions in the history of natural science, such representatives of modern postpositivist philosophy of science as, for example, T. Kuhn and P. Feyerabend regard the problem of objective truth to be generally meaningless as it applies to scientific knowledge and deny the existence of theoretical continuity in science. (2)

In these circles, ideas of the dependence of a given understanding of the truth of scientific assertions on the character of the scientific "paradigm" that has been adopted, or even on the broader cultural-historical situation, but in any case not on the objectively real state of things, are very much in fashion. (3) Furthermore, relativist ideas of this kind are exercising an influence on a broad range of specialists in the special sciences.

Under these conditions, recourse to the ideas of Materialism and Empirio-Criticism helps to place the question of the complex dialectics of absolute and relative factors of truth in the only proper perspective and provides theoretical means for disclosing the untenability of philosophical relativism. Lenin wrote that, as the sum of relative truths develops, as absolute truth takes shape, relative truths representing relatively true reflections of a thing independent of humanity and these reflections becoming increasingly true; within each scientific truth, regardless of how relative it may be, there is an element of absolute truth. (4) At the same time, Lenin emphasized that "the bounds of truth of each scientific proposition are relative, whether they are subsequently widened or narrowed by the further growth of knowledge." (5) It must be emphasized that Lenin's understanding of truth as a process includes recognition both of continuity in the development of knowledge and the presence of revolutionary reconstructions in the course of this process, and has nothing in common with the concepts of two-dimensional cumulativism. (That is why, for example, the notion that, in the course of the development of scientific knowledge, one theory may be totally reduced to another by means of logic does not at all derive from the Leninist understanding of the dialectics of truth as a process.)

Every system of knowledge verified by social experience and having proved its objective value reflects a certain objectively real state of things, although that reflection is always approximate and has its limits. What has been stated pertains both to scientific theoretical knowledge and to various forms of commonplace knowledge. In that connection let us pause to consider one problem that is now acquiring special significance in studies in the theory of knowledge and methodology of science. Reference is to the problem of the "ontological status" of the objects of scientific theory. In Western "philosophy of science" today, a viewpoint is rather widely held according to which only those things that are identified at the pretheoretical level, i.e., by means of commonplace perception and in the terms of everyday language, are to be regarded as existing in objective real-

ity. (Thus, this concept refutes the obvious subjectivism characteristic of the Machists and logical positivists.) Concerning theoretical entities, inasmuch as knowledge of them is introduced by means of a series of idealizations, these entities themselves are always regarded only as idealizations, i.e., as having no real datum point but taking on, so to speak, an "intra-theoretical" existence.

Let us, however, direct attention to the fact that in science as it exists in reality no identification of theoretical objects with idealized things occurs. Of course, the formulation of a law within the framework of a scientific theory presumes that procedures of idealization are carried out, i.e., that a number of assumptions are accepted which do not correspond to what is directly observable in empirical experience but, nevertheless, help to understand the law "in its pure form." Also indubitable is the fact that, within the framework of theory it is often necessary to construct what are termed idealized objects (a material point, an ideal solid body, an incompressible liquid, etc.), to which no real datum points correspond and the theoretical need for which is determined by their role in revealing particular objective relationships "in pure form." At the same time, at least some of the things of which knowledge is introduced at the theoretical level are taken by science as existing in objective reality: molecules, atoms, electrons, positrons, virtual particles, events in a four-dimensional space-time continuum, a field, etc. The factor thus noted is very important. It is not without reason that Lenin directed attention in his polemic with the Machians to the fact that the atom and the electron exist in objective reality. The point is that the self-differentiation of idealized objects from unidealized, i.e., real ones, is possible and makes sense only within the framework of knowledge of real objects and their real characteristics.

Such knowledge is not acquired solely in extratheoretical fashion (for example, with the aid of ordinary perception). Of itself, a scientific theory introduces notions about things having real existence that may not necessarily coincide with objects identified in commonplace, prescientific experience, or

may actually be unobservable (actually or theoretically). It must be emphasized that the hypothesis that a number of real entities exist of which knowledge exists only on the theoretical level (as a theory develops and the degree of its confirmation rises, this knowledge is gradually transformed from a mere hypothesis to a more or less authentic reflection of reality) is usually directly associated with the formation of what is termed the "core" of a research program, on the basis of which a series of scientific theories is subsequently evolved. In considerable measure this defines the heuristic potentials of the given program. Idealized theoretical entities are constructed only in relationship to real ones, i.e., they present themselves in the quality of objects in which various characteristics of real things are lacking or, on the contrary, in which properties are present that are impossible in real objects.

It follows from the foregoing, *inter alia*, that idealized entities may be idealizations not only of those real things that are reflected on the extratheoretical or even extrascientific level (as a rule, the real prototypes of idealized things are interpreted in precisely such fashion) but also of real things of which knowledge is attainable only by theoretical means. At the same time, it is important to emphasize that it is also possible for a situation to exist in which certain things that are presumed to exist in reality at a given stage in the development of science may, in the process of change of scientific notions, either be found to be totally fictitious (the fate that befell, for example, such a theoretical entity in classical physics as the ether) or be relegated to the status of idealized objects (as, for example, the atoms of classical science relative to the real atoms with which contemporary physics deals).

It is not difficult to see that the dialectics of objective, relative, and absolute truth is expressed in that process. (6) The function of a scientific theory therefore lies not only in being merely an "economic" and diagramming description of the data of sense experience, as the instrumentalists contend, but in more or less accurately reflecting a given fragment of objective reality.

In the light of Lenin's understanding of truth as a dialectical process of reflection, let us also pause to consider certain propositions of what is termed "scientific realism" (W. Sellars and others) (7), which is currently influential in Anglo-American philosophy. The proponents of this current take as point of departure the healthy (and essentially materialist) idea that the teaching of modern theoretical science — physics above all — about the structure of matter, about the presence of real material particles (molecules, atoms, electrons, etc.) represents truth corresponding to the objectively real state of things. (8) In this connection, however, the question arises: What is the ontological status of objects of commonplace perception? For those objects of everyday experience we regard as having objectively real existence (tables, trees, mountains, and even scientific instruments themselves) "from the standpoint of modern physics" would seem to be in actuality only particular combinations of a few material particles (atoms, etc.). This means, the advocates of "scientific realism" conclude, that the objects of commonplace experience do not exist in fact, but are subjective phenomena of a sort in the Kantian sense, behind which lie hidden the "real world," which, however, is not Kant's unknowable "thing in itself," but is entirely cognizable by the devices of modern science. (9) This is the other extreme, determined by the metaphysical understanding of the relationship between knowledge and its object.

In reality, as follows from Lenin's understanding of the dialectics of relative and absolute truth, it is necessary to speak not only of the process of reflection proceeding on many levels (becoming deeper from phenomenon to essence, from first-order essence to second-order essence, etc.) but also of the multilevel nature of objective reality itself. A table and the set of atoms of which it consists exist in objective reality but, so to speak, at different levels of reality, between which there are certain — not always simple — relations. From this, *inter alia*, there derive the potential for knowledge to exist on various levels (in particular, empirical knowledge, which in the form of scientific observation, for example, permits the iden-

tification not only of things in prescientific, everyday experience but also of things that are capable of being identified only in scientific thought) and a number of other questions that still require detailed treatment from the standpoint of dialectical materialism.

Lenin's Theory of Reflection and Research
on the Sociohistorical Nature of Cognition

Our philosophers have done a great deal of fruitful work in the study of problems of the theory of reflection, basing themselves upon the achievements of such specialized sciences as physics, chemistry, biology, the physiology of higher nervous activity, and cybernetics and collaborating closely with natural scientists specializing in these disciplines. A good deal has been done in the area of analyzing processes of reflection from the standpoint of the subject areas of semiotics and logical semantics (study of the coding and deciphering of information, the properties and laws of the functioning of sign systems, the interrelations among the notions "epistemological image," "model," "sign," "signal," etc.).

Less has been done in the study of the genesis and functioning of cognitive reflection as concerns its involvement in goal-oriented practical activity and in connection with the sociocultural and historical measurements of this activity. Yet, it is precisely through this kind of study, as Marxist-Leninist philosophy demonstrates, that one can fully discover what is unique to cognition and distinguishes it from all other forms of reflection. Physical or physiological reflection and processes of information transmission and decoding, although they assume exceptional importance in cognition, of themselves do not directly constitute a cognitive image.

It is important, even necessary, to interpret and assimilate philosophically data from all the sciences that reveal the mechanisms and preconditions for human cognition. Nevertheless, it would be an error to reduce the entire problem area of philosophy and epistemology to these data, ignoring the connection

between the theory of knowledge and the social and historical disciplines. Lenin directed the most serious attention to the fact that such reduction is impermissible. As is demonstrated in Materialism and Empirio-Criticism, Machists, empiriomonists, empiriosymbolists, and other representatives of "the most modern positivism" were identified specifically by attempts to confuse problems in epistemology and the special sciences, to substitute the latter for the former and dissolve the former in the latter. This was also revealed in the identification of the philosophical category "matter" with the theory on the structure of matter accepted in natural science and with substitution of the notion of functional dependence for causality, and so forth. This was also expressed in efforts, conducted in the spirit of vulgar materialism (and Machism, as Lenin demonstrated, combined subjective idealism with elements of vulgar materialism), to present the process of cognition with the aid of notions of "natural selection," "energy exchange," "equilibrium" between the organism and the environment, etc. "All this 'social energetics' and 'social selection' are merely combinations of words, and an absolute caricature of Marxism," wrote Lenin, criticizing Bogdanov. "What Bogdanov is engaging in is not at all Marxist research, but a dressing-up of the findings of that research in assorted biological and energy terminology. This entire undertaking is worthless from beginning to end, for the application of the notions 'selection,' 'assimilation and dissipation' of energy, energy equilibria, and the like to the sphere of the social sciences is empty phraseology." (10)

Defending the basic principles of Marxist materialism from the attacks of the subjective idealists, Lenin calls upon materialists of earlier times as allies in his struggle. At the same time, he emphasizes that dialectical materialism differs fundamentally from the concepts of the pre-Marxist materialists in that it places the category of practical social activity at the very foundation of the theory of knowledge. "The standpoint of life and experience has to be the first and basic viewpoint of theory of knowledge," wrote Lenin. "And this inevitably

leads to materialism, discarding at the very outset the endless concoctions of professorial scholastics." (11)

The act of cognition is performed not simply by a biological organism, or by an information-processing mechanism, but by the human being as active subject creatively transforming the world, a being incorporated into the system of social activity. Only in this broader system is it possible to understand the genesis and functioning of the cognitive relation, i.e., the relationship of knowledge as epistemological image to object. This understanding of cognition radically transforms the subject area of epistemology and removes it from the confines of the traditions typical of bourgeois theory of knowledge as a whole.

Recognition of the unity of reflection and practical goal-oriented activity is the starting principle of the Marxist-Leninist theory of knowledge, that very principle against which representatives of contemporary philosophical revisionism are waging an unsuccessful struggle. In this regard, study of the connection between cognition and goal-oriented practical activity, study of the sociocultural mediation of cognition and of that entire system of "mediator" entities that one places between oneself and the thing being cognized and that function in accordance with the laws of social activity, assumes particular importance for epistemological research. The specifically human, i.e., cognitive, reflection is understood as a historically developing system. Therefore, the theory of knowledge has to base itself on a broad philosophical synthesis of the phylogenesis and ontogenesis of cognition, on analysis of the history of cognition and culture as a whole. In this connection Lenin emphasized in his Philosophical Notebooks that the history of philosophy, the history of cognition in general, the history of the individual sciences, the history of the mental development of the child and of animals, the history of language, and the psychology and physiology of the sense organs are the areas of knowledge "out of which the theory of knowledge, and dialectics, must take shape." (12)

Our philosophers have to their credit certain advances in carrying out this task. Nevertheless, a great deal more re-

mains to be done. Specifically, it would appear quite urgent to deal with problems such as the various types and forms of goal-oriented activity and their relation to material practice as the principal starting core of all activity, the interrelation between operational and goal-oriented components in theoretical reflection, the interrelationship of activity and creativity, the dialectics of activity, knowledge and communications, the dialectics of communication and understanding, the dialectics of cognition and self-reflection, and the distinctive features of the production of knowledge in various different historical systems of society and culture. The problem of the relationship between consciousness and cognition and of philosophical aspects of the subjective mechanisms of consciousness require detailed treatment. (13) It must be emphasized that the timeliness of epistemological studies of these problems is a consequence of the development of a number of the social sciences and humanities that analyze both the practical, goal-oriented and the sign-symbol aspects of human activity (psychology, social psychology, linguistics, psycholinguistics, anthropology, the theory of culture, the history of science, the science of science, etc.) and also of the appearance of a number of scientific disciplines that not only investigate human activity but project new forms thereof (industrial psychology, design esthetics, ergonomics, etc.).

Lenin pointed to the trend toward an increasing "mathematization" of knowledge as a typical feature of the new physics. In the course of development of the scientific revolution of the twentieth century, this trend has spread to the entire system of scientific knowledge. At the same time, modern science has, in recent years, revealed another trend, which is sometimes called the "humanitarization" of knowledge. Reference is not only to the ever more pressing need for intensive development of the social sciences and humanities but also to the rising significance of problems of world view, ethics, and the like for development of the natural sciences as such (furthermore, not only at the stage of application of the findings achieved by science but also at the stage of research) and, finally, to the con-

stantly increasing awareness of the significance of the socio-cultural and historical preconditions for natural science and scholarship as a whole.

For the Marxist-Leninist theory of knowledge, which is based on recognition of the sociohistorical nature of cognition, detailed research into the problems of epistemology and methodology, associated both with development of present-day social science and the humanities and with the tendency toward "humanitarization" of knowledge as a whole, is a particularly important and timely task.

The Twentieth-Century Revolution in Science and the Theory of Knowledge

In his work of genius, Lenin provided a classical analysis of the most recent revolution in natural science and demonstrated that it is associated with the need for penetration of the ideas of materialist dialectics, of the dialectical materialist theory of knowledge, into the very fabric of theories of natural science, and that modern physics spontaneously "gives birth to dialectical materialism." However, the changes in physics at the turn of the century were only the beginning of a whole list of transformations that encompassed not only physics but a series of other disciplines, which led to profound changes in the scientific picture of the world and in the nature and structure of scientific theory. (14) The revolution in natural science became a revolution in science and technology and, by entering into that latter revolution as one of its fundamental components, itself rose to a qualitatively new level.

The general trend of the revolutionary transformation in science now in progress stands out more or less clearly. The essence of that transformation is a radical reorientation of science in the realms of world view and methodology, the emergence of fundamentally new notions about the world and scientific knowledge as such, and the appearance of a new ideal of science and what is scientific. Change in the notions of the character of cognized reality, of the interaction between space and

time, of the possibility of localizing cognized entities, of the place of instruments in the process of acquiring scientific data, of the nature and character of objective determination, etc.: all this simultaneously signified the formation of new demands on scientific description and explanation and change in the canons for construction of scientific theory, even, on a broader plane, in the very notion of what is to be regarded as scientific knowledge. Change in the interrelations among the various sciences and the appearance of fundamentally new disciplines also acted in the same direction.

The development of modern science is characterized by constantly increasing complexity in that system of research devices that a person places between himself and the cognized thing, ranging from various instruments and measuring devices, on the one hand, to theoretical schemata, models, deductive constructs, etc., on the other. All this creates certain complications in the tangible, goal-oriented interpretation of systems of theoretical knowledge and, at the same time, creates a situation in which the scientist's own estimate of the nature of the means of investigation he employs — both instruments and theoretical assumptions — becomes an increasingly necessary condition for the advance of theoretical work.

All this signifies a sharp increase in the self-reflexive nature of theoretical scientific thought. The increasing complexity of the structure of theoretical knowledge results not only from the increase in the number of mediating links between the upper levels of the theory and its empirical basis but also from the appearance of fundamentally new components in the very system of scientific knowledge: theoretical thinking about the logical structure and cognitive meaning of those conceptual systems that depict objective reality.

In some cases this thinking produces special scientific disciplines, for example, metamathematics, whose subject is the logical structure of mathematical proofs. In other cases, theoretical thinking does not take the form of a special science or component thereof, but plays a role of fundamental importance in the process of formulation, elaboration, and meaningful in-

terpretation of scientific theory. Such is the character, for example, of the identification and analysis of the general principles on which physical theory is constructed: the principles of correspondence, complementarity, observability, invariance, symmetry, etc.

Yet it is important to observe that theoretical reflection about science, to the degree to which it has recourse to investigation of ever-deeper foundations of theoretical scientific knowledge, cannot but assume a philosophical nature, cannot but touch on fundamental epistemological problems regarding the nature of cognized reality, the interrelationship between subject and object, the character of scientific knowledge, etc. In the course of the twentieth-century scientific revolution, theoretical epistemological thinking has begun to play a fundamentally new role in the process of evolution of theoretical scientific knowledge, and the relationships between epistemology and knowledge in the special sciences are changing.

As we know, the process of historical development of acquisition of knowledge was accompanied by separation of the special sciences from philosophy, a rise in specialization and professionalization both among scientists and among philosophers, closer definition of the subject area of the individual scientific disciplines and of philosophy itself. This progressive process has its costs, of course. Among bourgeois philosophers and scientists the opinion that knowledge in philosophy and in the special sciences is fundamentally different and mutually "non-interpenetrating" became widespread and hardened into a prejudice. According to this view, a special science solves its tasks with success without having recourse to the assistance of philosophy (moreover, philosophizing can only harm scientific activity). Philosophy, on the other hand, particularly the theory of knowledge, in the belief of adherents of this viewpoint, has absolutely no need for analysis of the cognitive process actually occurring in science, for it develops philosophical knowledge in a special way: either by analysis of the features of consciousness revealed to the subject in the act of self-observation, or with the aid of discovery and dissection of the the-

oretical content that has been eternally embodied in the categories of logic or as the result of investigation of the features of everyday, prescientific language, which in turn is regarded as invariant and given, etc. All epistemological knowledge, according to this point of view, unlike knowledge in the special sciences, is, by its very definition, eternal, unchanging, and absolute, and is developed within the framework of solution of special problems that allegedly differ fundamentally from the problems of the concrete sciences.

This understanding of the interrelationship between epistemological knowledge and that of the special sciences has collapsed in the course of development of the current revolution in science. One of the important features of scientific knowledge today lies in the fact that comprehensive discussion of fundamental problems of world view, epistemology, and philosophical methodology now proves to be a necessary condition for formulating fundamentally new ideas in science itself. This is demonstrated visually by the heated philosophical discussions in disciplines typical of modern science, such as foundations of mathematics, quantum mechanics, cosmology, the theory of biological evolution, etc. The creators of modern science — the physicists A. Einstein, W. Heisenberg, and N. Bohr; the mathematicians D. Hilbert and L. Brouwer — engaged in intensive discussion of problems of world view, epistemology, and philosophical methodology. In this regard it is important to emphasize that the matter at issue is not merely interpretation, in epistemological terms, of existing scientific conceptions in various fields of science: considerably more serious demands are today made upon epistemology, inasmuch as the totality of philosophical ideas plays a significant role in the very formulation of any concrete program of scientific research. The depicted epistemological image of science, of adherence to science, and of cognition not only has the function of describing the practice of scientific research as it has taken shape but itself becomes inscribed and incorporated within that practice and in certain respects reorganizes it.

But that situation also changes the demands made upon the

theory of knowledge itself. What occurs is a tempestuous process of "reintegration" of epistemological and special scientific knowledge. Retaining what is distinctive to it, not undergoing conversion into knowledge in special science, and avoiding the danger of a priori imposition of concrete solutions upon science in the spirit of the old Naturphilosophie, scientific epistemology emerges in constantly rising degree as a necessary methodological guidepost in the process of scientific questing.

At the same time, the scientific revolution of the twentieth century is associated with the need to resolve a special kind of crisis, the classic analysis of which is provided in Materialism and Empirio-Criticism. Reference is to the crisis in the philosophical world view and epistemological foundations of science. The philosophical basis of classical science was metaphysical and mechanistic materialism, which was more or less consciously accepted by the majority of natural scientists. This mode of philosophical interpretation of science came into sharp contradiction with the results of the scientific revolution of the twentieth century. The quests for an adequate philosophical basis, carried on so actively by the classical writers of modern natural science, express the striving to find a way out of the crisis of the philosophical foundations of science. And that effort is understandable, because a complete development of the revolution in science presumes the elaboration and conscious utilization by scientists of a basis in world view and methodology that would be totally adequate to the requirements of scientific knowledge. This basis, as Lenin stated in Materialism and Empirio-Criticism, is dialectical materialism. The scientific revolution of the twentieth century may be regarded with every reason as a process of objective dialecticization of science. Many conscious philosophical quests by the creators of modern science are also going in precisely this direction.

However, the process of providing a philosophical foundation totally adequate to modern science has proved an extremely complicated matter. Modern bourgeois philosophy has propounded a number of idealist concepts as philosophical inter-

pretations of the scientific revolution of the twentieth century, many of which have exercised a certain influence on the minds of scientists working in the capitalist countries. Therefore, if we consider the development of the scientific revolution under the conditions of modern capitalism, we cannot but note the complexity and paradoxical nature of that process. On the one hand, that revolution expresses the objective process of penetration of the ideas of dialectical materialism into modern science, but on the other hand, it is not accompanied by a complete and conscious assimilation of the epistemological position adequate to it. All this means that the scientific revolution, under the conditions of capitalism, does not lead to elimination of the crisis in the philosophical foundations of science, the crisis of which Lenin provided a classic analysis at the very beginning of that revolution. (15)

Nevertheless, when we speak of the fact that various trends and schools in current idealist theory of knowledge are no more than parasites upon the achievements of the revolution in science and are fundamentally incapable of being its self-expression in philosophy, this does not mean that the concepts proposed by bourgeois theorists simply have no bearing on the real problems of science in the twentieth century. In reality, the situation is such that the various epistemological and methodological concepts developed by professional bourgeois philosophers or created by philosophizing theorists in modern science themselves have been able to exercise a certain influence on people in science, not only on their self-awareness but sometimes on their research practices, because they sometimes grasped (albeit in one-sided and distorted form) certain real features of modern science, along with a generally distorted interpretation of scientific knowledge.

Thus, for example, operationalism, which has had a certain influence not only on physicists but on psychologists and on representatives of bourgeois sociology, and which provides an idealist and metaphysical interpretation of scientific knowledge, focusing scientific thought on narrow empiricism and thus coming into glaring contradiction with the real practices of the cur-

rent revolution in science, does, however, grasp in distorted form certain aspects of the mutual relationship between theoretical notions and the empirical base and specifics of the so-called "operational definitions." Philosophers who have treated problems of methodology and logic of science within the framework of the doctrine of logical positivism took as point of departure the generally false, metaphysical, and empiricist ideal of science and yet, in studying the language of scientific theories and the connections via formal logic among the elements of theoretical knowledge, obtained certain results in making scientific sense. Intuitionism, as one of the schools seeking to develop a basis for mathematics, is based on an idealist understanding of the nature of mathematical knowledge, and the program of work in the philosophy of mathematics offered by intuitionism cannot be implemented. Nevertheless, scientists working within this current have obtained results that are significant for metamathematics and mathematical logic. (16)

It is important, however, to emphasize once again that bourgeois philosophy is incapable in principle of overcoming idealism and metaphysics, cannot be an adequate philosophical self-awareness for the current revolution in science; and, therefore, the development of the latter is simultaneously accompanied by constantly rising disillusionment of scientists with those methods of interpreting science from the standpoint of world view and epistemology that are characteristic of bourgeois theoretical work.

In connection with this, Marxist philosophers face the task not only of scientific treatment of the problem area of epistemology but of analysis of change in the status of that theory itself under the conditions of the scientific revolution today and of the new interrelationships taking shape between the theory of knowledge and knowledge in the special sciences. The questions of what is specific to epistemological knowledge, the methods of arriving at it, its validation and development, the relationships between theoretical knowledge and the special sciences studying cognitive activity, etc., warrant special examination. It

must be observed that this range of questions is being greatly obscured by present-day bourgeois philosophers, who offer different but identically false answers. They range from practical abolition of the theory of knowledge by dissolving it into neurophysiology, information theory, and semiotics (the idea of the so-called "naturalized epistemology" of W. Quine) (17) to enunciation of the thesis that the theory of knowledge (epistemology) does not speak of what actually occurs in cognition but merely advances certain injunctions regarding what cognition should be, although these injunctions are, in the final analysis, conventional in character (K. Popper). (18)

The solution of this range of problems acquires special significance under the conditions of the present revolution in science, and the attention of our researchers has to be focused on them.

* * *

Recourse to the ideas of Lenin's work of genius not only assists in finding the key to the solution of philosophical problems today but enables us to understand how a Marxist philosopher has to respond to the needs of developing scientific knowledge and sociopolitical practice. It provides an opportunity to draw lessons from the genuinely innovative and creative development of the theory of dialectical materialism as such, a development that is inseparable from a consistent, Party-oriented defense of the fundamental principles of Marxism-Leninism.

Notes

- 1) V. I. Lenin, Poln. sobr. soch., vol. 29, p. 360.
- 2) "For the sake of greater accuracy we may abandon here the . . . assumption, explicit or implicit, that changing paradigms carries scholars and students along and leads them closer and closer to the truth," writes T. Kuhn. "Notions that there is a correspondence between the ontology of theory and its 'real' analogue in nature itself now appear to me to be illusory in principle" (T. Kuhn, Struktura nauchnykh revoliutsii, Moscow, 1975, pp. 214, 260).

3) K. R. Popper, the teacher of P. Feyerabend and many other contemporary "postpositivists," emphasizes the importance of the understanding of truth to scientific knowledge as a regulative idea associated with assertion of the correspondence between scientific theories and the objective state of affairs. Basing himself on Tarski's findings, Popper attempts to build a calculus of "verisimilitude" as a consistent expansion of the content of truth of successive theories. According to Popper, however, we lack the means with which to discover truth, and we cannot know that we have found it even if we actually have found truth. (See K. R. Popper, Objective Knowledge. An Evolutionary Approach, Oxford, 1973, pp.317-18.) The last-mentioned of these theses of Popper's, which is obviously subjectivist, was developed by a number of his pupils, who came to the conclusion that the problem of truth was a pseudoproblem.

4) See V. I. Lenin, Poln. sobr. soch., vol. 18, p. 328.

5) Ibid., p. 137.

6) It must be observed that a very important range of problems associated with understanding the "ontological status" of theoretical entities and, particularly, with the interrelations among real and idealized entities has not been treated to the full in our literature on problems of the theory of knowledge, logic, and the methodology of science. It would appear that not all the procedures that our literature is in the habit of terming idealizations actually are such.

7) See W. Sellars, Science, Perception and Reality, London and New York, 1963; Action, Knowledge and Reality. Critical Studies in Honor of Wilfrid Sellars, edited by H. -N. Castaneda, Indianapolis, 1975.

8) "Scientific realism" takes the following propositions as point of departure: (1) scientific theories may be true or false; (2) theoretical principles and assertions are interpreted; (3) the things well-founded scientific theories talk of actually do exist. (W. A. Rottschachter, "Wilfrid Sellars and the Demise of the Manifest Image," Modern Schoolman, 1976, vol. 53, no. 4, p. 398.)

It should be noted that in the modern Western (particularly Anglo-American) literature on problems of the theory of knowledge, trends sharing the fundamental principles of philosophical materialism enjoy a certain influence, but they have not raised themselves to the level of dialectical materialism and are marked by features of metaphysics and subjectivism. This is true of the so-called "scientific materialism" that emphasizes the dependence of consciousness on the work of the brain, but is incapable of discovering the entire complexity of the relations between the former and the latter and that, in one form or another, reduces consciousness to nerve processes. There are even attempts to combine dialectics and materialism in the form of what is termed "emergentist materialism"; these efforts are quite suggestive, but they, too, do not lead to success.

9) "Although the system of perceived things facing us in daily life," writes W. Sellars, "satisfies the attainment of the goals of daily life, it is totally inadequate to the true situation and cannot be adopted when the question arises as to what all things consist of" (W. Sellars, Science, Perception and Reality, p. 27).

10) V. I. Lenin, Poln. sobr. soch., vol. 18, p. 348.

11) Ibid., p. 145.

12) V. I. Lenin, Poln. sobr. soch., vol. 29, p. 314.

13) As though in opposition to today's "scientific materialists," Lenin emphasized that the essence of materialism is not "to deduce sensation from the motion of matter or reduce it to the motion of matter, but [to understand] that sensation is one of the properties of matter in motion." (V. I. Lenin, Poln. sobr. soch., vol. 18, p. 41); and "it is, of course, total nonsense that materialism has allegedly asserted the 'lesser' reality of consciousness..." (ibid., p. 296).

14) A detailed analysis of the stages in the current scientific revolution, and philosophical interpretation thereof, may be found in B. M. Kedrov, Lenin i revoliutsiia v estestvoznanii XX veka, Moscow, 1969.

15) Another crisis, affecting science as a social institution

under the conditions of contemporary capitalist society and expressed in the appearance of contradictions between a given mode of development of science and the interests of humanist development of man, has come, in the postwar years, to be interwoven with the crisis of the philosophical foundations of science. Emergence from this new crisis presumes not only a radical philosophical reinterpretation of science and its place in the system of culture, which is possible only on the basis of Marxist-Leninist philosophy and which includes problems in the realms of epistemology, methodology, ethics, and world view (at the present stage of the scientific revolution all these problems prove to be very closely interrelated): it also presumes change in the social functions of science, which proves possible only under the conditions of socialism.

16) Lenin emphasizes the need for discrimination in principle between the special results obtained in one or another sphere (today such results may also pertain to study of the logical structure of the language of scientific theories and to the history of science, the science of science, etc.) and their interpretation by philosophy and the theory of knowledge — no matter how intimately these things may be associated in real practice. He also points to the need to interpret these results from the standpoint of dialectical materialism (see V. I. Lenin, Poln. sobr. soch., vol. 18, pp. 363-64).

17) See W. V. Quine, "Epistemology Naturalised," in J. R. Royce and W. W. Rozeboom, The Psychology of Knowing, London, 1972.

18) See K. R. Popper, The Logic of Scientific Discovery, London, 1972, pp. 49-72. These ideas of Popper's are carried to the absurd by Feyerabend, who has published arguments supporting a so-called "anarchism in epistemology." This develops in ultrasubjectivist concept according to which every major scientific theory must, aside from everything else, be based on its own theory of knowledge, different from all others (see P. Feyerabend, Against Method. Outlines of an Anarchistic Theory of Knowledge, London, 1976).

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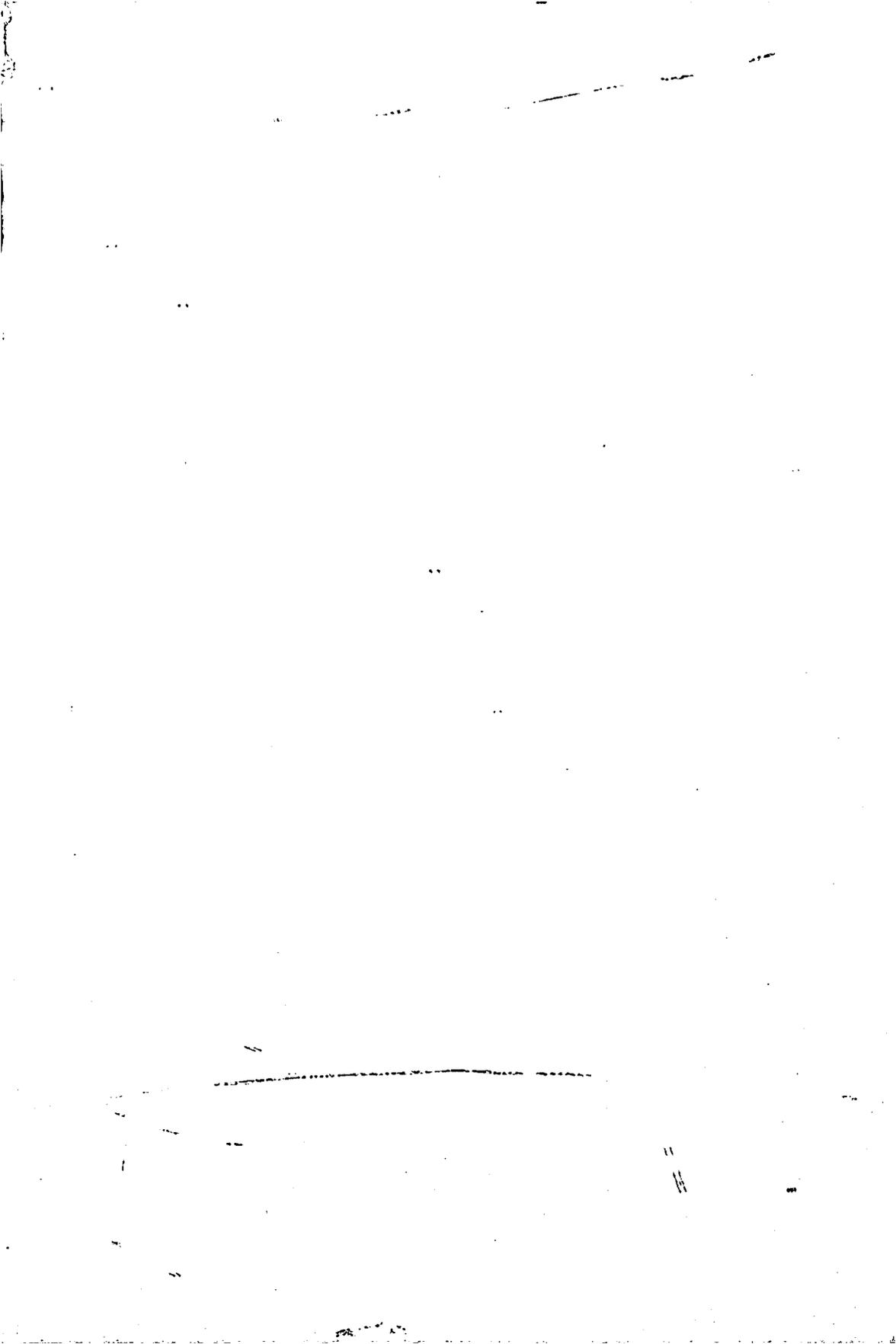
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