Einstein and Marx

Science and Determinism

by Will Herberg

The question of determinism—that is, whether there is a necessary sequence of cause and effect in the events of the world—is the central problem of science. Determinism is essentially the very cornerstone of the whole structure of science without which, it has always been believed, science itself would be quite impossible. And yet there is no feature more characteristic of contemporary scientific thought than the challenge to determinism all along the line. Indeed, the challenge has been elevated into a "principle"—the "Principle of Indeterminacy"—and the word has gone round that: "Causality has been dethroned! The scientific method' is being scrapped. The old cocksuredness of science is gone!"

It was inevitable that the name of Einstein should be linked up with this development but not this time as the champion of the new trend but rather as the defender of the old mode of thought. "Conservative Einstein"—the **New York Times** calls him after his two declarations in favor of determinism; but after all, the **Times** adds, his defense of determinism is based only on "sentiment" and not on "mathematical proof."

The whole question is a very serious one and we Marxists, who claim that our theory provides us with a unified and all-inclusive world-view, should not be the last to submit the contemporary attack upon determinism to systematic examination and to a critical analysis.

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"The Principle of Indeterminacy"

Tht central preoccupation of physical science in the last half-a-century has undoubtedly been the investigation of the structure of matter. And this field of study has yielded some remarkable and exteremely important results. For one thing, it has been rendered probable that the neither Newtonian mechanics in general nor the classical wave theory of energy transmission can bear the brunt of experience as far as intra-atomic physics is concerned. A quite different set of physical concepts has been elaborated by the famous physicist Max Planck under the name of the "quantum theory." It is, of course, impossible to go into this theory here but one remarkable consequence is of great importance for us. This is the "Principle of Indeterminacy" which was first explicitly formulated by the physicist Heisenberg. This principle may be simply formulated about as follows:

> As we proceed in our measurements of physical quantities more completely into the realm of what might be called the sub-microscopic (the world of atoms and electrons), our accuracy of measurement is limited in a curious way: If we decide to measure one feature (either position or velocity) very precisely, we are, for that very reason, prevented from measuring another feature with accuracy. The more accurately we measure the one—the less accurately, for that very reason, can we measure the other. The further we proceed into the sub-microscopic, the more is this principle evident; while, conversely, the further we advance into the world of the macrocosmic (i.e., the world of "big things"), the less becomes the relative importance of this uncertainty.

This "Principle of Inteterminacy" is not only an empirical fact insofar as our experience in intra-atomic measurement is concerned but it also harmonizes quite well with the Planck-quantum theory. From this "principle", however, some remarkable "implications" have been drawn which, in effect, undermine the whole basis of modern science and strive to dissolve the objective world into mystical phantasy.

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The Idealistic Implications of the "Principle of Indeterminacy"

The most important of these idealistic implications are:

1. **The denial of the objectivity of the physical attributes of matter.** On the basis of a thoroly distorted interpretation of Einstein's well-known dictum: "What cannot essentially be observed cannot be said to exist," the conclusion is reached that neither position nor velocity (nor any of the physical properties) of a particle has any objective existence. Says Professor Bridgman of Harvard:

> "A body has position only insofar as its position can be measured; if its position cannot in principle be measured . . . the position of the body does not exist . . . To carry the paradox one step further, by choosing whether I shall measure the position or velocity of the electron, I thereby determine whether the electron has position or velocity. The physical properties of the electron are not absolutely inherent in it. . . "

2. **The discarding of causality in favor of the "statistical concept."** If, it is argued, it is impossible to determine both the position and the velocity of a particle precisely, then the particle cannot be part of a deterministic scheme of necessary cause and effect since one particle cannot, as such, be distinguished from another. The entire possibility of prediction as to the future path of any particle is strictly limited. And, recently, Einstein, in a joint letter with Tolman and Podolsky, has shown that this uncertainty of prediction as to the future is correlated with an uncertainty as to the path of particle in the past (**New York Times**, March 22). **What then is left of determinism?** it is asked. **Nothing!** answer the physicists of the style of Eddington. The supposedly precise cause-and-effect relation is declared to be nothing more than a rough **statistical approximation**, correct only as an approximation, as a declaration of "probability." Thus is reached, on the basis of the "latest science", the same rejection of an inherent cause-and-effect relation in favor of a "statistical conception" that characterized the work of the English Machian idealists of the Karl Pearson type thirty years ago.

3. **Th discarding of the scientific method in favor of a "scientific" mysticism.** Thus is the idealistic trend in modern science carried to its logical extremes and the result is self-annihilation. The scientific method, the potent instrument that has widened the horizon of human knowledge more in the last three centuries than in the preceding twenty centuries, is based entirely on the presumption of a causal relation in the world of events. With causality gone, the scientific method is sure to go. And what remains? Declares Professor Kaempffert (**New York Times**, January 11, 1931):

> "There are certainly other methods of apprehension than those of science. To Eddington our strange flashes of insight, the stirring of something within us at the aspect of a sunset, the fierce belief of religious martyrs, can no longer be dismissed because they have nothing in common with the scientific approach to a problem. They acquire a new significance in view of the manifest impasse that science has reached. Possibly poets and seers who have had religious experiences may be aware in a dim way of what lies behind the mathematical concepts in which we now express what little we know of the world around us. Eddington says as much: 'The spiritual element in our experience is the creative element.'"

Only consistent materialism is in a position to refute systematically these idealistic vagaries. What then has consistent materialism (i.e., dialectical materialism) to say as to the idealistic implications of the "Principle of Indeterminacy?"

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A Materialist Critique

The basic criticism materialism makes is that the idealists thoroly misunderstand the real significance of the "indeterminacy principle" and its role in the scheme of science. Its validity as a generalization corresponding to the present stage of our scientific knowledge is very probable but this validity is strictly relative. It is essentially an expression of our relative (and very great) ignorance. **But what the neo-idealists do is to elevate a transitional stage in the development of knowlege into an eternal and paramount principle.***

The statistical cast of our present conceptions of intra-atomic behavior must be viewed from the same angle. It is true that the present atomic theories are essentially statistical (and hence indeterministic) in character; but, as Einstein points out (**New York Times**, March 17), this is a sign of the **incomplete** character of these theories. "The statistical character of this theory (the quantum theory) will eventually disappear.

> "He pointed out," the **New York Times** reports, "that new conceptions must be introduced to permit a more exhaustive description of the infinitesimal world of the electrons, protons and photons, before we can hope to get an accurate description of the things themselves. The mere 'probable' correctness of the present mathematical equations is only an indication of the fact that these new conceptions are still missing."

Einstein makes the very striking point that the statistical character of our present knowledge, which is idealized as the last word in human thought by Eddington, is thoroly unsatisfactory from the scientific viewpoint since "it does not describe nature but merely expectations from nature, while the aim of science is describing the things themselves not merely the probability of their happening." For this reason, Einstein declares, the development of science will lead to a situation in which "this theoretical basis will be replaced later on by a deterministic one." And all Marxists must heartily endorse this viewpoint.

The eagerness with which the neo-idealists are ready to reject the objectivity of the physical properties of objects (and therefore of the objects themselves) now turns out to be somewhat premature and

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* It should be noted that the inadequate and provisional character of the quantum-theory is admitted by all physicists since it cannot at all explain diffraction phenomena for which the directly contrary wave theory is still necessary. Obviously a more complete and all-embracing conception is on the order of the day.

TWO DRESS STRIKES: 1929-1931

by William Zweibon

"One of the main shortcomings in our strike activities in the past was lack of preparation. The last (1929) strike, which was not well prepared, resulted in the organization of only six thousand workers."

This paragraph appeared in the editorial of the *Needle Worker*, official organ of the N.T.W.I.U. of December 1930. The part of the paragraph dealing with the lack of preparation is absolutely correct. The union had only four weeks time to prepare the strike. January 1, 1929 was the last day of the union convention that decided on calling of the dress strike. The first week in February the strike was declared. More than 10,000 workers responded to the strike call and nearly 8,000 were sent back to work in settled shops. So despite poor preparations which were no fault of the union, there was created a solid foundation for the N.T.W.I.U. in organizing 8,000 dressmakers in about 300 shops.

That this accomplishment was a result of a more realistic, thoro, and correct strike strategy, is best proven by an examination of the preparations and results of the last dress strike. Not four weeks of preparation but full eight months of constant "work" for the strike. Above all, no strike in the needle trades ever witnessed such an enormous number of leaflets distributed in the market as the recent strike. And what was the outcome of this strike? The most optimistic opinion even of the "loyalites" is—that not even 2,000 dressmakers ressponded to the strike call, and only about 1,000 were sent back to settled shops. This happens in a time when there is supposed to take place a widespread, deep-going radicalization generally, and especially among Jewish, Negro and Spanish workers.

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During the Strike

In the article of May 6, 1930 printed in the *Daily Worker* (the essence of this article was taken from the Jewish *Forward*), Jack Johnstone says: "Collaboration with the police flourished among the leadership of the left wing and of the new union. The Industrial Union, under the leadership of Gitlow, Zimmerman and Gross, the brains of the union, was being hooked up with Mr. Broderick, head of the Industrial Police Squad." Genuine *Forward* jewels, aren't they? The needle trades workers know quite a different story. In all left wing strikes, as well as in the 1929 dress strike, the strikers were brutally attacked by the uniformed police as well as by the Industrial Squad. Unlimited arrests of our strikers, heavy fines and sentences to jail—this occurred practically every day, at least for the first two weeks of the strike. Johnstone and the *Forward* called this strike "cooperation with the police." If that is so, how will you explain the recent 1931 strike with everything so pure and kosher? Neither Johnstone nor the union leadership can bring facts to prove that in the recent strike more strikers were beaten by the police and gangsters or more arrested than in 1929.

The natural consequence of "police cooperation," one should expect, is unrestricted picketing, the least possible arrests and the "impartial," gentle behavior of the police. Compare the mass arrests in 1929 in the first four weeks of the strike with the same period of time in 1931. Let Johnstone explain what "police cooperation" actually means!

The same is true about mass picketing and demonstrations. While in 1929, with "police cooperation," we succeeded in carrying thru several demonstrations of a mass character in the strike area, the N.T.W.I.U. in 1931 completely failed to mobilize the strikers and sympathizers to have even one demonstration in the strike area. On Tuesday, February 24, some 300 workers and about 40 pioneers marched thru the district and this was the first and the last "mass picketing demonstration."

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Secret Dealing

In the same article of Johnstone's we find another piece of slander.

"The main prop of this leadership of Gitlow-Zimmerman was secret dealings with the bosses." The answer to this lie will again be found in the facts. In 1929, when the union signed an agreement with the Protective Association, that agreement was brought before the striking workers in the halls and read before them. The strikers discussed and ratified the agreement. But in 1931, the *Freiheit* announces that an agreement was reached with the association. Can any striker tell what is in the agreement? Was the agreement read before the strikers? Was it discussed in the halls? Nothing of the sort! So who is guilty of making "secret dealings?"

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Mistakes in 1929

In analyzing the course of events in both the 1929 and 1931 strikes the impression should by no means be created that everything was correct in the 1929 strike. Not at all! There were too many shortcomings even then. Already at that time the beginings of the new sectarian line were beginning to make themselves felt (the refusal to make individual settlements, etc.).

Unquestionably, some "expert" on trade unionism of the Johnstone type will come to the next meeting of the needle trades fraction and put the blame for the failure of the strike upon the shoulders of the comrades for not "carrying out" the new line of the T.U.U.L. and the R.I.L.U. "correctly." But the comrades will have to go into a thoro anlysis of the

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APRIL opens with a shower of unfavorable statistics. Dividend reductions by such powerful corporations as the Anaconda Copper, Westinghouse, National Cash Register and Baltimore and Ohio R. R. have sent a chill down thru the back of the stock market which has seen very heavy losses in recent days. The Easter impetus was largely spent in March. Therefore, very probably April will usher in a seasonal decline running at least thru July. The slight steel upswing has been definitely checked,

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based on a very shaky foundation. The other "far-reaching consequences" (far-reaching indeed, for they destroy even the possibility of science!) rest on no better basis.

The arguments that lead to the rejection of the objectivity of the physical properties of objects are especially illegitimate. The most that can be wrung out of the "Principle of Indeterminacy" is that some physical properties of particles (velocity, position) cannot, **under certain circumstances**, be measured **accurately**. But there is nothing to say that these properties cannot essentially be observed. On the contrary, it is quite certain that they are "observed" in the sense in which this word has any significance in the criterion of knowledge, i.e., they enter into our experience. It is obviously a case of eagerness tripping up logic!

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The Dialectic Development of Scientific Thought

But the question naturally arises: **Why is contemporary science so eager to destroy itself that it is ready to resort to the elevation of our ignorance into a principle as a basis for its idealism and indeterminism?**

Modern science arose on the shoulders of materialism and determinism which very soon became its openly recognized foundations. We have shown elsewhere (**Revolutionary Age**, No. 2.) that this militant materialism and determinism were a reflection of the vigorous upward development of capitalist society. The scientists, as bourgeois ideologists, could look the world of nature confidently in the face and make a bold effort to dominate it, because the bourgeoisie was making a gigantic and successful effort to dominate the world of society. This was the great tradition of classical bourgeois science of which Einstein is at once the last remaining banner-bearer and outstanding destroyer. Einstein is, in fact, the connecting link, the bridge, between the new and the old.

Today official science bears another aspect because the bourgeoisie faces another world. Today the capitalist class faces a world of chaos, disintegration and decay. Just as yesterday the "inexorable operation of natural forces" seemed to promise to the rising bourgeoisie the inevitable fulfilment of its highest aspirations, so today the necessary operation of the cause-and-effect relation holds out the threat of coming doom. The striking decline of the enthusiasm of the bourgeoisie for the "inevitable" is immediately transformed into its ideological form: the rapid rise of the anti-materialistic and anti-deterministic trend of scientific thought to the point where it now dominates the field. Bourgeois science has been transformed into its opposite and has thereby ended its own cycle of development. But the development of science, reflecting the dialectic development of society, is itself dialectic, a development thru contradictions.

The steady and systematic degeneration of bourgeois science and its culmination in mysticism is only one side of the picture. The other side is the appearance upon the scene of history of a new phase in the development of human thought, which, reflecting the historical rise of the proletariat, again dares to look nature full in the face with confidence of the outcome. This science of the future, already a reality in the Soviet Union, builds on the past and in that sense is the historical fulfilment of the promises of the classical epoch of science. It builds upon materialism and determinism, which it enriches and transforms into dialectical materialism; it settles account with all forms of mysticism and idealism once for all; and, freed of these encumbrances, it prepares for the mastery of nature in thought and in action.