

Ch. VI. Sociology of Science

1. We mentioned previously that an impact of the social environment upon science certainly exists if we single out the technological purpose of scientific theories. All factors of social and economic power will favor scientific research that will produce such technological progress as they consider desirable. As we mentioned previously, this influence of social factors upon science will not be discussed in this book because it has little to do with philosophy of science. We learned, however, in our treatment of theory building, that scientific theories have not only technological purposes; they have always been used to direct human conduct along desirable lines. We spoke briefly of moral purposes in contrast to technological purposes of scientific theories. It is obvious that all factors of social power will not only favor the rise of scientific theories that bring about desirable advances in technology, but they will also favor scientific theories that satisfy moral purposes or, in other words, which can be used to direct human conduct along desirable lines.

We have learned from many examples, discussed in this book, that from Plato to Einstein scientific theories have been interpreted philosophically and, accordingly, used for various moral, religious, and political purposes. If we include these interpretations in the theories, it is evident that social powers have an influence on the acceptance of scientific theories. If we try to make a sharp distinction between the scientific theories in the proper sense of the word and the philosophical interpretations, it is easy to see that this is impossible if we wish to include very general theories like determinism in physics, spontaneous generation in biology, structure and origin of the universe in cosmology, etc. This again amounts to the question of whether science can be "purged" of philosophy, which we have already discussed. There is, in any theory, a part which is not determined by technological criteria, but by the requirement of economy or beauty. The axiom that the validity of a theory does not depend upon the life situation of the author is wrong in the pragmatic theory of knowledge. The validity of a theory cannot be judged without knowing its purpose, and the purpose cannot be known without knowing the life situation of the author.

The revision of that axiom, required by Mannheim, has actually taken place. In the pragmatic theory of knowledge, or science of science, the dependence of theories upon the life situation of the authors is an indispensable part of the explanation of how a certain theory has been constructed. We have to discuss the effect of the different criteria of validity according to the intended purpose. Eventually, we obtain not one unique theory, but a choice among several theories, exactly speaking, among an infinite number of theories. We can present this fact of choice in two different ways: we can say that the choice is arbitrary, in which case we describe the situation in the language of "conventionalism" as suggested by Henri Poincaré and others. The choice is, however, only logically arbitrary; this means that no decision can be achieved by logical conclusions and physical experiments. If we conclude, however, not only physics and mathematics, but also the fields of psychology and sociology, we can derive reasons for preferring determinism to indeterminism, or the Copernican system to the Ptolemean system. The consistent investigation of theory formation in the physical sciences leads to the result that without considering the social situation of the theory builder, no unambiguous criteria for the validity of a theory can be established. From the point of

view of the pragmatic theory of knowledge, the puzzling questions posed by the sociology of knowledge do not arise: the influence of social factors upon the validity of scientific (even physical) theories is a necessary part of pragmatic epistemology.

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If we carefully consider the way in which the validity of a scientific theory is judged, according to the pragmatic theory of knowledge, we notice that in case of very general theories the answer cannot be “yes” or “no.” A compromise has to be worked out as to what weight is to be given to each different purpose of a theory, particularly to the technological and the moral or political purposes. The process of achieving an agreement about a compromise very often has the character of negotiations about a compromise in political action; it often looks like the search for a “happy formula” that may solve a diplomatic conflict. In order to understand this point clearly, it would perhaps be instructive to remember some concrete cases in which such compromises have been established.

As a first example, we present the compromise proposed to Galileo in the matter of the Copernican theory of the planetary system. Both parties agreed that from the astronomical (technological) point of view the Copernican (heliocentric) system was acceptable. While Galileo wanted to call it “true” or “valid” for this reason, the representatives of the Church pointed out that from the religious and moral point of view the “mobility” of the earth raised grave difficulties; it implied complications in the interpretation of the Bible and conflicted with the generally accepted philosophy which was also the generally accepted basis of religion. Cardinal Bellarmine wrote, on the 16th of April, 1616, a letter to Foscarini, a Carmelite monk and a good friend of Galileo. From the letter it is evident that the Church did not press for a “yet” or “no,” but for a formula of compromise that would be acceptable to both parties. The Cardinal wrote:

It seems to me that you and Galileo should content yourselves with speaking not positively but tentatively, as I have always believed Copernicus did himself; the supposition that the movement of the earth and the immobility of the sun accounts for appearances seems to me legitimate, is harmless, and suffices for a mathematician.... Even if there were a positive proof for the immobility of the sun and the movement of the earth it would be necessary to proceed with the greatest prudence in the explanation of the sacred books which would seem opposed to the fact. But I cannot believe in such a proof until it has been shown to me; for it is one thing to save appearances and another to destroy them, and in case of doubt the Holy Scriptures should not be questioned.

The above letter sounds, indeed, like proposals that are made, say, in the United Nations, to settle a conflict by a diplomatic formula.

As a second example, we may look at the formula that has been proposed in the Soviet Union, to establish an agreement between physics and political ideology in regard to the theory of relativity. While the official philosophy, dialectical materialism, requires belief in the objective reality of the external world, and in the objective truth of physical theories altogether, the theory of relativity has frequently been interpreted as denying this belief. At the Jubilee Session of the Academy of Science of the USSR, the academician M. B. Mitin gave a speech on the subject “Twenty-five Years of Philosophy

in the USSR:"[note 1]

As the result of the tremendous work that our philosophers and physicists have carried out, as a result of ... the battle of ideological principles, it may now be said that our philosophical conclusions concerning the theory of relativity have been firmly established.

The physical content in its purely technological interpretation can be fully accepted, but from it

springs neither the rejection of the existence of an objective world, nor the rejection of the objective concept of nature. The theory of relativity does not deny that time and space, matter and movement are absolute in the sense of their objective existence outside human consciousness. No "point of view" of an observer, no "system of reckoning" ... has any more power to destroy the objective fact of natural processes.

These formulations establish the way in which the term "objective" has to be used. On the other hand, the term "relative" can be used in the following formulations:

The theory of relativity established only the relativity of the results of measuring time and space by observers who are moving relatively to one another.... Time and space are indivisible from the moving body and must be regarded relative to the movement. In this respect time and space are relative.

What is really achieved by the above formula is assuring to the common-sense term "objective" a legitimate place in the general principles of physical theory.

As a third example we may describe the compromise on the theory of relativity that occurred in Germany under the Hitler government. The reasons why such a compromise was necessary are the following: relativity theory, as well as quantum theory, had introduced a language that was much more "sophisticated" than the common-sense language, and that led to results that looked absurd when they were expressed in common-sense language. To state that the speed of light was the same in different systems of reference, or that position and velocity of a particle cannot exist together seemed to make it possible to deny all statements expressed in common-sense language. Since the government held that it was necessary for the well-being of the German people to impose rules which everybody had to believe and follow without the slightest doubt, it was impossible to tolerate theories that showed a way by which gaps in the validity of seemingly self-evident rules could be pointed out and even confirmed. These dangers of the new theories were usually denoted by the derogatory names "relativism" and "sophistications." On the other hand, it was clear that these new theories were the scientific basis for new weapons which were also necessary to vanquish the enemies of the German Reich. Just as in the Soviet Union, a compromise had to be prepared, in order to preserve the scientific basis of the atomic bomb, but to separate "relativism" from science. The German government looked for a way to combine the blessings of the atomic bomb with the elimination of relativism and sophisticated conclusions.

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On November 1, 2, and 3, 1942, the leaderships of the University Teachers convoked a 'physicists' encampment' in Seefeld (Tyrol). About thirty physicists of excellent scientific reputation were invited to discuss the "leadership" representing the ruling party a compromise between the technological requirement and the political or moral requirements for the validity of contemporary physical theories. The compromise was recorded in a protocol, a copy of which was brought to the United States by Professor Sam Goudsmit [note 2]. The content of the compromise was, of course, as in analogous cases, the acceptance of the theory of relativity as far as its technological consequences are concerned. It was regarded as legitimate to draw from the principles conclusions which are technologically valuable, but drawing logical conclusions "for their own sake" in order to investigate the logical consistency of the principles was flatly rejected. The meeting unanimously passed a resolution to reject "an elaborate investigation of certain subtleties and paradoxes of a typically Jewish character which are presented as the essential content of the special theory of relativity." Moreover, the encamped group rejected the "philosophical interpretations of the physical theory of relativity that have been given by Einstein and his followers." This means, practically, that physical science has to be tolerated only as a technological device, while every philosophical or even logical investigations is to be reserved to the leadership of the political party.

This is fully in agreement with the well-known advice of Lenin that "one should not trust a bit, even to the most prominent and deserving physicist or chemist, when he starts speaking about philosophy." It can easily be discovered, by quoting statements of the highest authorities in the German government of that period, that the main goal was to reduce science to a purely technological instrument in the hands of political authorities, and to make scientists machines directed by politicians. The Prussian Minister of Education Russ [note 3] said, in 1934, at an inspection of the government institution for physics and technology: "National Socialism is not hostile to science; it is only hostile to theories." Herman Goering, minister of the Air Force, said in the same year:

We esteem and honor science, but it must not be pursued for its own sake and degenerate into intellectual arrogance. Our scientists are now faced by a fertile field of research. They should concern themselves with how we can produce in Germany some raw material that has had to be imported previously from abroad.

From this speech we learn that the determination of the political leaders to restrict science to its technological task and to reserve all philosophical interpretations to the politicians. This interpretation had to be completely in agreement with the party line. This adjustment was required precisely in a speech delivered by the German Minister of Justice, Hans Frank. He said, "I am in favor of full freedom of teaching and thinking.... Since science serves truth, it has to serve National Socialism." These views are, of course, in complete accord with the doctrine announced by Lenin that science has to adjust itself to the party line.

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This compulsory compromise is very obvious in the totalitarian countries. However, the tendency towards such a compromise is visible under any form of government, except that refusal to align oneself with the compromise does not always mean “liquidation.” Michael Polanyi writes: “The propositions embodied in natural science are not derived by any definite rule from the data of experience...” as we have seen.[note 3] This holds, in particular, if we consider very general propositions concerning which we cannot be certain whether they belong to science or to its philosophical interpretations. Polanyi stresses the point that there will always be a conflict between possible general theories, which can only be solved by prescribing an order of predilection for the different purposes of these theories. He says:

The conflict can be resolved only through one third party standing above the contestant. The third party is...his scientific conscience.... This indicated the presence of a moral element in the foundation of science.

If we analyze the concept of “scientific conscience” according to contemporary depth psychology, it is clear that such a conscience cannot develop without a community that cultivated the belief in scientific method and has proved by its successes in advancing our knowledge its usefulness.

This “community of scientists” has, to a high degree, established itself in universities and research institutes. Polanyi asks under what practical circumstances the community of scientists can become an authority and a guide of scientific conscience. He asks for a “practical art” by which the spirit of the scientific community can be cultivated and transmitted. An essential part of it is, as Polanyi writes:

the art of free discussion, transmitted by a tradition of civic liberties and embodied in the institutions of democracy. This art, this tradition, these institutions will be discovered in the purest form in countries like Britain, America, Holland, and Switzerland, where they were first and most efficiently established.

Whatever the practical manifestations of “scientific conscience” may be, it boils down to the social pressure of a group, when we want to define it in operational terms. Polanyi writes: “A child growing up in a modern community will be forced to abandon the magical outlook to which it is primarily inclined and to adopt instead a naturalistic view of everyday life.

Considering all these points, we must understand that in shaping the compromise leading to the selection of a scientific theory, the authority of the “scientific community” or, in other words, of the “authorized scientific method” will play an important part. In an address to a group of Jesuit scientists, the head of the Biology Department of Boston College, the Reverend Father Welsh, compared the authority of the “scientific method” with the authority of the ruling party in the Soviet Union. He said:

One is using the party principle as the sole criterion of truth, and the other is using the scientific method just as dogmatically as the only source of human knowledge.... We

must remember that American and British scientists can be just as wrong as Soviet statism.

Using the language of the present book, this means that in judging the validity of a scientific theory one must not omit any of the factors that participate in forming the compromise, as previously described. No single factor, not even the “scientific method” can warrant validity. The effect on human conduct, the moral aspect, has to be considered with the same weight as the technological aspect.

How the different aspects are to be weighed cannot be derived from any logic of science, but only from our knowledge of human behavior. If we want to express ourselves in a slightly flippant manner, we would say that all decisions about the choice of a theory are based upon sociological propositions or, if we prefer to say so, involve, ultimately, moral decisions. If this is so, we must no wonder that every political, religious, or moral creed is connected with a specific philosophical or even metaphysical interpretation of science, which serves to give to the creed concerned the blessing of science. It is well known that the “totalitarian” systems have been very eager and very serious in their attempts to set up philosophical interpretations of science that belonged to the creeds of the ruling parties and were an object of indoctrination in all schools, from the elementary schools to the universities. We have given, in this book, particularly in the present chapter, numerous examples of this kind of “official” interpretation. We have learned that it was an important point in Lenin’s world view that every political philosophy is supported by a specific philosophical interpretation of science, and we learned how the leading members of the Hitler government were articulate and specific in giving directives for the interpretation of science.

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The great propaganda value of this connection between politics and science has been a matter for grave apprehension among followers and advocates of a democratic outlook. Repeatedly the wish has been voiced that a philosophical interpretation of science that would support the democratic way of life would be produced. Many advocates of democracy have even suggested making this democratic philosophy a subject of indoctrination in schools and a creed in which every good democrat had to believe. The official Soviet doctrine has been that to present political division of our world corresponds also an “eastern division” and a “western” division in the philosophical interpretation of science. As we shall learn more precisely in chapter X [10?], the official doctrine of the Communist Party and the government of the USSR describes these two philosophies as “materialism” and “idealism.” There have been many statesmen and philosophers in the Western world who have accepted this doctrine and who have proposed to declare “idealism” and “anti-materialism” as the official philosophy of the Western democracies. A very clear-cut example of the intentions of prominent Western authors to provide a philosophical background for their political ideals was given by the prominent legal philosopher, Jerome Frank [note 4]. He starts from the consideration that contemporary physics cannot, from the purely scientific point of view, decide whether our world is, ultimately, determinist or indeterminist. Both philosophical interpretations are possible. “Since,” argues Frank, “from the purely scientific (technological) angle, the choice between determinism and indeterminism is arbitrary,

we can choose the theory that is preferable from the moral point of view.” He goes on, “We can choose the theory which is a better support for the American way of life. This is obviously the hypothesis of ‘indeterminism’ because it allows for freedom, the essential trait of American political philosophy.”

Perhaps the most instructive example of this attitude is Charles Malik, who has been a statesman as well as philosopher, an Easterner by birth and a Westerner by learning; he has been representative of Lebanon at the United Nations and took courses at Harvard under Whitehead. He writes, “Because man is a rational being, the evil of his own doing always has its origin in an error of his mind.” According to the official Soviet doctrine, every departure from the party line has its origin in an error in philosophy, i.e. in a departure from the authorized interpretation of dialectical materialism. Malik’s statement is practically the translation of this doctrine into the language of scholastic philosophy. He continues: “I shall now list eight basic errors committed by the metaphysics of communism, and contrast them in each case with the truth of the Western positive tradition.” We shall quote only four among the eight “contrasts” that are in a close relation to the philosophical interpretations of scientific theories.

1. Communism: The ultimate reality is through and through matter. Western Tradition: The truth is that besides matter and utterly irreducible to it, there is an independent and superior reality, namely, mind and spirit.

2. Communism: The proper attribute of reality is change and strife. West: The truth is that there is a changeless and stable order of existence, on which the mind can really rest.

3. Communism: There is no objective and external truth. West: the truth is that such a truth exists, and that only by humbly seeking it and finding it can we achieve genuine understanding and real peace.

6. Communism: That so far as the nature of things is concerned, only the tradition of Democritus, Lucretius, Feuerbach, and Marx is right. West: The truth is that this materialistic tradition from Plato and Aristotle to Hegel and Whitehead.

This example shows very clearly the great difficulty of the task of producing a “democratic metaphysics” that could match the totalitarian metaphysics. The first three items are typical metaphysical interpretations of our experience or, for that matter, of our systematized knowledge called science. On both sides of the “iron curtain” the attempt is made to characterize the world of our observations by propositions couched in some common-sense terms. The same propositions should also be fit to guide human conduct. Since in a democracy no philosophical system is enforced by the authority of the government, we must not wonder that the “Western positive tradition” that is described in Malik’s “contrasts” is not generally in agreement with or even similar to the philosophy that is actually accepted in the Western democracies. The whole philosophy of empiricism and pragmatism which has been so instrumental in giving philosophical form to the ideas of democracy among the English-speaking nations, is in

sharp contrast to the “Western tradition” introduced by Malik. As a matter of fact, Malik describes the contrast between two philosophical systems: dialectical materialism and scholastic metaphysics. Actually, only a part of the Western world ascribes to what Malik calls the Western tradition; and this is certainly not the part which has been responsible for the advance of science. This becomes clear if we consider Malik’s sixth alternative. Western science has certainly been influenced more by Democritus and Lucretius than by Aristotle, and in the Communist philosophy of science Hegel certainly plays a greater role than he does in the formulations of Western science.

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Perhaps the most stimulating effort made in this country to try to find a correlation between a certain political philosophy and a certain philosophy of science was presented by F. S. C. Northrop, [note 6]. He starts from the fact that what he calls the “normative propositions of the social sciences cannot be proved nor even confirmed by an investigation of the social facts.[“?”] The “normative statements” give advice to people on how to conduct their lives; they are “statements about values” or “appraisals” or “predilections.” Even if we knew the laws connecting the social facts, we would not learn from them what a “good society” or “good conduct” is. However, the system of values that is accepted by a certain nation or party is rooted in a philosophy which is connected with the scientific theories that are accepted by that nation or party. According to Northrop, these philosophies “are always regarded by the people who hold them as called for by the scientific knowledge which they take into account.” In the language used in the present book, these philosophies are, exactly speaking, philosophical interpretations of the scientific theories of the period in question. According to Northrop, these interpretations are “called for” or “determined” by the results of science and determine, in turn, the value system of the same period and the same group.

What Northrop emphasized is the close connection between the normative theory of social science and the factual theory of natural sciences:

By making primitive concepts and postulates identical in both the normative theory of social science and the factual theory of natural science...one obtains normative social theory which can be verified, since the deductively formulated theory of natural science is scientifically verifiable.

As an example, Northrop analyzes the difference between the value system of Western democracy and the Soviet state. He attempts to reach the underlying differences in philosophy. Each philosophy is closely connected with a certain conception of science; the “true” science corresponds to the “good” value system. In this way, Northrop finds the philosophies which are at the roots of Western democracy and Russian communism, respectively. His results are very different from Malik’s.

According to Northrop, Western democracy is based upon the empirical philosophy of Locke, while Russian communism is based upon a philosophy that is much closer to Aristotle than Locke. Looking for the scientific roots of these philosophies, Locke’s is based upon Newton’s physics, while Aristotle’s philosophy is based upon his own organismic physics. The soul or personality in Locke’s moral and

political philosophy was identical with the person of the observer in Newton's physics. The only connection between different persons could be achieved by the sense impressions of these persons. In Aristotelian or Thomistic philosophy, however, the individual person is a part of a hierarchical order. The nature of the individual person is connected with the nature of other persons, with the nature of higher beings like angels, and, ultimately, with God. These conceptions of the human person were based upon the conceptions of nature prevalent in the periods of Aristotle, St. Thomas and Locke, respectively. Northrop writes:

It is the lack of any intrinsic social relations between persons which is the Lockean modern formulation of the political economy expressed in the American Declaration of Independence to the effect that there is no basis for government, no normative social theory, apart from a social convention.

Hence, according to Northrop, the most articulate formulation of a democratic state, the Declaration of Independence, was based on Locke's philosophy that was, in turn, based upon Newton's physics.

This connection between political philosophy and philosophy of science becomes very clear if we investigate the analogous connection between Aristotle's physics, Thomistic philosophy, and the political philosophy of authoritarian states. According to Northrop, "in the Aristotelian theory of a person, a person is organically related to other people and must have this relation expressed in society, if society is to give expression to his own individuality." He continues: "Consequently, a good state is one in which a man cannot be himself except insofar as he operates through an organized social church and through an organized political government." While, according to him, Lockean philosophy is closely connected with Anglo-American modern political theory, the Marxist political theory is much nearer to the Aristotelian than to the Lockean philosophy. Northrop stressed the point that according to Marx, the human individual has no meaning apart from this status within the organic structure of society. The Communist state is based philosophically upon Aristotle and, of course, Hegel.

It is easy to see how differently Northrop sees the coordination between political philosophy and philosophy of science from the way Malik sees it, from the above passages. Although such a connection seems to exist, the precise coordination does not seem to follow unambiguously from the actual state of science. Although in our Western world, there is a strong belief in some connection between political ideology and the philosophy of science, there is a great difference of opinion as to what, specifically, this coordination may be. We do not even know with certainty on which side of the "iron curtain" such a great philosophical system as Aristotle's belongs. There is no doubt that at all periods of intellectual history the philosophical interpretations of science have been analogies to some daily life experiences which have been formulated in common-sense language. There is no doubt either that these interpretations have been used as philosophical support for desirable human conduct, and that this has been possible because this advice is formulated in the same common-sense language that occurred in the philosophical interpretations of science.

Northrop pointed out that every philosophy of science can be tested by scientific methods and that, therefore, by implication, political philosophy can also be tested by

scientific methods. If and when we become convinced that Newton's physics is scientifically preferable to Aristotle's physics, we know also that Locke's philosophy is, in one period, preferable to Thomistic philosophy and, by implication, Western democracy to the totalitarian state. There is no doubt that this way of arguing has a great deal of attraction for all groups who like to be guided by scientific argument; but there is some inherent weakness in this argument. As a matter of fact, as we have learned in several special cases, a scientific theory does not imply unambiguously a scientific interpretation. We have seen, e.g., that the theory of relativity has been used as a support of idealistic, materialistic, and positivist philosophies. The choice of the interpretations is determined by the political philosophy (the "normative system" in Northrop's language) of the group concerned.

Hence, the statement that by confirming a scientific theory by experiment, I confirm simultaneously a philosophy of science and by implication a political philosophy implies a vicious circle, because the philosophy of science itself is determined by a political philosophy. If we try to keep as closely as possible to the scientific way of arguing, we will probably notice that the connection between philosophy of science and political philosophy cannot be established satisfactorily by analyzing their language. It is necessary to study the social facts directly and to realize that building up science belongs to these social facts as well as building roads and houses.

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One of the most ancient parts of science consists in the human picture of the physical universe, which always bears some analogy to human society. The gods operate sun and stars, oceans and mountains, just as human rulers direct their officials and their subjects. Once the picture of the physical universe has been established as a "cosmic state," man has attempted to make the states on earth as similar as possible to the cosmic state. The closer to this ideal a state has come, the more it has been regarded as a "good" state. We remember that the geocentric and the heliocentric systems were regarded as two different "constitutions" of a cosmic state, and have implied two different ideals of human states. If we look at the facts in this way, it becomes clear that no "normative principles" of social philosophy are necessary. The only "normative" factor occurs in the urge of men to imitate the cosmic state. Every philosophy of science has interpreted the laws of science as a "cosmic state" and in this way has created an ideal for human states. This is probably the historical and sociological root of the well-known fact that actually all philosophical interpretations of science are used as foundations of moral, religious, or political philosophies.

The view that our pictures of the physical universe are not based upon intellectual research, but are influenced by our moral and political ideas, has been strongly upheld by John Dewey and presented in a very lucid fashion. [note 7] He suggests:

as a reasonable hypothesis the idea that philosophy originated not out of intellectual material, but out of social and emotional material.... If anyone will commence without mental reservation to study the history of philosophy not as an isolated thing... if one will connect the story of philosophy with a study of anthropology, primitive life, the history of religion, literature and social institutions... the history of philosophy will take on a new

significance. What is lost from the standpoint of would-be science is regained from the standpoint of humanity.... When it is acknowledged that under the disguise of dealing with ultimate reality, philosophy has been occupied with the precious values imbedded in social traditions... it will be seen that the task of future philosophy is to clarify men's ideas as to the social and moral strifes of their own day.

In order to give an instructive and simple example from which we can see in what way the picture of the physical universe has been used for guiding the conduct of man towards desirable goals, we need only look into the first book of the Scripture (Genesis). We are all so familiar with this narrative that we do not realize sufficiently how closely physical hypothesis and moral guidance are interwoven. No one would doubt that the most characteristic feature in our picture of the physical world is the existence of physical laws or, in other words, the law of causality or uniformity. However if we read carefully the story of the Great Flood in the Bible, we learn that these laws were established as reward for the good behavior of men and can be revoked at any time if men do not behave well.

These considerations lead up to the conception of a general analogy between the physical universe and a "good" human society. This conception was named by Ernest [Ernst?] Topitsch the "socio-cosmic universe" and will be taken up later on (part II. ch II, sect. 3) [note 8] The relation between physical and moral laws in the Bible will be more elaborately discussed at the point when we present the conscious and unconscious reverberations of ancient and mediaeval philosophies upon modern science and philosophy.