Purpose and Necessity in Social Theory

Mandelbaum, Maurice

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4 ➔ Determinism & Chance

It is usually assumed that if either chance or choice were to affect the course of human affairs, all hope for arriving at adequate explanations in the social sciences would have to be abandoned. In this chapter and the next that assumption will be shown to be mistaken.

There are many reasons why these concepts were looked upon with disfavor by most social theorists in the nineteenth century; not least among them was the view that for a modern thinker to employ them would be to fall back on prescientific modes of explanation. The reign of law was widely taken to be as absolute in human affairs as in nature, and neither chance nor choice seemed compatible with it. There were, however, two confusions connected with this assumption: the first was most clearly articulated by Comte, that the fundamental nature of science consists in its capacity for prediction; the second was a confusion regarding the meaning of determinism.

That science does permit us to predict what will occur under given circumstances, and that this is one of its most significant features, is not to be denied. What must not be overlooked, however, is that such predictions are possible only if we possess sufficient knowledge of the conditions initially obtaining and if we can also assume that the process with which we are dealing will not be interfered with through the intrusion of external factors. In short, laws give us the power of prediction only when taken in conjunction with a knowledge of the relevant initial and boundary conditions. In many cases we are not—and cannot be—in possession of such knowledge; in
those cases, therefore, we cannot predict what will occur. Never­
theless, even in such instances it may be possible to offer adequate
explanations of what has occurred once it has occurred. For example,
it is possible to account for past changes in living forms on the basis
of Darwinian theory even though the occurrence of these changes
could not have been predicted. Similarly, it is possible to identify the
causes of a patient’s death through a postmortem examination even
though (in the present state of knowledge) there may be no way in
which these causal factors could have been discovered while the
patient lived: his death, therefore, could not have been predicted.
This asymmetry between prediction and explanation undercuts
Comte’s attempt to identify science with “prevision”; and when that
identification is abandoned, it is no longer necessary to deny that
either chance or choice can affect the course of human affairs. In fact,
as we shall now see, on one meaning of the terms, each is compatible
with an acceptance of “determinism.”

Perhaps the most inclusive meaning of “determinism” is the
view that, whatever happens, there are always conditions which,
given them, nothing else could have happened. That meaning, how­
ever, does not rule out either chance or choice. For example, if I say
that it was a matter of chance that two events happened to occur in
the same neighborhood at the same time. I am not saying that, given
these conditions, something else might have happened. Rather, I am
merely saying that I can find no single set of conditions which ac­
counts for these events’ occurring in the same neighborhood at the
same time: it was a matter of chance that they did so. Similarly, if I
say that an event would not have happened had someone not chosen
as he did, I am not denying that it was necessary for this event to have
occurred once he had so chosen; rather, I am merely saying that his
choice (whatever may have been responsible for it) was one of the
conditions which entered into the event’s occurring.

In addition to this meaning of “determinism,” however, there is
another which does rule out chance and choice. When a series of
transformations takes place within a closed system, and each step in
that process is predictable as following from the preceding state of
the system in accordance with some applicable law, we are dealing
with a process the outcome of which is, in a strict sense, determined.
Since, ex hypothesi, no factors external to the system intervene in the
process and since whatever choice a human being makes with re­
spect to such a system occurs only with respect to its initiation,
neither chance nor choice affect the outcome of the process. Thus,
carefully controlled experiments provide paradigmatic cases of deter-
minism, whereas events occurring in nature—even though they follow necessarily from the conditions under which they occur—are not in the same sense “determined”: their occurrence may not be free of chance influences, nor of interventions due to human choice.

Those who, like Spinoza, hold that the world as a whole forms a single determined system, and thus that every event within it is strictly determined, do so on metaphysical, not on empirical grounds. In fact, Spinoza’s attempt to rule out chance and to establish his deterministic monism by means of the example of a tile which falls from a roof and kills a passerby, involves a petitio principii. He wished to prove that since neither the tile’s falling nor the passerby’s presence was an uncaused event, the accident itself was determined. This, however, would have served only to establish what he wished to establish were it true that neither chance nor choice had entered into the series of events which, on the one hand, culminated in the fall of the tile, and which, on the other hand, led to the passerby’s presence at that particular point at that moment. Neither of these causal series, however, existed as a closed system: when tracing back either series one finds that the ultimate outcome was dependent on the fact that in a series of events multiple lines of causation intersected. Thus, the problem of whether the outcome was or was not accidental is only compounded and not solved, since it arises once again in exactly the same form at every point in each of the causal series when two previously independent lines of causation are seen to have intersected. It is only when one confines one’s attention to the very last stage of what has occurred, when the tile is already falling and the passerby is about to be struck, and it is already too late for anyone or anything to have interfered, that we can say that this outcome, rather than any other, was determined.

While both Spinoza and Laplace held that the world as a whole is to be considered as constituting a single closed system, and while others, such as Buckle and Taine, also took this for granted, there are no empirical grounds to justify such an assumption. Even assuming that there may be some well-attested, universally applicable laws, such as the laws of motion assumed by Spinoza or by Laplace, there are two reasons to doubt that this would justify complete determinism. In the first place, as we have noted, laws can be used in predicting or explaining specific events only insofar as one has knowledge of whatever initial conditions were both present and relevant to the occurrence of the event in question. To claim that we possess any knowledge concerning the totality of the conditions obtaining in the whole universe at any one time, present or past, is to make an absurd
claim, therefore, to state that the world as a whole forms a determined system is at best only a speculative ideal, not a matter which can be confirmed. In the second place, even if—as Spinoza and Laplace believed—there are general laws applicable to all forms of motion, it is by no means certain that these laws can be applied to all events in nature or in human affairs. For example, it is by no means clear where one should look for the initial conditions to which any universal laws of physics might be applied if one were to explain the choices of individuals, or explain the variations which are to be found in human institutions in different places or at different times. One may wish to insist that there must be such conditions, and that there must be such laws, but that is only to say that determinism must be true. That there was this insistence on the truth of all-encompassing determinism is readily understandable, since the progress of scientific explanation in terms of laws, especially during and after the seventeenth century, seemed to suggest the possibility of establishing the reign of law throughout nature. Yet, toward the end of the nineteenth century, new interpretations of scientific explanation and of the status of scientific laws introduced a new intellectual climate insofar as the physical sciences were concerned, and this undermined the basic postulates of metaphysical determinism.

The new intellectual climate had multiple roots: among them was the recognition that a law of nature should not be regarded as a force which governs events but, quoting Huxley, should be regarded as "a mere record of experience upon which we base our interpretations of that which does happen, and our anticipation of that which will happen." Such a view had, of course, been anticipated by Hume, but it had not made substantial inroads into the thought of scientists until the middle of the nineteenth century. For example, as late as 1831 one finds Herschel, in his influential Preliminary Discourse on the Study of Natural Philosophy, not only speaking of the laws of nature as permanent, but as "consistent and intelligible," and holding that God, in creating the basic materials of the universe, had impressed upon these materials certain fixed qualities and powers "which made all their subsequent combinations and relations inevitable consequences of this first impression." This, it would seem, entailed the acceptance of the world—at least of the physical world—as a single, completely determined system.

Herschel himself, however, was soon led to abandon this view, and he did so under the influence of the new interest in the theory of probabilities as it was being applied in the physical and social sciences. This change is represented in an essay, stimulated by Que-
telet, which Herschel published in the *Edinburgh Review* in 1850. In it he explicitly rejects the view that the concept of causation should be used as referring to a force capable of producing an effect; instead, he takes the cause of an effect to be the type of occasion on which a given effect can be shown to occur with a certain frequency. Causes are thus to be interpreted as the tendencies of events to occur under a given set of circumstances. While this did not demand that one give up “determinism” in its broadest signification—that, whatever happens, there always are conditions which, given them, nothing else could have happened—it did entail abandoning the stricter form of determinism according to which every event is in principle predictable on the basis of some one law or set of laws, with any apparent irregularities being attributed to human ignorance or error. What had been innovative in Quetelet’s work was that instead of denying the existence of such irregularities, he had seen them as a means of discovering nature’s basic laws. In order to arrive at these laws he had used tables of frequency derived from observation, and by means of these tables he distinguished between those correlations which represented “accidental causes”; those which, because they varied periodically, represented “variable causes”; and those which were constant, thus representing “constant causes.” Herschel accepted this position, and thus abandoned his earlier view that all that happens in the universe is an inevitable consequence of the permanent, consistent, intelligible laws originally impressed on matter by God.

In spite of their rejection of a complete determinism which would rule out all contingency in nature, neither Quetelet nor Herschel was led to suppose that any events are uncaused. Nor was Cournot, another scientist-philosopher who attempted to show the relevance of the theory of probability to both the natural and the social sciences. Unlike Quetelet, however, Cournot directly attacked the metaphysics of determinism, according to which the world as a whole is to be regarded as a single, determined system. In this connection, the view which he developed in his *Essai sur les fondaments de nos connaissances* consisted in arguing—as I have argued against Spinoza—that the meeting of two previously independent lines of causation represents a contingent, or accidental, occurrence. He held that an event should be regarded as determined only when the various series of events which led to it were internally related—that is, when they were interdependent. When, on the other hand, two or more such series proceeded independently, even though they proceeded concurrently, the event resulting from their conjunc-
tion was to be regarded as a fortuitous, or chance, event. One might suppose that this thesis would not have provided an adequate answer to the metaphysical determinist, since each of the apparently independent lines of causation would have been known to an omniscient observer, and the event which occurred because of their conjunction would, therefore, in principle have been predictable. To this Laplacian mode of argument, Cournot had an adequate answer. The fact of an omniscient being’s foreknowledge would not alter the fact that the two lines of causation were independent of one another: their coincidence would remain an example of a chance event. One should in such cases simply say that God (or a mathematical angel) is able to foresee just when and where chance events will occur. There should be nothing puzzling in this. When events are determined, one holds them to be determined by the conditions actually obtaining and not by virtue of the fact that God (or a mathematical angel) does have or could have, knowledge that they would occur. The case is precisely the same with respect to the contingent fact that two previously independent lines of causation have met. Whatever occurs in such cases is not to be regarded as having been determined by God’s foreknowledge that it would occur. Rather, we must account for it in terms of the circumstances which brought it about, and these circumstances were, *ex hypothesi*, the fact that the lines of causation which met at that particular time and place were previously independent of one another; in short, the event remains, as Cournot claimed, a chance event.

It follows from Cournot’s characterization of chance events that one should not identify such events with what is rare or surprising. This can be illustrated through one of his own examples. If one draws a white ball from an urn known to contain mostly black balls, this is a relatively rare and perhaps surprising event; but it is equally a chance event if in such a case one draws a black ball. It was at this point that Cournot’s defense of contingency as a fact in nature and in human affairs made contact with his interest in the theory of probabilities. He analyzed many uses to which such calculations could be put, but among them was that of distinguishing between events which were due to chance and those which were not. For example, if, in rolling dice, one die comes up with a six on a whole series of trials, we do not attribute this to chance, but look to some causal factor (such as the conformation of the die) for an explanation. Cournot then extrapolates from such simple cases to the wider uses of probability in the sciences and in everyday life.

In looking to probabilities as an important source of knowledge,
Cournot was in line with strong currents among the scientists of his period. This fact was later stressed by Peirce, who cited Darwin’s evolutionary doctrine as a prime example of how chance begets order. In this connection Peirce cited Quetelet, Herschel on Quetelet, and Buckle as representing the new reliance on chance in scientific explanations: to their names he added others, such as those of Clausius and Maxwell, as examples of thinkers who used chance as an explanatory concept in thermodynamics. Although Boltzmann was not cited by Peirce in this connection, he was, of course, the foremost exponent of the statistical method as applied to mechanics. It is of interest, then, that Boltzmann, too, cited Buckle’s use of statistics concerning the constancy of voluntary behavior among masses of people as analogous to the molecular motions which engender the large-scale phenomena with which the laws of thermodynamics are concerned. It was Peirce, however, who most completely developed the doctrine of chance as begetting order and extended this contention beyond the sciences to a metaphysics of the world’s structure. This was his doctrine of “tychism.”

The groundwork for that theory was laid in two articles Peirce published in The Monist in 1891 and 1892. In one of them, “The Doctrine of Necessity Examined,” he attacked traditional mechanical philosophies, attempting to show that, contrary to what was often believed, the doctrine of absolute determinism was not a necessary postulate of science. In this connection, he argued that scientific method rests on inductive sampling and needs no such postulate. In the same article, he attacked the view that there is adequate empirical evidence for the necessitarian position: he did so by stressing the element of fallibility in scientific measurement, and the steps which scientists take to reduce the range of probable error in their sampling techniques. At one point in his defense of the objective reality of chance, Peirce introduced a dialogue between himself and the necessitarian designed to show that the existence of physical laws does not preclude the existence of chance. Chance, he held, is to be found in diversity, specificity, irregularity, whereas law explains what regularly occurs. The argument runs as follows.

Peirce says: “I must acknowledge there is an approximate regularity, and that every event is influenced by it. But the diversification, specificness, and irregularity of things I suppose is chance.” The necessititarian answers: “If you reflect more deeply, you will come to see that chance is only a name for a cause that is unknown to us.”
Peirce presses him, saying: “Do you mean that we have no idea whatever what kind of causes could bring about a throw of sixes?” To this, the necessitarian replies: “On the contrary, each die moves under the influence of precise mechanical laws.” But then Peirce makes his point, saying: “But it appears to me that it is not these laws which make the die turn up sixes; for these laws act just the same when other throws come up. The chance lies in the diversity of the throws; and this diversity cannot be due to laws which are immutable.”

Peirce then went on to argue that the necessitarian view runs counter to an acceptance of evolutionary theory, according to which diversity and specification develop over time. As is well known, his interest in the scientific and religious implications of evolutionary theory had been of long standing, and like Spencer and others of the period, he attempted to build an evolutionary cosmology. His aim in doing so was to show how it might be possible to account for those laws which we find to be exemplified in nature, rather than simply taking them for granted as given. This he did by postulating that there was a primordial continuum of feeling which gradually differentiated itself and out of which habits developed, these habits being fixed modes of action that were strengthened through repetition; it was “from this, with the other principles of evolution, [that] all the regularities of the universe would be evolved.” Thus, instead of holding—as the necessitarian does—that “chance” is simply a name for that of which we are ignorant, Peirce regarded it as ultimate, and regarded order as being derivative from it and to be explained through it.

This metaphysical cosmology, presented as it was in a highly abbreviated, opaque, and fragmentary form, seems not to have had any appreciable influence on contemporary thought except insofar as it was taken up, in new contexts, by William James. It was James rather than Peirce who, at the time, did most to undermine the dominance of necessitarianism in popular philosophic thought by extending Peirce’s original pragmatism to moral and religious issues. While the pragmatic theory of knowledge, in all of its forms, did much to undercut necessitarianism, a far more potent force—so far as technical philosophy was concerned—was the growth of positivistic interpretations of science. It is to them that we now turn.

As we have noted, the view that nature “obeys” fixed laws, which it is the scientist’s aim to uncover, had been deeply ingrained in scientific thought; it was only gradually displaced by the view that
natural laws are simply generalizations based on observed regularities which appear to hold without exception. This view, implicit in Hume's analysis of the source of our belief in the causal relation, became widely accepted only toward the middle of the nineteenth century. Until then, it was common to speak—as Herschel himself had originally spoken—of the laws of nature as if they were forces governing the phenomena they explained. Even Comte did not wholly free himself from this conception, in spite of the fact that he attempted to rid science of the notion that phenomena were to be explained in terms of underlying “causes.” In fact, it was probably John Stuart Mill who first clearly formulated a consistent positivistic conception of the nature of scientific laws. In 1843, in his System of Logic, he wrote, “The Law of Causation, the recognition of which is the main pillar of inductive science, is but the familiar truth, that invariability of succession is found by observation to obtain between every fact in nature and some other fact which has preceded it; independently of all ‘considerations’ respecting the ultimate mode of production of phenomena, and of every other question regarding the nature of ‘Things in themselves.’” Similarly, in 1847, Helmholtz had held that “the principle of causality is in fact nothing more than the presupposition that in all natural phenomena there is conformity to law [Gesetzlichkeit],” and Kirchhoff, too, rejected the notion that the task of the scientist was to explain phenomena in terms of something lying behind them, rather than being content to formulate laws concerning phenomena and to explain these laws not in terms of underlying causes but through appealing to further laws.

As I have elsewhere shown, scientists such as Helmholtz, Claude Bernard, and Huxley, who adopted a positivistic view of the laws of nature and who presumably stripped them of all metaphysical overtones, nonetheless believed—along with Mill—that the uniformities which found expression in these laws were uniformities existing objectively in nature. By the 1880s, however, this view was subjected to radical revisions which undercut the assumption that the laws scientists formulate can be assumed to reflect, directly and unambiguously, the patterning of what occurs in nature. Two major strains of thought contributed to this altered view. The first is best epitomized in Mach’s interpretation of scientific laws as originating in our tendency to organize experience in accordance with the principle of “the economy of thought”; the second was at first most influentially represented by Poincaré’s interpretation of scientific hypotheses as theoretical constructions, a view which had much in common with some of Boltzmann’s theoretical utterances.
and received an even more radical interpretation in Duhem.

Mach's concern with philosophical issues antedated his own scientific investigations, having first arisen during his youth when he abandoned the Kantian notion that behind our experience a "thing in itself" is to be postulated. After briefly accepting a Berkeleian position, he challenged the conception of substance not only as it had been applied to material objects but also as it had been applied to the mind or ego. Like Avenarius, he adopted a philosophy of pure experience, attempting to shun all metaphysical notions, whether realist or idealist, claiming that what is given as the material for all knowledge are simple data, or "elements," of which we are directly aware. From the point of view of his interest in physics and in psychophysics, Mach saw this approach as highly advantageous, for it permitted him to investigate the relations among physical events, physiological events, and the data of consciousness, while escaping conventional problems concerning the relations between what occurs in the physical world and what is present in consciousness. According to Mach, the laws of physics, physiology, and psychophysics, and any psychological laws connecting our various ideas with one another, were simply ways in which we relate different sets of elements to one another. Such laws do not in any sense determine the relations among the elements: they merely summarize relations which we have regularly observed in the past. Thus, the function of laws is to serve as a means whereby we codify, recall, and anticipate experience, and in this way their function is life-serving. Mach's use of the concept of the life-serving function of thought was connected with the influence that Darwin's theory had exerted on him. It was not, however, the scientific systematization of experience that he regarded as life-serving, as is clear in his Contribution to the Analysis of Sensations (1886), he also held that our commonsense categories have an adaptive function, and this function, too, was included in his principle of the "economy of thought." Thus, on his view, neither the way in which science organizes experience nor the way in which we organize experience in everyday life is to be interpreted as reflecting relations which exist in nature independently of us. This marked a departure from the assumptions of such earlier positivistic thinkers as Comte, Mill, Helmholtz, Huxley, and Spencer, and supplemented the influence which was soon to be exerted by Poincaré and later by Duhem.

In the meantime, however, Mach's great intellectual opponent, Boltzmann, attempted to develop a philosophy of science which went beyond positivism, supporting a critical realism (which he
called "materialism") based on the procedures and results of the sciences rather than on any form of "metaphysical" argument. In opposition to Mach's phenomenological physics, which reduced all physical concepts to observational terms, and in opposition to Ostwald's energetics, Boltzmann held that given the laws of physics there was every reason to regard atoms as actually existing entities, not hypothetical constructs. In defending this position, he was forced to emphasize that physics could not concern itself simply with observable correlations, but must be allowed to construct a theory that went beyond the directly observable and would be validated only insofar as its constructions permitted one to ascertain relations among observable facts not discoverable in any other way. He recognized that this position forced him to grant the possibility that there could be alternative constructions, and in doing so his statements sometimes seemed to suggest that no particular theoretical construction was likely to present an adequate model of the independently existing world. For example, he said:

Hertz makes physicists properly aware of something philosophers had no doubt long since stated, namely that no theory can be objective, actually coinciding with nature, but rather that each theory is only a mental picture of phenomena, related to them as sign is to designatum. From this it follows that it cannot be our task to find an absolutely correct theory but rather a picture that is as simple as possible and that represents phenomena as accurately as possible. One might even conceive of two quite different theories both equally simple and equally congruent with phenomena, which therefore in spite of their differences are equally correct. The assertion that a given theory is the only correct one can only express our subjective conviction that there could not be another equally simple and fitting image.

Similarly, he concluded a lecture entitled "On the Indispensability of Atomism in Natural Science" (1897) with the statement:

Imagine there could be an all-encompassing picture of the world in which every feature has the evidence of Fourier's theory of heat conduction, then it remains so far undecided whether we should reach that picture by the phenomenological method or by constant further development and experimental verification of the pictures of current
atomism. One might then equally well imagine that there could be several world pictures all of which possessed the same ideal property.\textsuperscript{26}

Nevertheless, Boltzmann repeatedly argued that while there may eventually prove to be more adequate theoretical constructions than that involved in assuming atomism, the path of science up to the present had increasingly validated that construction, rather than any alternative to it. As he said, “Perhaps the atomistic hypothesis will one day be displaced by some other but it is unlikely.”\textsuperscript{27} Furthermore, given the successes of the atomistic view in linking a great variety of natural laws in a systematic manner, Boltzmann felt justified in challenging his opponents, saying, “One can ask only what would be more disadvantageous to science: the excessive haste implicit in the cultivation of such pictures or the excessive caution that bids us abstain from them?”\textsuperscript{28} On his view the answer was clear: the model of nature proposed by atomism had allowed science to proceed with remarkable success in establishing laws which had thus far proved to be applicable to an ever-expanding range of phenomena. Thus, he insisted that it was in and through science itself, not in terms of subjective criteria nor in terms of philosophic argument, that scientific constructions were to be validated.

There is at least one respect in which the position of Poincaré resembled that which has here been attributed to Boltzmann, and in which it differed radically from the views held by Mach. Poincaré no less than Boltzmann regarded it as the task of science to come to grips with an independently existing world, rather than merely providing a means by which our experience is ordered in an economical way. Like Boltzmann, Poincaré also stressed the fact that science depended upon the use of hypotheses which go beyond observations, yet it was at this point that their views diverged. While Poincaré agreed with Boltzmann that the success of a hypothesis in assimilating further facts was a test which could serve as a means of validating those particular hypotheses which we designate as laws, he drew a parallel between physics and mathematics, insisting that just as it is possible to construct multiple, equally valid geometries, so it is possible to construct alternative physical theories resting on differing definitions and conventions, which he called principles. For example, in his treatise *Electricity and Optics* (1901), he said, “If therefore a phenomenon admits of a complete mechanical explanation, it will admit of an infinity of others which will account equally well for all the peculiarities disclosed by experiment.”\textsuperscript{29} Thus, insofar as the
element of convention enters into the formulation of general scientific theories, which Poincaré insisted that it always did, it becomes impossible to choose among the alternatives on the basis of empirical evidence: the more ultimate criterion which he used was that of relative simplicity, and he justified the use of this criterion not in terms of practicality but in terms of aesthetic appeal. While this introduced an element of subjectivity into science, Poincaré insisted that the subjectivity was an impersonal one, for in the end, the decision was one on which many minds agreed.

Poincaré's attempt to shield his theory from subjectivistic interpretations can scarcely be regarded as anything but a failure, and a failure magnified by his insistence that science can never inform us concerning the nature of the entities with which it deals, but only concerning the relations among them. This opened the way for those who, for various reasons, were inclined to limit the significance of science as a means by which we ascertain truths about the world. For example, much to Poincaré's discomfiture, Le Roy combined a conventionalist interpretation of science with a Bergsonian metaphysics, and Pierre Duhem's form of conventionalism made it possible for him to accept as equally valid, though wholly independent of science, an orthodox form of metaphysical theism. Nor was this an idiosyncratic view on the part of Duhem. Toward the end of the century, when interpretations of science became less and less closely associated with epistemological realism, more and more philosophers used the newer interpretations of science as a means of defending their commitments to what they regarded as other, no less reliable forms of truth.

Among those who merit special mention in this connection is Poincaré's brother-in-law, Emile Boutroux. In the preface to the English translation of The Contingency of the Laws of Nature, Boutroux described the position he had adopted in the following way:

Philosophical systems appeared to me as though they might be summed up, speaking generally, in three types, which all had the same draw-back: the idealist, the materialist, and the dualist or parellelist types. These three points of view have this in common: they force us to regard the laws of nature as a chain of necessity, rendering illusory all life and liberty.

Analyzing the notion of natural law, as seen in the sciences themselves, I found that this law is not a first principle but rather a result; that life, feeling, and liberty are
true and profound realities, whereas the relatively invariable and general forms apprehended by science are but the inadequate manifestation of these realities.34

This point of view was not, of course, wholly new with Boutroux. Slightly earlier, in 1867, in a survey of nineteenth-century French philosophy, Ravaisson had criticized both eclecticism and positivism, and in his concluding section had proclaimed a spiritualistic idealism reminiscent of Maine de Biran, in which personality and free volition offered the fundamental clues to the nature of ultimate reality. A similar position was developed with somewhat greater rigor by Ravaisson’s pupil and friend Lachelier, whose Foundations of Induction (1872) was in large part based on a criticism of Mill and ended by saying that “the realm of final causes, by penetrating the realm of efficient causes without destroying it, exchanges everywhere force for inertia, life for death, liberty for fatality.”35 Nevertheless, it was probably Boutroux’s essay The Contingency of the Laws of Nature, published in 1874, that had the greatest initial impact on the development of that form of French idealism which had as its obverse side a critique and rejection of scientific realism.

At the same time, Revouvier’s systematic exposition of a neo-Kantian form of criticism, emphasizing contingency and individual freedom, gave further impetus to the growth of idealism in French philosophy. This movement, which was highly critical of the ultimate adequacy of scientific forms of thought, might have had relatively little impact outside of France at the time had it not been for the influence of Bergson’s anti-intellectualism, which began in the early 1890s but grew enormously after 1907, when his Creative Evolution appeared.36 In speaking of this period in French thought, Parodi summarized it as having abandoned the dominant nineteenth-century interpretation of science, seeking instead to exploit other avenues of approach to reality, particularly those in which morality, religion, or intuition played a dominant role.37

In one form or another, the idealism present in French philosophy was paralleled in England and in the United States by a great deal of popular philosophic and quasi-scientific thought. It was, however, the development of the positivist tradition—and especially in the form of logical positivism—that did the most to undermine the traditional forms of necessitarian doctrine. It was characteristic of this approach to treat laws as descriptive generalizations, rather than viewing them as expressions of relations which mirrored the underlying forces of nature. While those who stood in this tradition did not
generally regard contingency as an ultimate, irreducible aspect of natural events, as had Cournot and Peirce, they relied increasingly on a probabilistic interpretation of scientific laws. Thus, the necessitarian tradition—whether in the form it assumed in seventeenth-century rationalism or in its eighteenth-century formulations—came to an end. Not only was it denied by those who appealed to contingency in nature or to freedom in man, but it was also regarded by positivists as unnecessary metaphysical baggage which scientists and scientifically oriented philosophers would be well advised to discard. At the same time, positivists strongly opposed the legitimacy of appealing to either chance or choice in interpreting the course of human affairs. Their use of statistical probabilities for the purpose of explaining what occurs under given circumstances was not coupled with any assumption that what occurs is not itself determined, nor were they willing to assume—as were the French idealists or pragmatists like Peirce and James—that human action is any less strictly determined than are natural events. What had happened was that a new conception had been introduced into the ways in which most scientists and many philosophers used the concepts of "a law of nature" and "determinism" and "choice": necessity, it was assumed, still reigned. To what extent that view must be accepted insofar as human affairs are concerned is a subject I shall discuss in the final chapter.