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*The only possible conclusion the social sciences
can draw is: some do, some don't.*

—Ernest Rutherford



THE SOCIAL SCIENTIST'S MISCONCEPTION OF SCIENCE

Mortimer J. Adler

Archivist's Note: This is an unpublished lecture (outline) delivered before the Social Science Research Council Summer Conference at Hanover, NH, August 1930. It is fortuitous that we have a copy of this. It was only located because it was footnoted in *Social Science in the Crucible: The American Debate over Objectivity and Purpose, 1918-1941*, by Mark C. Smith (Duke University Press, 1994), and the author was able to provide a copy of the document that Dr. Adler sent to him.

THESIS:

Current research programmes in the social sciences are misdirected and methodologically ill-advised because of erroneous conceptions of the nature of science which comprises the “raw empiricism” characteristic of contemporary social science.

ARGUMENT:

1. Science as knowledge must be distinguished from common-sense knowledge and from information.
 - a. Scientific knowledge is a systematized body of propositions.
 - b. Scientific knowledge must include general propositions; information consists of propositions about particulars.
 - c. Mere aggregates or assemblages of facts (propositions about particulars) cannot constitute scientific knowledge.

2. The distinction between exact science (the physical sciences) and inexact science (the social sciences) is a distinction between good and bad science, not between two different kinds of science.
 - a. The methodological problems of the social sciences are essentially the same as those of the physical sciences.
 - b. The scientific aims of the social sciences are the same as those of the physical sciences.
 - c. There is nothing inherent in the subject matter as such of the social sciences which prevents them from being exact sciences.
 - (1) Subject-matter must not be confused with phenomena.
 - (2) The subject-matter of a science is constructed by the scientist not discovered by him.
 - (3) Social phenomena are not different from physical phenomena if properly considered as the object-matter of science.

3. The fundamental trait of exact science may be stated methodologically as the cooperation between its rational and empirical branches.

- a. Science results from the relationship between theory and experiment.
 - (1) We are not here considering purely theoretical doctrines, such as mathematics.
 - (2) There can be no purely empirical or experimental science, i.e. lacking all theory.

- b. Theory must be distinguished from speculation.
 - (1) Speculation is the substitution of imaginative thinking, for empirical investigation where empirical investigation is possible.
 - (2) Theory consists in reflective analysis, without which empirical investigations cannot be intelligibly executed.

- c. The relation of theory and experiment in exact science is that of prescription and exemplification.
 - (1) The analytic function of theory: the articulation of the primary concepts which determine the subject-matter.
 - (a) Concepts are definitions, not images.
 - (b) Assumptions state the relations of primary concepts, which are determined by definition and not by fact, experience or experiment.
 - (c) A theory is an analytic doctrine: a set of definitive propositions, systematized by assumptions.
 - (2) The prescriptive function of theory:
 - (a) Theory provides for the formulation of experimental hypotheses.
 - (1) A hypothesis is not a hunch or a guess, but a theoretical proposition. Hypotheses may be stated either in the if-then form or the either-or form.
 - (2) Hypotheses are theoretical propositions stating the relation of specific variables.
 - (b) Hypotheses are not predictions but prescriptions.
 - (1) Hypotheses determine the relevance of specific methods of research to specific research problems.
 - (2) Hypotheses not only formulate problems but determine the character of the evidence relevant to their solution.
 - (c) Digression: The operational point of view in modern physics as an illustration of the prescriptive

- function of concepts.
- (3) The explicative function of experiment and investigation.
 - (a) Experiment and investigation do not verify hypotheses but exemplify them.
 - (b) The results of an experiment or investigation must be distinguished from its conclusion.
 - (1) The results are the summarized findings. Example: statistical description.
 - (2) The conclusions are the results formulated in the light of theory and in their relevance to hypotheses which they exemplify. Example: statistical inference.
4. Theory is methodologically indispensable in the accomplishment of the purposes of exact science.
- a. Without hypotheses, research is merely exploratory and not experimental
 - (1) Experimental research is any investigation directed by hypothesis, not research done in a laboratory with apparatus.
 - (2) Exploratory research achieves information (collections of fact-propositions) and thus does not satisfy the purpose of science which is to achieve general propositions.
 - b. Without definitions (clear concepts), valid and reliable observation is impossible.
 - (1) A scientific datum is a particular instance of a defined class of data.
 - (2) Scientific data are different from common sense perceptions.
 - (3) Scientific data rendered by instruments are defined by the nature of the instrument.
 - (4) Scientific data achieved by direct inspection must be defined prior to observation; observation itself does not define.
 - c. Without theory, problems cannot be formulated which are capable of scientific solution.
 - (1) The phenomena do not formulate problems.
 - (2) Problems are dilemmas made obligatory by theory.

- d. Without theory, specific methods of research cannot be devised to solve scientific problems.
5. In the light of the foregoing statement of the nature of exact science (which is equivalent to science), we can now enumerate the misconceptions which prevail among social scientists.
- a. That exact science must be quantitative, and that quantitative means arithmetical, or mathematical.
 - (1) Rather a science cannot be quantitative (mathematical) unless it is exact. Data which are not defined by theory cannot be quantified. Measurement (hence quantification) involves definition and assumption. Measurement is not quantitative; it is merely the use of proportion. Projective geometry as an example of non-numerical, non-quantitative exact science.
 - (2) Numbers are rarely symbols for premise relationships: they do not make the relationships precise.
 - (3) The science of genetics is an instance of an exact science which is not mathematical; similarly qualitative chemistry & psychophysics, etc.
 - b. That exact science entails certainty; hence, since the social sciences deal with probabilities, they cannot be exact.
 - (1) Only mathematical or logical (purely theoretical) propositions are certain.
 - (2) The conclusions of exact physical science are merely probable. All empirical propositions are probable.
 - (3) But probability does not mean vagueness or indefiniteness. Whatever the degree of probability it can be known with exactness, and in some instances with certainty.
 - (4) Furthermore, the probability of any empirical proposition depends upon *a priori* probability furnished by theory. Hence, there can be no scientific determination of probabilities without theory.
 - c. That exact science must be experimental rather than statistical, and that the physical and biological sciences can be experimental whereas the social sciences must be statistical.
 - (1) But experiment means nothing more than directed re-

- search as opposed to mere exploration.
- (2) Experimental or directed research investigates the covariation of variables.
 - (3) The control of variables can be accomplished either in a laboratory or by statistical treatment of the research data.
- d. That the purpose of science is to describe the fact and nothing more.
- (1) Mere description of facts is informational whereas science seeks to achieve general propositions about the facts: empirical conclusions have systematic intelligibility in terms of a theory, and an ascertainable definitive degree of validity (probability).
 - (2) There are no facts *per se* without reference to concepts definitive of classes of particulars.
- e. That concepts are valuable in proportion as they describe facts and are based upon knowledge of facts, i.e. that concepts are *a posteriori*.
- (1) But concepts do not describe; they define.
 - (2) Definitions must be *a priori*, and unless *a priori*, no particulars could be unambiguously observed.
 - (3) There are no “concrete concepts”; all concepts are abstract.
 - (4) Theories do not attempt to represent the facts; they attempt to analyze concepts.
 - (5) The value of a concept is the symbolic function it performs in analysis; it is not a picture.
- f. That theories (concepts and assumptions) must come after experience and not before; that the scientist can develop only a theory as a result of his acquaintance with the phenomena.
- (1) The fallacy here is the failure to distinguish between logical order and temporal order.
 - (2) Today’s scientific theory is the result of all the knowledge which was acquired yesterday, but it is the psychological or temporal result, not the logical result.
 - (3) Today’s theory, however, is logically *a priori* to today’s and tomorrow’s investigations; without some theory, which is logically *a priori*, no researches can be carried on in the present.

- g. That the social sciences are very young, and therefore should continue to do merely exploratory work, gathering the raw materials out of which theories will someday be constructed.
 - (1) But the physical sciences had theories when they were very young.
 - (2) Ordinary common sense experience is all that is required as raw material out of which to begin the construction of a theory.
 - (3) The early theories of a science need not be perfect.
 - (4) The science progresses by the progressive perfection of its theories.
 - (5) But without some attempt at theoretical construction, without some attention to the development of its rational branch, the social sciences, so-called, will never move from the level of more informational or common sense knowledge to that of exact science.

- h. That the objects (perceptions) of common sense experience are scientific data.
 - (1) The objects of common sense are defined by the categories of common sense; and the data of science should be defined by the categories of science.
 - (2) Illustration: the three ranges of observation in physics, and the distinction between common sense observation and the scientific observation of data.
 - (3) The three ranges of observation in social science.

- i. That some of the social sciences deal with temporal phenomena, have histories, and other of the social sciences deal with aggregates or groups rather than individuals; hence, they cannot be exact sciences.
 - (1) But the phenomena of physical science are temporal, have histories, and physics deals with groups and aggregates.
 - (2) History as such is purely descriptive, is narrative, and hence has no place in science. The physical sciences treat time as a dimension: the social sciences can do similarly.
 - (3) Natural history is not science.
 - (4) Exact science deals with aggregates by means of statistics and is thereby no less exact. The social sciences

have failed to understand the distinction between the field-laws of physics and the statistical laws.

(5) Science cannot ever deal with individuals; it must deal either with particulars, groups, or classes.

6. We can now summarize these fallacies, and indicate their historical origins.
 - a. The confusion of theory and speculation. Comte's positivism, the 19th century empiricism of Mach, Mill, Pearson, etc.
 - b. The antipathy to abstraction as valueless, and the supposition that there are concrete, as opposed to abstract, concepts which accurately describe (picture, represent) the facts. The empirical logic of John Stuart Mill and the pragmatism of James and Dewey.
(Note: The appendix contains a striking statement by John Dewey in which he denies this position and agrees that science is impossible without abstraction, and the more abstract and theoretical a science is, the more power it has for practical application.)
 - c. The confusion of definition with description and analysis with representation, in general, the confusion of formal logic with psychology. Again the influence of English empirical psychology and epistemology.
 - d. The failure to understand the purely symbolic function of concepts in analysis.
 - e. The confusion of the scientific datum with the observable objects of every-day, common-sense perception.
 - f. The fallacy of reification or entitization of concepts.
 - g. The suppositions that experiments verify and hypotheses predict, Francis Bacon, and the empirical and positivistic methodology of the 19th century.
 - h. The failure to understand the relation between induction and the logic of probability, and the relation between statistical inference and the logic of probability. Mill's logic.
7. In short, the social sciences had their initiation either in the latter part of the 18th century or in the 19th century, and unfortunately came under the influence of the exponents of positivism and "raw empiricism"; Comte, Mach, Mill, Pearson, James, Dewey.
8. Furthermore, whereas the early workers in physical science in the 16th and 17th centuries were well trained in mathematics and formal logic, the early workers and the contemporary

workers in social science either entirely lack this training, or else have been trained to distrust mathematics and logic, or else have been thoroughly confused as to the nature of theory.

9. The two ways of viewing science, in the path of one of which the social sciences have been misled, can be briefly exhibited by the citation of the two traditions in the criticism and interpretation of science:
 - (1) Bacon, Comte, Mill, Mach, Pearson, Ostwald, Bridgman, Haldane, Dewey.
 - (2) Descartes, Whewell, Kant, Poincare, Jevons, Cassirer, Clifford, Campbell, Eddington, Whitehead, Meyerson.

10. The foregoing argument can best be illustrated by a brief comparison of the one social science which has understood the method of exact science; with the others which have failed because of their raw empiricism.
 - a. Brief analysis of theoretical and mathematical economics.
 - b. Critical discussion of political science, anthropology, psychology, and sociology.
 - c. Sociology as the worst offender.
 - d. Illustrations of theory in criminology and in psychology.
 - e. Proposal for the constitution of a science of history.

APPENDIX

C.I. Lewis. "Pragmatism and Current Thought," *Journal of Philosophy*, XXVII, 238.

"The physicist's elephant is an abstraction, but a rather palpable sort of abstraction. All of him that the physicist finally deals with is what is common to the elephant and the pointer-readings; namely a mere abstract, a very abstract, configuration of relationships ... Nor is it appropriate to cry shame upon the physicist for leaving the world of palpable elephants in favor of such unimaginable abstractions. The physicist's concept represents simply an intermediate stage in a process which begins and ends with elephants and such ...

"As Professor Dewey points out, the physicist and the mathematician simply take this intermediate stage off by itself and deal with it on its own account. Thus, if we reflect upon the functional theory of knowledge, I think we may come to the conclusion that there is no implication of it which is incompatible with the notion that con-

cepts in general are abstractions—even very thin abstractions. Because the function of concepts is not to photograph elephants, but to get them into box-cars. Concepts represent simply that operational function of cognition by which it transforms something given, with which it begins, into the something anticipated or something done, with which it ends. That they may have lost or discarded as irrelevant, those elements of the concrete and immediate which characterize direct perception and imagination, is nothing to the point. Goodness in a concept is not the degree of its verisimilitude to the given, but the degree of its effectiveness as an instrument of control. Perhaps Professor Dewey might even, with entire consistency, find less occasion to regret that the relatively undeveloped sciences of human affairs show a tendency to imitate this abstractness. When the social sciences attain that degree of abstractness, and consequent precision, which already characterizes mathematics, perhaps they will have less trouble getting their social elephants into their social box-cars. Economics is the best developed of the social sciences, and a fair illustration.”

John Dewey. “In Reply to Some Criticisms,” *Journal of Philosophy*, XXVII, 271.

“I find myself in such sympathy with the article of Mr. Lewis that I shall confine my comment upon it to one minor point. He says, ‘Professor Dewey seems to view such abstractionism in science as a sort of defect—something necessary, but always regrettable; an inadequacy of it to the fullness of experience.’ I fear that on occasion I may so have written as to give this impression. I am glad therefore to have the opportunity as saying that this is not my actual position. Abstraction is the heart of thought; there is no other way—other than accident—to control and enrich concrete experience except through an intermediate flight of thought with conceptions, relata, abstractions. What I regret is the tendency to erect the abstractions into complete and self-subsistent things or into a kind of superior being. I wish to agree with Mr. Lewis that the need of the social sciences at present is precisely such abstraction as will get their unwieldy elephants into box-cars that will move on rails arrived at by other abstractions. What is to be regretted is, to my mind, the tendency of many inquirers in the field of human affairs to be over-awed by the abstractions of the physical sciences and hence to fail to develop the conceptions or abstractions appropriate to their own subject-matter.”

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