

One thing existed that neither he nor the government knew about at that time. That was the secret military treaty, made in 1892 between France and Russia, in which it was laid down that mobilization of the two countries was a declaration of war against Germany. This meant that, if a war broke out, Great Britain was committed to obligations of armed force far beyond Germany.

(Continued)

Port Washington, New York

C O M M E N T

On "Measurement as Scientific Method in Economics"

By E. C. HARWOOD

DR. YEAGER'S PAPER seems important and useful for two principal reasons. In the first place, his criticisms of those who believe that "science is measurement" and little else (if there are any such individuals?) are well taken.¹ Second, several of his assertions about modern scientific method perhaps are representative of the views of many economists; consequently, further discussion of those points may be useful not only to Dr. Yeager but also to others.

In parenthetically raising a question above as to whether there are any individuals who believe that "science is measurement" and little else, I do not imply that Dr. Yeager has indulged in the pastime of setting up a "straw man" in order to display his own forensic powers. The situation simply is that Dr. Yeager does not cite enough from the works of any individual to justify convicting that person of such a restricted understanding of scientific method as the phrase "science is measurement" seems to imply. Nevertheless, there may be such individuals, and if there are I should agree with Dr. Yeager's criticism of their viewpoint.

In this connection, he might well have broadened his criticism to include those who apparently believe that restating or summarizing an argument in the form of a mathematical equation somehow constitutes proof that the assertion is warranted. Not only is measurement alone far from the whole or even *the* significant portion of scientific method, but also measurement

¹ Leland B. Yeager, "Measurement as Scientific Method in Economics," *Am. J. Econ. Sociol.*, 16 (July, 1957), pp. 337-46. [For the Cowles Commission's evaluation of its experience under the motto "Science Is Measurement"—revised in 1952 to read "Theory and Measurement"—see *Economic Theory and Measurement: A Twenty Year Research Report*, Chicago, Cowles Commission for Research in Economics, 1952, especially the popular discussion of endogenous and exogenous variables and of random or stochastic variables, pp. 31-40, and part VII, "Economic Theory Revisited, 1948-1952," pp. 43-65.—ED.]

plus mathematics must be denied the right to claim that position.^{1a}

Turning now to certain of Dr. Yeager's assertions about scientific method, he argues that "In economics, no numerical constants occur." In the next paragraph he says, "People who believe in constants and dependable numerical relations in economics should be asked to name some."

In the first portion of his paper Dr. Yeager discusses various applications of scientific method in the physical sciences and points out that numerous uniformities of relationships (or constants) among various quantitative measurements have been found. From his own description, I assume Dr. Yeager understands that the degree of accuracy with which those uniformities of relationships have been measured has covered a wide range. Initially, the quantitative measurements were in such crude form as "hotter or colder," more or less, heavier or lighter, etc. Decades, even centuries in some instances, elapsed before the degree of precision now attained in many fields was reached. Moreover, the end is not yet; hardly a month passes without an announcement that some "constant" in the physical or physiological sciences has been measured more precisely.

Thus it is plain that the word "constant" may be misleading in that it may imply to many readers fixity and finality, an ultimate and invariable bit or aspect of "reality." Modern scientific method now progresses in its inquiries without such notions. Perhaps the phrase "uniformity of measured relationships" is a more useful name for the ever-improving and ever-to-be-improved accuracy of specification and measurement that characterizes modern science. (I am assuming that Dr. Yeager would not argue that at some stage in the progression from crude to more accurate measurement the method applied suddenly becomes scientific.)

If Dr. Yeager will grant that the phrase "uniformity of measured relationships" may be substituted for "constant" in his discussion, his challenge to the effect that "People who believe in 'uniformities of measured relationships' in economics should be asked to name some" can be met. I should cite first the following: ". . . people prefer more income to less. . . ." (I assume this is, or could be, based on observation of others' behavior rather than on introspection.)² This is one of Dr. Yeager's

^{1a} Lest the reader think that I have indulged in the "straw man" technique, the following example is offered: Paul A. Samuelson, *Economics, An Introductory Analysis*, pages 283 and 291, where mathematical formulas in pictorial form (charts) are alleged to "confirm" the author's reasoning. The accompanying discussion suggests that he sincerely believes he has thus offered incontrovertible proof. With such procedures apparently escaping challenge at the Massachusetts Institute of Technology, it is hardly surprising that they have been widely accepted as sound elsewhere.

² In fairness to Dr. Yeager, I should point out that this parenthetical comment was added after seeing his reply, below.

examples in section III of his paper. However, in the same paragraph where he offers this example Dr. Yeager asserts that ". . . these postulates are qualitative rather than numerical truths." Presumably he is using "numerical" as a substitute for "quantitative" although in the example cited above either "numerical" or "quantitative" obviously would be applicable.

Evidently Dr. Yeager is using the label "qualitative" in a different sense than it frequently is used in discussions of scientific method. I do not of course assert he is in error when so using that label, but I am curious to know where, to him, the difference between "qualitative" and "quantitative" is found. One can judge "more or less" only by comparative measurements, however crude those measurements may be. To me it would seem exceedingly difficult, perhaps impossible, and probably pointless to find some degree of accuracy of measurement that would satisfactorily separate qualitative from quantitative relationships.

In the interests of clarification another point should be made. Dr. Yeager asserts in relation to his examples that ". . . we know from personal experience how people react." In a subsequent paragraph he says ". . . introspective observations are among the facts to be integrated into the theoretical system." I suggest that introspection could simply be discarded without necessarily lessening the usefulness of his examples. In this connection, Dr. Yeager may wish to consider the material for which Dewey and Bentley provided this footnote: "Many a man is confident in saying that he knows for certain (and often with a very peculiar certainty) what is behind and beyond his personal knowings. We are well aware of this. Nevertheless, we do not regard it as good practice in inquiry when dependable results are sought."^{2a}

In the closing paragraphs of his essay Dr. Yeager says, "This paper does not attack measurement in economics. It simply attacks naive exhortations to concentrate on gathering numbers." With the objective of discouraging such a fruitless task any modern scientist will agree. However, when Dr. Yeager goes on to assert that ". . . the essential function of measurement in the natural sciences is largely replaced in economics by direct empirical knowledge of the most generally applicable principles and concepts" he is describing economics as it has been and not as it may be.

Modern students of human inquiries who are continuing the Peirce, Dewey, Bentley line of what appears to be advance in understanding and applying scientific method do not differentiate between "natural" sciences

^{2a} John Dewey and Arthur F. Bentley, *Knowing and the Known*, Boston, Beacon Press, 1949, p. 143.

and other (unnatural, supernatural, or?) sciences. In this connection, one modern view is that ". . . man, inclusive of all his knowing, should be investigated as 'natural' within a natural world; and, secondly, that investigation can, and must, employ sustained observation akin in its standards—though not, of course, in all its techniques—to the direct observation through which science advances."³

It seems to me that Dr. Yeager, like many other economists, has not adequately answered the questions: What is "direct empirical knowledge" or any other economic "knowledge"? In that aspect of human behavior labeled economics, what criteria or standards shall govern the acceptance of assertions as warranted?

When and if Dr. Yeager undertakes to expand and clarify portions of his paper, for example, to pin down and display adequately what a human "motive," economic or otherwise, actually is, I suspect that he will find Dewey and Bentley's work indispensable to further progress. Thus far Dr. Yeager seems to be unaware that some of the terms he so confidently uses (for example, "motive," "empirical facts," "concepts," "real," and "knowledge" itself) have proved to be undependable in scientific reports. The proof that such language has been found inadequate, not because the words are somehow intrinsically unsuitable but because of the attitude and methods they reflect and evoke, is well presented by Dewey and Bentley in the references already cited. To me it seems important that economists, as well as other students of the behavioral sciences, open their minds to the possibility that they may wish to revise their methods. Criticisms such as those offered by Drs. Brodbeck and Rudner in the papers cited in Dr. Yeager's footnote 2 merit far more adequate consideration than is reflected in Dr. Yeager's discussion. Thus far, he has hardly begun to cope with the issues they raise.

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Reply to Colonel Harwood

By LELAND B. YEAGER

OF COURSE not even extremists among would-be economic Galileos insist on measurement and practically nothing but measurement. My paper dealt, rather, with exhortations about the special virtue of concentration on gathering numbers. These exhortations are all too common.

Colonel Harwood evades my challenge to name some counterparts in

³ *Ibid.*, p. 79.