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How Do You Know That You Know Anything?

Although AIER's primary emphasis is on economic problems, those problems are related to many of the concerns—and inadequacies—of other behavioral science fields. The Behavioral Research Council (BRC), a division of AIER, was founded to study these issues, with an emphasis on identifying methods of inquiry that would advance the pursuit and dissemination of useful knowledge. BRC is sponsoring an international symposium on "Dewey: Modernism, Postmodernism, and Beyond" on July 20-22 in Great Barrington. The work of philosopher John Dewey has significantly influenced the Institute's views, as indicated in the following essay, which provides a timely summary of AIER's findings regarding useful procedures of scientific inquiry.

By the time they have attained physical adulthood and have acquired diplomas stating that they have been "educated" to some "degree," many individuals have some reason to believe that they know something. Nevertheless, few even among those who have been the teachers are able to describe coherently and consistently how anyone knows that he knows anything. Therefore, we begin with this question: How do you know that you know anything?

Your first reply may be that you have devoted many years to acquiring knowledge, that you have demonstrated to the satisfaction of many teachers that you have acquired knowledge, and that there is no doubt in your mind that you know what you know. In short, you are convinced that your own confidence in the knowledge you have acquired is a sufficient guarantee that you know what you know.

What Is Knowledge?

If such is your answer, we then suggest that it raises at least two more questions. The first is, What is Knowledge?

Philosophers have been busy for at least 2000 years in an attempt to answer this question. Those in one branch of philosophy, epistemology (the theory of knowledge), have given this problem their primary attention for many centuries. Unfortunately, they have not yet been able to agree on an answer; and few even agree on the usage of words in which they endeavor to state the answer. John Dewey and Arthur F. Bentley offer this comment:

> *Knowledge*: In current employment this word is too wide and vague to be a *name* of anything in particular. The butterfly "knows" how to mate, presumably without learning; the dog "knows" its master through learning; man "knows" physics and "knows" mathematics; he knows, *that*, *what*, and *how*. It should require only a moderate acquaintance with philosophical literature to observe that the vagueness and ambiguity of the word "knowledge" account for a large number of the traditional "problems" called *the problem of knowledge*. The issues that must be faced before firm use is gained are: Does the word "knowledge" indicate something the organism possesses or produces? Or does it indicate something the organism confronts or with which it comes into contact? Can either of these viewpoints be coherently maintained? If not, what change in preliminary description must be sought?*

For the purposes of the discussion at this stage we accept this quoted comment at face value and note that how one knows what he knows is a more complicated matter than it first appears. If firm, consistent, and coherent use of the name "knowledge" has not been achieved by the eminent philosophers who have devoted their lives to studying epistemology, perhaps we are justified in avoiding the further use of the word in this discussion.

Conceits of Confidence

We turn now to a second question raised by your supposed answer to our basic question. To what extent is your confidence that you know something a sufficient guarantee that you know what you think you know?

Many people who demonstrably do not know what they are talking about are supremely confident that they know what they think they know. Every hospital for psychopathic disorders has such patients; and who does not have acquaintances, not as yet incarcerated, who are similarly confident that they know what others believe no one can know? Consider also the knowing behavior characteristic of primitive peoples—and even of people in complex societies with developed technologies—whose knowing reflects views, religious views perhaps, at variance with your own. You probably believe that they obviously do not

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* John Dewey and Arthur F. Bentley, *Knowing and the Known*, Boston, Beacon Press, 1949, p. 296. Reprinted in entirety in Rollo Handy and E. C. Harwood, *Useful Procedures of Inquiry*, Great Barrington, Behavioral Research Council, 1973, in which the quotation appears on p. 176.

know what they are so confident they do know. Our own forefathers knew that some people were witches—knew this well enough to hang or burn the supposed offenders. Yet we today assert that our forefathers, in spite of their great confidence, did not know what they thought they knew.

Such overconfidence is found even in developed scientific areas. For example, when Marconi proposed radio transmission between the United States and Great Britain, he was severely criticized by Heinrich Hertz. In a letter to Marconi, Hertz pointed out that the earth is round, that radio waves travel in straight lines, and that therefore the waves could not go across the Atlantic, but instead would go out into space, unless they were reflected back by "a mirror the size of a continent." Hertz, of course, was unaware of the so-called "Heaviside layer" (ionosphere) that serves as a reflector, so his apparently unanswerable refutation of Marconi's proposal turned out to be wrong.* What at a time seems to be a convincing proof frequently is revealed at a later time to be erroneous.

These considerations suggest that simply having a superabundance of confidence in what one knows is not a sufficient guarantee that what is "known" is the way things are.

Scientists' Procedures of Inquiry

Evidently, in order to answer the basic question, How do you know that you know anything?, we shall have to inquire into the matter more adequately than have philosophers in the past. Apparently, from the beginning of human inquiry into unknown situations, the accepted objective nearly always has been *Truth* or absolute certainty. By the time written records were kept, that goal almost never was questioned.

Various methods of inquiry have been used in pursuit of this goal, including those embraced by common sense, revealed religion, secular revelation, divination, formal logic, and Newtonian mechanics, to name a few. In the past, such methods of inquiry sometimes were supposed to yield results so certain that skeptics simply were not tolerated. It was thought necessary to torture those who failed to comply with results obtained by these methods—or to tie the unrelenting to stakes and burn them alive.

The quest for certainty has been the accepted goal even of many modern scientists. Today, for example, it appears among cosmologists seeking to confirm "Grand Unified Theories" regarding the beginning and end of the universe. But in this respect, a great irony seems to be taking shape in physics—and in other "hard" sciences. For currently the search for some absolute or complete "theory" that will resolve inconsistencies between the observed results of experiments in particle physics and the cosmological theories of astrophysicists seems to be leading toward results—"quantum gravity" for instance—in which the geometry of space and time are subject to continual fluctuations and where even the distinction between past and future may become blurred. The constants and absolutes upon which Einsteinian "modern" physics have depended—even the Newtonian gravitational constant and specific measurements of the velocity of light—do not apply to these new results. The only certainty in the now-emerging cosmologies seems to be uncertainty.

Mathematics, the once "certain" science, is no longer the universally accepted body of "knowledge" it was thought to be a century ago. Professor Morris Kline, author of *Mathematics: The Loss of Certainty*, states: "We should drop the ideas that mathematics and what mathematics says about the world are indubitable truths. Today there is no agreement among mathematicians on fundamental principles."

Such recent scientific developments are consistent with the objective of scientific inquiry here suggested—an objective that does not include achievement of "knowledge" in any absolute or final form, does not purport to establish "certainty," and does not offer its findings as unalterable, indestructible truth (whatever that my be). The goal of scientific inquiry is assertions warranted by the procedures of inquiry but not alleged to be fixed or immutable. The reports of scientific inquiry invariably are provisional, and always are subject to revision if and when better means of observation and measurement or other improvements in procedures of inquiry make possible more useful descriptions of what happens under specified circumstances.

Initial Differentiation and Naming

In view of the inability of epistemologists to achieve agreed-upon warranted assertions during centuries of work, we obviously should be on guard against the most common pitfalls to progress in the study of knowing. Many of these, perhaps all, have been semantic booby traps. Consequently, we shall attempt to achieve firm, coherent, and consistent naming of whatever we are talking about.

We begin by noting the vast universe of experience—the world, sun, stars, and all that we can see, smell, taste, hear, and feel. We wish to talk about the sum total of such things without repeatedly having to describe them in detail. For that purpose we need a short name, and we select "cosmos." This name is applied to the universe as a whole system, including the speaking-naming thing who uses the name.

Next, we differentiate (or note the differences) among the vast number of things in the cosmos and select for naming the living things; for these we choose the name "organism." Note that selecting for naming does not imply detaching the physical thing from the cosmos. Everything named remains a part of cosmos with innumerable relations to other parts.

Among the organisms, we further differentiate for the purpose of the present discussion and select for naming ourselves, our ancestors, and our progeny. These we name "humans."

We then observe the transactions of humans with the remainder of cosmos and note the transactions named "eating," "breathing," etc. Among the numerous transactions, we differentiate further and select for naming those transactions typical of humans but rarely, if ever, characteristic of other organisms. These transactions we name "behavior," with the understanding that this name refers to human behavior unless otherwise indicated.

Stages of Signing

Human behavior involves transactions in which something stands for or refers to something else. This behavior we name

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* This example comes from Colin Cherry, "Language and Extra-Linguistic Communication," in Noel Minnis, Ed., *Linguistics at Large*, New York, Viking Press, 1971. Cherry notes also that the flat-earthists were delighted by Marconi's success, which they took as proof that the earth is flat.

"sign behavior," or simply "sign." Note that "sign" is the name of the whole naming-named transaction rather than the name of any isolated part of that transaction. Sign or sign process is the type of organism-environmental transaction that distinguishes a behavioral from a physiological process such as eating, digesting, and seeing.

Sign in evolutionary development has progressed through the following still-existing stages:

1. The signaling or perceptive-manipulative stage of sign observable in transactions such as beckoning and whistling.
2. The naming stage, as observable in speaking and writing.
3. The symboling stage, as observable in mathematics.

Focusing our attention now on the naming stage of sign, we choose to name it "designating." Designating always is behavior, an organism-environmental transaction typical only of man in the cosmos. Designating includes:

a. The earliest stage of designating (or naming) in the evolutionary scale, which we shall name "cueing."

> "Cue" as primitive naming, is so close to the situation of its origin that at times it enters almost as if a signal itself. Face-to-face perceptive situations are characteristic of its type of locus. It may include cry, expletive, or other single-word sentences, or any onomatopoeic utterance; and in fully developed language it may appear as an interjection, exclamation, abbreviated utterance, or other casually practical communicative convenience.*

b. A more advanced level of designating or naming in the evolutionary scale, which we shall name "characterizing." This name applies to the everyday use of words, usage reasonably adequate for many practical purposes of life.

c. The farthest advanced, at present, level of designating, which we shall name "specifying." This name applies to the highly developed naming behavior best exhibited in modern scientific inquiry.

For the purpose of economizing words in discourse, we need a general name for the bits and pieces of cosmos differentiated and named. For these we choose "fact." Fact is the name for aspects and phases of cosmos in the course of being differentiated and named by humans (themselves being among its aspects) in descriptions sufficiently developed to include definite time and space aspects. Fact includes all namings-named durationally and extensionally spread; it is not limited to what is differentiated and named by any one person at any moment or during his lifetime.

Frequently, we have need to discuss a limited range of fact where our attention is focused for the time being. For this we choose the name "situation." This is the blanket name for those facts localized in time and space for our immediate attention.

Within a situation we frequently have occasion to refer to durational changes among facts. For these we choose the name "events."

Finally, in discussing events we often have occasion to refer to aspects of the fact involved that are least vague or more firmly differentiated and more accurately specified. For those we choose the name "object." Object is differentiated from event in that it is subject matter of inquiry that is relatively stable, at least for the time being.

All the subject matters of scientific inquiry are aspects and phases of cosmos. All are natural in that modern scientific inquirers do not purport to provide warranted assertions (useful descriptions) about the allegedly supernatural. Nor do modern scientific inquirers assert that nothing ever will be found beyond the scope of present means of observing by seeing, smelling, feeling, hearing, and tasting, and any extensions of sense perception, such as telescopes, microscopes, and other instruments.

Various subject matters of inquiry may be classified into groups from time to time in accordance with the various techniques of inquiry that may be applicable. Major classifications now widely recognized are physical, physiological, and behavioral. None of these fields of inquiry is subject to the domination of one over another, yet in each an inquirer may use some of the findings from another, and all remain in the general system of cosmos becoming known by means of man's knowing behavior.

Within much of the realm of knowing behavior, wherever sign is involved, knowing is naming. Naming is the application of verbal or other signs to things differentiated in cosmos. Things are differentiated by observing, hearing, touching, or otherwise noticing that this differs from that in some respect or phase. Differences are ascertained by comparison, one thing with another, one aspect with another, etc.

The Observable "Real"

Durationally and extensionally observable events are sufficient for inquiry. Nothing more real than the observable is established by using the word "real" or by attempting to peer behind or beyond the observable for something to which its name can be applied. Abandoned is the notion that "reals" exist as matter, or that "minds" exist as manifestations of organically specialized "reals," or that the "certainty" of matter somehow survives all the "uncertainties" of increased knowing about it. Finally, nothing is accepted or assumed in modern scientific inquiry that is alleged to be inherently nonobservable or as requiring some type of supernatural observation.

One of the most significant characteristics of the suggested method of inquiry is that it includes procedures for correcting and revising both the findings of inquiry and the procedures used. In the course of inquiry, the initial problem situation may be reformulated, and what seemed to be hard facts may turn out to be otherwise. Facts that apparently were pertinent may become irrelevant and vice versa, and the initially most plausible conjectures may have to be abandoned. The outcome, when inquiry is successful, is a warranted assertion, *i.e.*, a description of what happens under specified circumstances, useful for solutions of the problem that prompted the inquiry. But even the best available warranted assertion is not "certain" or an embodiment of "truth"; later inquiry may lead to its modification or abandonment.

Our reply to our initial question thus is: we "know that we know" something when we achieve warranted (but not "final") assertions through inquiry that enable us successfully to resolve a problem situation. We regard human knowing as a behavioral process, rather than a nonnatural or supernatural

* *Knowing and the Known*, p. 157; *Useful Procedures*, p. 136.

apprehension of truth.

Summary Description of Procedures Found Useful

A summary description of the procedures of scientific inquiry that we have found useful may be helpful to readers. Another purpose of this discussion is to comment on the technical names "conjecture," "hypothesis," and "theory." The last two terms in particular are used in so many different ways in the current literature on scientific method that clarification is a first essential step to useful discussion.

1. The objective of scientific inquiry is to provide useful descriptions of what happens under specified circumstances.

2. The adjective "useful" designates those descriptions that are adequate for such purposes as confirmation or refutation of the conclusions by duplicating the procedures insofar as may be practicable, or those descriptions of what happens that can be used to predict what probably will happen. Those descriptions at times help to control events (for example, warranted assertions about metal alloys that have led to thermostatic control of heat and humidity in localized areas). Where such control is not possible, they may facilitate human adjustive behavior (for example, cessation of fear that a solar eclipse symbolized the "death" of the sun).

3. An inquirer proceeds toward his goal of achieving useful description in a series of steps that may be described as follows:

a. First is awareness of happenings for which a useful description is not available or somehow is inadequate.

b. Next is the attempt to ascertain the facts in the situation. However, the facts in the situation, including the relationships among various facts, usually are not readily apparent at first.

c. Difficulties arise; the development of adequate description of what is happening or has happened is blocked in one way or another. Perhaps instruments with which to observe and measure are not sufficiently delicate. Perhaps ignorance about some facts or aspects of facts pertinent to the investigation blocks inquiry. There could be any number of reasons.

d. Although temporarily blocked in the further development of adequate description, the inquirer does not abandon the inquiry. Notions or conjectures are developed about the possible facts or relationships among facts that may be involved. Usually many different conjectures can be developed, and the inquirer's immediate problem then is selecting among them in order that inquiry may proceed. Aspects of the various conjectures suggest or point toward facts possibly not previously recognized as pertinent or in any event not yet adequately investigated. The inquirer proceeds to test one conjecture after another by returning to the facts in the case, perhaps discarding some facts at first thought pertinent, perhaps ascertaining new facts by experimental procedures or by further investigation in other ways. Eventually, adequately developed description is achieved so that the inquirer proceeds to the next point in the inquiry where again progress temporarily may be blocked.

e. Again the inquirer imagines what may have happened and formulates (possibly with the help of mathematical formulas) new conjectures, until a return to the again possibly revised facts or newly ascertained facts is possible in order once more to select the apparently most useful among alternative conjectures in order to proceed with the inquiry.

f. Ultimately, if the inquirer is successful, useful description of what happens (or what happened) under specified circumstances is achieved.

What we call "conjecture" above sometimes is called "hypothesis" or "theory"; however, the last two names also are applied in numerous other ways that may reflect outmoded epistemological notions about Truth, certainty, or other allegedly immutable entities. We use "hypothesis" only as a name for a conjecture developed in the course of inquiry, and avoid using it otherwise except when quoting from or discussing the work of others. We apply "theory" as a name for the useful description of what happens under specified circumstances, which is the goal of scientific inquiry, and we avoid using it otherwise except when quoting from or discussing the work of others.

— The earliest version of this essay was published in 1961. —

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