

The Reality of Operationism: A Rejoinder

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Leahey's view of operationism (1980), offered with the framework of his conception of philosophy of science, ignores the merits of operational definitions in revealing the observational base of concepts and in facilitating communication. These merits are revealed in a methodological analysis of operationism from the viewpoint of the researcher. Brief operational analyses of the concepts of *intelligence* and *self-actualization* illustrate the positive contributions of operationism. Operational definitions do not, however, give the "full meaning" of concepts. It is necessary to distinguish between four kinds of meanings: operational, empirical, intuitive, and theoretical. Within this context operationism can contribute to the understanding of scientific concepts.

Leahey's article (1980), *The Myth of Operationism*, serves a useful function by encouraging a re-analysis of a concept that has generated much confusion. In the past, the role of operationism in psychology has typically been overvalued or underestimated, resulting in polarized views that ignore either its limitations or merits. The reasons for these unbalanced views about operational definitions are twofold: (1) they are considered as the sole form of scientific definitions and (2) they are judged within a framework that is detached from the actual efforts of the researcher and theorist.

Unfortunately Leahey's views of operationism suffer from these two distorted perspectives as well as from the tendency to view the problem of operationism as an "either-or" issue; it is either good or bad. His major theses are that (1) psychologists as a group are strongly committed to operational definitions in their scientific efforts, (2) contemporary philosophy of science demonstrates that scientific concepts, especially theoretical terms, cannot be assigned operational definitions, and therefore (3) psychologists should renounce the "myth" of operationism and judge the adequacy of theories without concern for their adherence to the standards of operational meaning.

The Current Status of Operationism

Leahey's view that operational definitions exert a "powerful hold on contemporary psychologists" is not shared by this reviewer. Opera-

tionism reached its pinnacle of popularity in the 1940's and since that time has receded in significance. In addition there are forces within psychology (psychoanalytic, humanistic, gestalt-oriented systems) that have expressed strong reservations about, if not outright rejection of, operationism. Discussions of operationism have disappeared from introductory textbooks not only because the texts have become more elementary but also because contemporary authors do not share the commitment to an operational approach of many of their predecessors. The discrepancy between Leahey's and my views about the status of operationism in contemporary psychology is, however, unimportant. We agree that operationism presently deserves careful analysis and discussion.

A Methodological Analysis of Operationism

The major part of Leahey's manuscript is dedicated to the methodological analysis of operationism, initially within the framework of the philosophy of science and later in terms of how this concept has been interpreted by psychologists. Several different issues are discussed and I will attempt to deal with the major ones.

Operationism and Logical Positivism

Leahey notes that operationism began with Bridgman (1927) but also was conceptualized by the logical positivists. Bridgman finally disassociated himself from the operationalist movement because of the exaggerated claims and oversimplifications advanced by its proponents. Regretfully, Bridgman concluded that he had sired a "Frankenstein." He wrote,

I abhor the word *operationalism* or *operationism*, which seems to imply a dogma, or at least a thesis of some kind. The thing I envisaged is too simple to be dignified by so pretentious a name; rather, it is an attitude or point of view generated by continued practice of operational analysis. (Bridgman, 1954, p. 224)

It is important to recognize that although Bridgman is critical of an overinflated operationism he does not reject, as does Leahey, operationism. Operational analysis can be a useful pursuit in clarifying empirical and theoretical issues. In a similar vein, Bergmann (1954) criticizes overinflated operationism without rejecting operationism, "The root of the trouble was that some psychologists in their enthusiasm mistook the operationist footnote for the whole of the philosophy of science."

Instead of narrowing down the meaning of operationism, as both Bridgman and Bergmann encouraged, Leahey chooses to enlarge the meaning by discussing it within the broad context of the philosophy of

science, particularly in relation to logical positivism. Within this philosophical framework Leahey suggests that operationism cannot be detached from such broad issues as the distinctions between metaphysics and science, meaningful and meaningless statements, and empirical and theoretical statements. Leahey argues that operationism is based on these distinctions, most notably the one between empirical and theoretical statements. Since these distinctions are at best blurred and at worst nonexistent, operational definitions must be rejected because of their faulty foundation. This line of reasoning can be vigorously challenged.

One can object to the notion that philosophers of science are in general agreement that logical positivism is fundamentally inadequate and therefore is incapable of offering useful methodological guidance to empirical scientists. A current criticism of experimental psychologists in general, and behaviorists in particular (e.g., Koch, 1964), has been that they are wedded to inappropriate methodological commitments. The suggestion that philosophers of science are in general agreement about this matter does not reflect reality. Some distinguished scholars (e.g., Nagel, 1971; Scheffler, 1967) would still argue that many of the distinctions offered by logical positivism are useful for psychologists and other scientists. Nagel, for example, admits that he cannot state a precise distinction between observational and theoretical statements but contends that the distinction is useful. Sharp lines cannot be drawn between day and night and living organisms and inanimate systems yet these distinctions are neither empty nor useless. Thus the general argument that modern philosophers of science reject in totality both logical positivism and operationism is not strictly true.

Operationism and Empiricism

Operationism need not be justified by philosophical analysis, as Leahey believes. Rather, its utility can be justified by pragmatic considerations of the psychological researcher and theorist. In this regard, it is interesting to note that Michael Ghiselin (1969) in his perceptive book, *The Triumph of the Darwinian Method*, concluded that Darwin operated as a logical positivist. The distinctions suggested by logical positivism may be blurred but they can, nevertheless, still operate as guides, or ideals, for researchers and theorists.

Although the philosophical and research orientations overlap both in sphere of interest and method of analysis, they are nevertheless far from equivalent in technique or purpose (Kendler, 1981). Perceiving operationism primarily within a research context encourages the isolation and identification of problems capable of empirical resolution. This orientation also has the virtue of keeping psychologists from becoming en-

tangled in philosophical issues that have no direct bearing on research issues. Although this distinction between the two methodological orientations may be considered by some philosophers to be excessively parochial, it does suggest that a methodological-oriented analysis of operationism by a research psychologist will differ from that conducted from the viewpoint of a philosopher of science. This is not surprising considering that their methods and goals differ.

Leahey's commitment to the philosophical, in contrast to the empirical framework, is strikingly revealed in his treatment of Underwood's analysis of operationism (1957):

Underwood goes on to discuss six types of "operational definition" in a confused presentation. At no point does he refer to the philosophical roots of operational definition, nor to any of the forms presented by Bridgman, Carnap, or Hempel. (Leahey, 1980, p. 134)

Must one, when discussing psychological research, consider it only within a philosophy of science framework? Cannot one consider the problems of definition and explanation within the context of the activities of the empiricist and theorist? The argument being advanced is that operationism within this context can facilitate communication and clarify issues. Although Leahey decries the notion that intelligence is what the intelligence test measures, such a hard-nosed definition clarifies much of the confusion surrounding *intellectual ability*. Intelligence (mental ability) was operationally defined by James McKeen Cattell as performance on a series of sensory and motor skill tests (e.g., reaction time, strength of grip). Binet and Simon, confronted with the task of identifying students who could not profit from normal educational instruction, selected tests with apparent academic implications and judged their appropriateness if they conformed to an age standard scale. Operationally the two concepts are distinct. Leahey is correct in arguing that the survival of one definition (Binet-Simon) over another (Cattell) depends upon the significance of the empirical laws in which it is embedded. But this does not mean that operational definitions cannot be treated independently of their empirical relationships. Reconstruction of knowledge frequently demands this. In the current debate surrounding Burt's research on intelligence (Jensen, 1978; Kamin, 1974), it becomes important to identify the operational definition of intelligence employed by Burt. This controversy is clarified by noting that Burt, like many school and clinical psychologists of his day, "valued subjective impressions and quite openly modified test scores to better represent the child's innate ability as judged from all he knew" (Cronbach, 1979). This operational analysis of Burt's technique for measuring intelligence does much to clarify the controversy concerning the implications of data he reported. Clearly, the difference between Burt's procedures and those

presently accepted for measuring test intelligence indicates that the two techniques are not commensurate.

Operational Analysis of Self-Actualization

Even the proponents of operationism will readily admit that operational analysis can be so simple as to appear trivial. But simplicity is not equivalent to insignificance especially when sources of confusion that are readily ignored are uncovered. A case in point are the various conceptions of self-fulfillment (e.g., self-actualization) that play a central role in many humanistic psychologies. Maslow, for example, suggests that by examining self-actualizing people it becomes possible to discover a scientifically *valid* ethical system. His rationale for the argument is that self-actualizing individuals are the healthiest, having achieved the highest level of human potential.

...you can find the values by which mankind must live, and for which man has always sought, by digging into the best people in depth. I believe...that I can find ultimate values which are right for mankind by observing the best of mankind... If under the best conditions and in the best specimens I simply stand aside and describe in a scientific way what these values are, I find values that are old values of truth, goodness, and beauty and some additional ones as well — for instance gaiety, justice, and joy. (Maslow, 1961, pp. 5-6)

An operational analysis of Maslow's concepts of self-actualization and a valid ethical system would readily reveal the flaw in Maslow's conclusions. Maslow (1954) collected information about a group of individuals whom he considered self-actualized. Included in this group were Beethoven, Jefferson, Lincoln, Eleanor Roosevelt, and some of Maslow's friends and acquaintances. They exhibited a variety of characteristics (e.g., realistic, spontaneous, private, humorous in a philosophical rather than a hostile sense, spiritual in a humanistic sense, capable of peak experiences, nonconforming).

The link between these behavioral and experiential characteristics and the "right" set of values proves to be, by an operational analysis, simply tautological. Self-actualizers share Maslow's own value system; Maslow labels such people as the "best" and therefore their ethical commitments — his own — become the "ultimate values which are right for mankind." Suppose another psychologist, more enamoured with pragmatism than Maslow, considers Henry Kissinger, Neil Simon, and Andrew Carnegie as examples of self-actualized individuals. Or perhaps another psychologist, fascinated with the irony of life, would suggest that both Groucho Marx and W.C. Fields were fulfilled.

Can such differences about who is actualized be resolved by empirical methods? No. The reason is that Maslow's definition is determined by

value judgments. He essentially adopted a set of ethical principles in the same manner as do others who rely on some outside authority such as church or state. In truth, Maslow substituted the authority of the psychologist, in this case, himself, for that of God or government. The failing, it must be underlined, is not with the values Maslow chose to adopt, because psychologists, as other people, are entitled to choose values they consider best. The fault is with the manner in which Maslow chose to justify his value system. By insisting that his value system is demanded by psychological facts and is a consequence of a scientific analysis, Maslow misled himself as well as his audience. Smith (1978) comes to the same conclusion:

Maslow has built no bridge between facts and values, not even a shaky one. He has stayed in the closed circle of his own values. (Smith, 1978, p. 190)

Immaculate Perception

Fundamental to Leahey's rejection of operational definition is his belief that theoretical assumptions influence observations, that is, "immaculate perceptions" are impossible. He apparently accepts this position without question, presumably because philosophers of science to whom he resonates, such as Kuhn, have not only endorsed it but also justify it by citing the results of perceptual research. The particular study that Kuhn (1970) employed to deny immaculate perceptions is the Bruner and Postman study (1949) which demonstrated the influence of preconceptions on observations. College students were briefly shown individual playing cards with instructions to identify them. Mixed in with the regular cards were incongruous ones such as *black four of hearts*. Most students identified such a card as a *red four of hearts* or a *black four of spades*, thus revealing that a person's preconceptions determine what he observes.

There is no doubt that psychological data support the notion that preconceptions can influence observations. Therefore the facts of psychology are consistent with the position that a scientist's observations can be contaminated by his preconceptions. The fundamental issue is whether preconceptions *need to* influence observations. Cannot researchers with incompatible theoretical preconceptions agree about the same set of observations? The history of science (e.g., Galileo, Darwin) demonstrates that although preconceptions may influence observations they do not necessarily have to, especially when precautions are taken. I believe Kuhn misused the Bruner-Postman experiment in his argument against "immaculate perceptions" in scientific research. He employed it from the point of view of the subject, rather than from that of the scientific community. Bruner and Postman did not encounter any difficulty in

specifying clearly to psychologists the actual characteristics of the anomalous displays that were employed in their study. Psychologists, with different theoretical preconceptions, would have no difficulty in knowing what they meant by an anomalous playing card and replicating their experiment.

In sum, I strongly disagree with Leahey's negative evaluation of operationism and his suggestion that it should be discarded. Admittedly our different opinions emerge from somewhat different conceptions of operationism. My view is more from the research perspective where operationism is useful in facilitating communication and in the task of reconstructing knowledge. Operationism is not, however, the whole story as is implied by many of its proponents, and certainly the "total meaning" of a concept, as Leahey argues, cannot be reduced to its operational meaning. Nevertheless, operational meaning is one component of four that together provide the "full meaning" of a concept. These four meanings can be clarified by using the concept of *intelligence* as an example.

Four Kinds of Meaning

Operational Meaning

As already suggested, operationism represents a simple recipe to further meaningful discourse about empirical results. Misunderstanding can be reduced and hopefully eliminated by tracing the meaning of a term back to its observational base via the operations of the scientists. In the controversy surrounding intelligence, an operational analysis clearly reveals that different operational meanings of intelligence are being employed.

Empirical Meaning

The validity of an intelligence test refers to its empirical meaning; how test scores are related to other operationally defined concepts such as academic success, achievement tests, and job performance. A clearly operationally defined concept need not have empirical meaning. That is, operationism does not guarantee the fruitfulness of a concept. For example, *cephalic index*, the ratio multiplied by 100 of the maximum breadth of the head to its maximum length, is operationally defined when the techniques of measuring maximum breadth and length are clearly stated. Nevertheless, its elegant clarity has failed to give psychology a concept of any importance for the simple reason that no one has been able to involve the concept of cephalic index in any signifi-

cant psychological law.

The fact that cephalic index is operationally defined but empirically empty in no way detracts from the communication value of its operational meaning. Knowing that an operationally defined concept is empirically empty provides significant information. It indicates at the time that the concept is not fruitful, and the investigator has the option of dropping the concept, persisting in his/her attempts to discover some empirical meaning or modifying its operational meaning.

The possibility of altering a concept's operational meaning has been overlooked by some critics of operationism. A common complaint against operationism is that it tends to freeze the meaning of a concept before it can be developed into a fruitful construct. Such a criticism is inappropriate if the proper scope of operationism is realized. An operational definition is not permanent. Its meaning can evolve by the addition of new operations or the elimination or modification of old operations. Nevertheless, at any *given* time its operational meaning can be discerned.

Within the same context one can deal with the problem of whether different operations necessarily produce different concepts. Although this may represent a philosophical problem from the viewpoint of the researcher, the issue is insignificant. Different tests do imply different operational concepts. Nevertheless if they produce similar results and can be interpreted within the same theory we can conclude that they possess similar empirical and theoretical meanings.

Intuitive Meaning

A criticism frequently heard is that operationism places an unnecessary burden on the creative scientist. Demanding a set of operations when one is forming vague ideas of a concept may be too much of a burden for the creative process. Again we find a criticism that is not aimed at the proper target. Operationism does not offer a prescription for productive thinking. Operational definitions are the results of creative thought, not necessarily the means by which a definition is formulated. A psychologist may have only a vague, imprecise notion of a concept (e.g., intelligence, motivation) when first thinking about it. When he or she is "thinking through" the concept, indulging in *intrasubjective* communication, the requirements of operational definitions need not be considered, and certainly need not be met. In actual fact, it is not inconsistent for a researcher who is investigating intelligence to use an IQ test as his/her operational definition of intelligence while simultaneously entertaining an intuitive conception of intelligence that is much broader and more complex, involving such notions as symbolic representations,

cognitive structures, intellectual operations, and other concepts that one might consider to be fundamental in intellectual functioning. To underline this distinction, *intuitive meaning* must be contrasted with *operational meaning*.

Critics of operationism argue that the richness of the *intuitive meaning* of a concept is destroyed by the narrowness of its operational meaning. Such a conclusion emerges from the misconception that the two kinds of meaning need to be at odds when in fact they can be complementary. Intuitive notions can be enriched by surveying relevant empirical evidence, which of necessity contains the ingredients of operational definitions. Although an investigator may not self-consciously formulate an operational definition when conducting research, such a definition can be extracted from an examination of procedures.

I find it difficult to imagine that a psychologist interested in interpreting intelligence within a broad theoretical framework would fail to be stimulated by the wealth of data that has been collected from intelligence testing designed to predict academic and job success. The evidence obtained as a result of wide-scale intelligence testing reveals important developmental changes that must be accounted for by any theory of intelligence.

Theoretical Meaning

At this point, a fourth meaning of a concept, *theoretical meaning*, must be added to conclude this discussion of operationism. Again using intelligence as an example, intelligence need not be viewed as: (1) an operational definition that refers to particular procedures of measurement; (2) an empirical law relating operationally defined concepts (e.g., intelligence test scores with academic success); nor as (3) a set of intuitive reflections and ideas entertained by a scientist when thinking creatively about the psychological nature of intelligence. Instead, intelligence can be conceptualized as (4) an explicit theory of intellectual functioning. In essence, the *theoretical meaning* of intelligence is contained in the totality of theoretical statements that are proposed to account for the empirical relations involving intellectual functioning. Such a theory, if it aspires to any breadth, would seek to go beyond the facts of intelligence testing. The intelligence test movement, it must not be forgotten, was not originally conceived for the purpose of collecting data about fundamental processes of intellectual functioning or for formulating a general theory of intelligence. A broad theory of intelligence would have to cope with many processes such as symbolic representation, conceptual development, memory, intellectual operations, and inference. The theory would have to account for the facts of learning sets, hypothesis testing,

conservation, discrimination-shift behavior, stages of information processing, and so on. Within such a broad theoretical and empirical context, intelligence means much more than what the intelligence test measures. Whereas operational meaning is designed solely for purposes of communication, theoretical meaning serves the need for understanding.

After distinguishing between operational, empirical, intuitive, and theoretical meanings, it should be apparent why Bergmann assigned operational meaning the status of a footnote in the philosophy of science. A primary aim of science is to provide understanding, and the really difficult tasks in achieving this goal are the formulation of some guiding notions (intuitive meaning), collection of significant facts (empirical meaning), and development of fruitful hypotheses (theoretical meaning). In contrast, operational meaning assumes minor importance. But it should be understood that the searches for these four kinds of meaning are not independent efforts, insulated from each other. Rather they represent different components of a single venture, and even though operational meaning may be of secondary importance when compared with the other forms of meanings, it nevertheless serves an essential function in the entire scientific enterprise.

A Final Thought

Bridgman recognized a fundamental opposition to his modest conception of operationism:

Any person can make an operational analysis, whether or not he accepts what he supposes to be the thesis of "operationalism," and whether or not he thinks he is wasting his time in so doing. So far as the "operationalist" is to be distinguished from the "nonoperationalist," it is in the conviction of the former that it is often profitable and clarifying to make an operational analysis, and also, I suspect in his private feeling that often the "nonoperationalist" does not want to make an operational analysis through fear that it might result in a change in his attitude. (1954, pp. 224-26)

Bridgman's clinical judgment could be extended a bit further. The nonoperationalist may resist an operational analysis not for fear of change of attitude but rather because of an unshakeable faith in the validity of his or her intuitive conceptions. He or she is convinced that all operational definitions will fall short of the true meaning of his or her intuitive notions and, if employed, might lead to a premature "disproof" of an idea that is intrinsically sound. The nonoperationalist is correct in believing that operational definitions cannot possibly reflect the full range of one's intuitions for the simple reason that the latter are much broader and more intricate than the former. But what the nonoperationalist fails to realize, or refuses to acknowledge, is that intuitive no-

tions can only evolve into viable theoretical conceptions via the employment of some operational definitions. Theoretical development cannot occur in the absence of empirical evidence, which of necessity, implicitly or explicitly, contains operational definitions. In essence, the nonoperationalist employs a protective shield to defend intuitive ideas from possible refutation and by so doing stunts their scientific growth.

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