An Assessment of the Scientific Merits of Action Research

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This article describes the deficiencies of positivist science for generating knowledge for use in solving problems that members of organizations face. Action research is introduced as a method for correcting these deficiencies. When action research is tested against the criteria of positivist science, action research is found not to meet its critical tests. The appropriateness of positivist science is questioned as a basis for judging the scientific merits of action research. Action research can base its legitimacy as science in philosophical traditions that are different from those which legitimate positivist science. Criteria and methods of science appropriate to action research are offered.•

CRISIS IN ORGANIZATIONAL SCIENCE

There is a crisis in the field of organizational science. The principal symptom of this crisis is that as our research methods and techniques have become more sophisticated, they have also become increasingly less useful for solving the practical problems that members of organizations face.

Many of the findings in our scholarly management journals are only remotely related to the real world of practicing managers and to the actual issues with which members of organizations are concerned, especially when the research has been carried out by the most rigorous methods of the prevailing conception of science. Whatever its shortcomings in method and conception, early research such as that by Fayol, Barnard, Urwick, Roethlisberger, and even Taylor, unlike the more recent organizational research, was at least grounded in the actual problems faced by organizational members and was carried out in close collaboration between researcher and practitioner. Sometimes researcher and practitioner were the same person.

The crisis in organizational science is also reflected in the failure to recognize latent values behind the claim to neutrality about how knowledge is generated. The methods of organizational science have generated knowledge that has led to improvements in the effectiveness and efficiency of organizations, but often at the expense of the quality of working life of their members (Davis and Taylor, 1972).

Additionally, the crisis in organizational science is reflected in a conception of research as an accumulation of social facts that can be drawn on by practitioners when they are ready to apply them. This conception encourages a separation of theory from practice because published research is read more by producers of research than by practitioners. As a result, practitioners and their clients complain more and more frequently about the lack of relevance of published research for the problems they face and about the lack of responsiveness of researchers to meeting their needs.

What appears at first to be a crisis of relevancy or usefulness of organizational science is, we feel, really a crisis of epistemology. This crisis has risen, in our judgment, because organizational researchers have taken the positivist model of science which has had great heuristic value for the physical and biological sciences and some fields of the social sci-

ences, and have adopted it as the ultimate model of what is best for organizational science. By limiting its methods to what it claims is value-free, logical, and empirical, the positivist model of science when applied to organizations produces a knowledge that may only inadvertently serve and sometimes undermine the values of organizational members.

This article describes the deficiencies of positivist science for generating knowledge for use in solving problems that members of organizations face. Action research is presented as a method for generating knowledge that corrects these deficiencies. Action research is then tested against the criteria of positivist science and is found not to meet its critical tests. Action research is shown to be able to base its scientific legitimacy in philosophical traditions that are different from those which legitimate positivist science. Criteria and methods of science appropriate to action research are offered.

DEFICIENCIES OF POSITIVIST SCIENCE

The positivist conception of science has dominated the physical, biological, and social sciences for more than a hundred years. Comte (1864) who is generally credited with the term positivism, used the word "positive" to refer to the actual in contrast to the imaginary, to what can claim certainty in contrast to the undecided, to the exact in contrast to the indefinite. We will use the term positivist science for all approaches to science that consider scientific knowledge to be obtainable only from sense data that can be directly experienced and verified between independent observers. Although commitment to an empirical base for scientific knowledge characterizes what we are calling positivist science, the term subsumes different approaches to generating scientific knowledge. In one approach, which Oquist (1978) labels empiricism, rigorous observation is all that is needed to generate scientific knowledge. Theory is avoided because adherents of this approach believe that theory leads to multiple interpretations and distortions of the observed data. This approach is not widely used in organizational research. Organizational research using behavior modification techniques comes closest to this approach (Luthans and Kreitner, 1975). Radnitsky (1970) labels five "schools" of philosophy which are committed to an empirical base for scientific knowledge as Formalist, Reconstructionist, Pragmatist, Pragmaticist, and Anglo-linguistic. The most representative members of the Formalist school are Russell, members of the Vienna Circle such as Carnap, and, more recently, Hempel. The most well-known member of the Reconstructionist school is Bergmann. The Pragmatist school includes Dewey and James, the Pragmaticist school consists of Peirce, and the Anglo-linguistic school includes Wittgenstein, Austin, and Anscombe.

Radnitsky uses the term "worldpicture" for a conception of the world that Reconstructionists formally acknowledge and Formalists unintentionally encourage. This worldpicture may be characterized by the following four assumptions.

1. The world exists a priori as a unified and causally ordered system.

2. The structure of the world can be inferred from empirical observation.

3. Data about the world can be logically reconstructed into laws which are applicable regardless of the meaning humans may give to the terms of such laws.

4. A morphological correspondence can be established between the structure of logic and the structure of the world. Since propositions about the world can be hierarchically organized from the more abstract and general to the more concrete and specific, the world must be so organized. The discovery of a general scientific proposition from which all other scientific propositions can be deduced is considered to be, at least, a realistic possibility.

Since laws are hierarchically organized, according to this worldpicture, knowledge advances either by deduction or by induction. In the first case, new propositions are deduced from previously accepted laws. These new propositions are considered confirmed when their terms can be linked to objects or events, and the relationships between these objects or events can be shown empirically to correspond to relations between the terms of the proposition. In the second case, objective and undistorted observations of associations between discrete objects or events are noted. These associations are scientifically explained only if they can be shown to be particular cases following under more general laws. According to the Formalist and Reconstructionist worldpicture, inductions developed from raw data will meet deductions developed from yet more general propositions creating ultimately a unified hierarchical system of knowledge.

Both Formalists and Reconstructionists have confidence that a universal denotative language such as mathematics or logic can further the growth of scientific knowledge. Mathematics and logic allow a community of scientists to achieve consensus on the validity of scientific propositions. Observational language, another specialized type, reduces sentences used in ordinary speech to sentences that can be verified by direct observation. For example, the sentence "The bear frightens me" can be transformed into "The sight of the bear is associated with the beads of sweat forming on my brow and the trembling of my hands." One of the objectives of Formalists and Reconstructionists is to unite logic and mathematical sentences with observational sentences through "correspondence rules" (see Carnap, 1936, 1937), e.g., if A (bear), then B (beads of sweat), and C (trembling hands).

The Formalist and Reconstructionist worldpicture is an inadequate basis for generating knowledge about organizations and more particularly for developing problem-solving methods if one adapts the following perspective on organizations.

1. Organizations are artifacts created by human beings to serve their ends. Organizations obey laws that are affected by human purposes and actions. In this sense, they do not exist independently of human beings, like the planets, just waiting for an Isaac Newton of organizational theory to discover an equivalent of the laws of planetary motion.

2. Organizations are systems of human action in which the means and ends are guided by values. Consequently, judging the morality of proposed solutions to organizational problems is inescapable.

3. Empirical observation and logical reconstruction of organizational activities are not sufficient for a science of organization because:

A. Organizations are planned according to their members' conception of the future. But statements about the future have no truth value according to any criterion of confirmation acceptable to positivist science.

B. Organizations can be understood experientially by organizational researchers so that the truth of many propositions about organizations need not be supported empirically or validated logically.

4. Organizations can be legitimate objects of scientific inquiry only as single cases without considering whether such cases are subsumable under general laws. Knowledge about what actions are appropriate for problem-solving need not be derived by reference to a general category of similar organizations from which we know what the best action to take is on average.

Pragmatists and Pragmaticists differed from Formalists and Reconstructionists in not believing that any worldpicture was a necessary foundation for scientific inquiry. They believed that claims to knowledge were legitimized not by their relationship to an underlying reality but, rather, by the norms and rules of inquiry itself which are themselves open to rational criticism. Peirce (1955) characterized the pragmaticist criterion of truth as the ideal limit of the ultimate opinion of an indefinite community of investigators.

Anglo-linguists did not believe that a universal denotative language such as mathematics or logic could be united with observational language through correspondence rules. Although a Formalist, Hempel (1950) did not believe this either. He and the Anglo-linguists rejected the exclusive use of specialized languages for scientific inquiry. The Anglo-linguists pursued their investigations with language in everyday use.

Although Pragmatists, Pragmaticists, and Anglo-linguists avoid the difficulties that Reconstructionists and Formalists create for organizational research by support of their worldpicture or by the search for correspondence rules between types of language, we find all positivist approaches to science (P.S.) to be deficient in their capacity to generate knowledge for use by members of organizations for solving the problems they face. The following arguments explain this deficiency.

P.S. assumes that its methods are value neutral. As Habermas (1971) points out, knowledge and human interests are interwoven, as reflected in the choice of methods and the ends toward which such methods are put. The primary criteria of confirmation for P.S. are prediction and control of its objects of study, whether they be human or otherwise. When the objects of study are human, methods based on deception and manipulation are not uncommonly used to assure that the experimenter will get the results he or she predicted. It is not too difficult to translate the word "experimenter" into that of "manager" to see the moral implications of extrapolating methods and ends from the "laboratory" to the organization. Habermas pointed out that unless we reflect on the ends to be served by science, we may unwittingly find that prediction and control and its attendant methods will exclude other ends such as improved understanding among persons and the release of human potential.

P.S. treats persons as objects of inquiry, even though they are subjects or initiators of action in their own right. Humans differ from objects in their capacity for self-reflection and their ability to collaborate in the diagnosis of their own problems and in the generation of knowledge.

P.S. eliminates the role of history in the generation of knowledge. Individuals and organizations are not born in an instant with their present structures and functions intact. Rather, present patterns of behavior can many times only be understood as the product of shared definitions held by organizational members regarding what their common endeavor is about. These definitions may have evolved from the unique history of a particular organization, its periods of exceptional performance, the psycho-social defenses of its members, its prior leaders, etc.

P.S. assumes that a system is defined only to the extent that a denotative language exists to describe it. However, any representational system is always less than the actual system leaving the practicing manager to rely on intuition, hunch, interpretation, etc. P.S. generally acknowledges that such methods can be precursors to scientific knowledge, but it does not consider them by themselves to be legitimate scientific methods. As Polanyi (1958) has pointed out, such methods generate "tacit knowledge." Rather than poor substitutes for articulation, such methods encourage a deeper understanding of organizational values, encourage consideration of new organizational forms, and facilitate recognition of clues to the new forms the organization might take.

P.S. is itself a product of the human mind, thus knowledge of the inquirer cannot be excluded from an understanding of how knowledge is generated. If a human's consciousness, worldviews, language, etc., are a product of the history of ideas as well as of social and economic development, then a social science model that ignores this product will ratify the past rather than help to create a better future.

Our view is that action research is a mode of inquiry more congenial to the perspective on organizations we characterized above and avoids the deficiencies of positivist science for generating knowledge for application to organizational problems.

ORIGINS OF ACTION RESEARCH

The term "action research" was introduced by Kurt Lewin in 1946 to denote a pioneering approach toward social research which combined generation of theory with changing the social system through the researcher acting on or in the social system. The act itself is presented as the means of both changing the system and generating critical knowledge about it.

Lewin gave us a clear picture of what he meant by action research and how it differed from traditional positivist science. His letters between 1944 and 1946 expressed profound concern and urgency for finding methods to deal with critical social problems (fascism, anti-Semitism, poverty, intergroup conflict, minority issues, etc.) (Marrow, 1969). He characterized action research as "a comparative research on the

conditions and effects of various forms of social action and research leading to social action (1946: 202–203). The immediacy of critical social issues forms an essential ingredient of action research. Indeed, the first article containing the term action research (Lewin, 1946) was entitled "Action Research and Minority Problems," indicating Lewin's concern that traditional science was not helping in the resolution of critical social problems.

Lewin's laboratory is the change experiment on the social system in which the practitioners and social scientists collaborate to find ways to bring about needed changes. The process is conceived as "a spiral of steps, each of which is composed of a circle of planning, action, and fact-finding about the result of the action" (1946: 206). Workshops conducted jointly by the practitioners and scientists would have the triple function of action, research, and training "as a triangle that should be kept together for the sake of any of the corners" (1946: 211). Training referred to "the training of . . . social scientists who can handle scientific problems but are also equipped for the delicate task of building productive hard-hitting teams of practitioners" (p. 211).

Action research had a parallel but independent development in Britain during the same years that Lewin was formulating his ideas. It began with a World War II group which later formed the Tavistock Institute of Human Relations. This interdisciplinary group drew more on psychoanalysis and social psychiatry than on social and experimental psychology, as did Lewin. But like Lewin, the group was committed to the social engagement of the social sciences, both as a strategy for advancing fundamental knowledge and as a way of enabling the social sciences to contribute solutions to important social problems. One of the group's first projects was the civil repatriation of prisoners of war. Twenty transitional communities were designed partly on data contributed by the repatriated prisoners and partly on the results of the experiments (Wilson, Trist, and Curle, 1952) at Northfield, a military psychiatric hospital with self-governing wards, in which pioneering group therapy techniques were developed by Bion (see Bion, 1946; Bridger, 1946). Subsequently, the Tavistock Institute has broadened its original medical orientation to action research by focusing on engagement with large-scale social systems (see Trist, 1976).

John Collier (1945), who was Commissioner of Indian Affairs from 1933–1945, must also be credited with recognizing the need for developing an approach to generating action-oriented knowledge that requires collaboration between researcher, practitioner, and client.

DEFINITION OF ACTION RESEARCH

Rapoport's (1970: 499) definition of action research is, perhaps, the most frequently quoted in contemporary literature on the subject:

Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework.

To the aims of contributing to the practical concerns of people and to the goals of social science, we add a third

aim, to develop the self-help competencies of people facing problems.

Foster (1972) suggested that the two aims of action research in the Rapoport definition be sought through the process of changing the problem situation itself. The small face-to-face group is the primary medium through which the problem situation may be changed, as well as in which the interests and ethics of the various parties to this process may be developed "within a mutually acceptable ethical framework." An infra-structure of ad hoc and permanent face-to-face groups is generally developed within a client system to conduct action research. A client system is the social system in which the members face problems to be solved by action research. It may be one of the face-to-face groups, an organization, a network of organizations (Trist, 1977), or a community.

While Rapoport's definition of action research focuses on aim, action research can also be viewed as a cyclical process with five phases: diagnosing, action planning, action taking, evaluating, and specifying learning. The infra-structure within the client system and the action researcher maintain and regulate some or all of these five phases jointly (Figure).

We consider all five phases to be necessary for a comprehensive definition of action research. However, action research projects may differ in the number of phases which are carried out in collaboration between action researcher and the client system. Chein, Cook, and Harding (1948) use the term "diagnostic action research" when the researcher is involved only in collecting data for diagnosis and feeding the data back to the client system. Chein, Cook, and Harding use the term "empirical action research" when the researcher only evaluates the actions undertaken by the client system and feeds data back to it. They use the term "participant action research" when diagnosing and action planning are carried out in collaboration between researcher and client system. Finally, they use the term "experimental action research" when researcher and client system collaborate in all
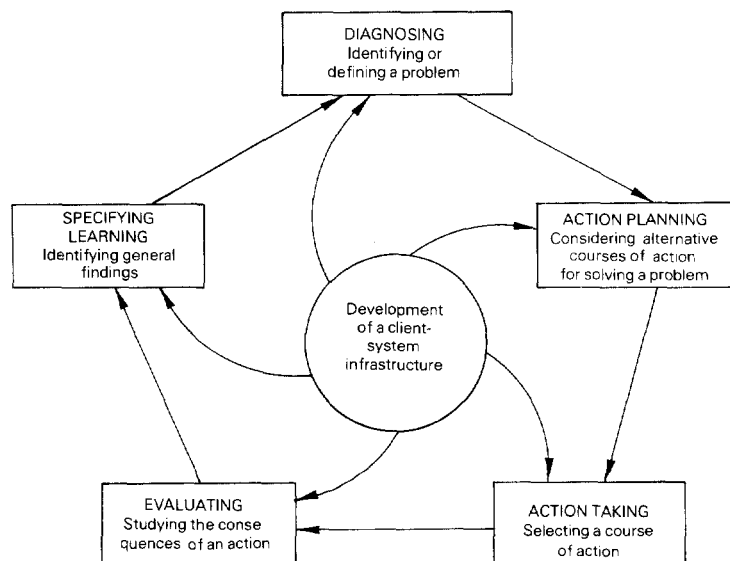
Figure. The cyclical process of action research.

or nearly all phases to set up an experiment for taking an action and evaluating its consequences.

In addition to the number of phases that can be carried out in collaboration between action researchers and the client system, contemporary applications of action research can use different techniques for data collection especially in the diagnosing and evaluating phases. Action researchers with a background in psychology tend to prefer questionnaires for such purposes, e.g., those affiliated with the Institute for Social Research at the University of Michigan (Mann, 1957; Seashore and Bowers, 1964; Nadler, 1977), while action researchers with a background in applied anthropology, psychoanalysis or sociotechnical systems tend to prefer direct observation and/or in-depth interviewing (Jaques, 1951; Rice, 1958; Whyte and Hamilton, 1964; Duckles, Duckles, and Maccoby, 1977; Trist, Susman, and Brown, 1977). Action researchers with any of these backgrounds may also retrieve data from the records, memos, and reports that the client system routinely produces.

ACTION RESEARCH AS A CORRECTIVE TO THE DEFICIENCIES OF POSITIVIST SCIENCE

Six characteristics of action research provide a corrective to the deficiencies of positivist science we discussed earlier. These characteristics are representative of the methods and objectives of key developers and practitioners of action research (A.R.).

A.R. is future oriented. In dealing with the practical concerns of people, A.R. is oriented toward creating a more desirable future for them. Human beings are therefore recognized as purposeful systems (Ackoff and Emery, 1972) the actions of which are guided by goals, objectives, and ideals. In being future-oriented, A.R. has close affinities to the planning process, so that planning research may be potentially useful in informing A.R. and vice versa.

A.R. is collaborative. Interdependence between researcher and the client system is an essential feature of action research, and the direction of the research process will be partly a function of the needs and competencies of the two. On the one hand, A.R., as Cherns, Clark, and Jenkins (1976: 33) state, "challenges the position of the social scientist as privileged observer, analyst, and critic." On the other hand, it prevents him from taking the role of disinterested observer and obliges him to clarify and represent his own ethics and values so that they, along with those of the client system, can serve as guidelines against which to assess jointly planned actions.

A.R. implies system development. The action research process encourages the development of the capacity of a system to facilitate, maintain, and regulate the cyclical process of diagnosing, action planning, action taking, evaluating, and specifying learning. The aim in action research is to build appropriate structures, to build the necessary system and competencies, and to modify the relationship of the system to its relevant environment. The focus is on generating the necessary communication and problem-solving procedures. The infrastructure of the system, which the action

research generates, is the key instrument for (1) alleviating the immediate problematic situation, and (2) generating new knowledge about system processes.

A.R. generates theory grounded in action. In action research, theory provides a guide for what should be considered in the diagnosis of an organization as well as for generating possible courses of action to deal with the problems of members of the organization. This is the case for psychoanalytic theory, Lewinian field theory, and general systems theory (see Susman, 1976). Furthermore, A.R. contributes to the development of theory by taking actions guided by theory and evaluating their consequences for the problems members of organizations face. Theory may then be supported or revised on the basis of the evaluation.

A.R. is agnostic. The action researcher recognizes that his or her theories and prescriptions for action are themselves the product of previously taken action and, therefore, are subject to reexamination and reformulation upon entering every new research situation. The action researcher also recognizes that the objectives, the problem, and the method of the research must be generated from the process itself, and that the consequences of selected actions cannot be fully known ahead of time.

A.R. is situational. The action researcher knows that many of the relationships between people, events, and things are a function of the situation as relevant actors currently define it. Such relationships are not often invariant (Blumer, 1956) or free of their context, but can change as the definition of the situation changes. Appropriate action is based not on knowledge of the replications of previously observed relationships between actions and outcomes. It is based on knowing how particular actors define their present situations or on achieving consensus on defining situations so that planned actions will produce their intended outcomes.

IS ACTION RESEARCH SCIENTIFIC?

One criterion of positivist science for judging whether action research is scientific is whether relationships between actions and their consequences can be explained as particular cases falling under more general laws governing types of actions and their consequences. If relationships between actions and consequences can be explained in this way, then the action researcher will know what action to take in future settings by reference to types of actions having lawful relationships to consequences. "Covering law" is the term which Hempel (1965), a leading contemporary philosopher of the Formalist school, applied to a general law which explains a particular case by "covering" or subsuming it. Covering laws are the basis for the only two kinds of explanation that Hempel considered as meriting the label of being scientific; that is, the *deductive-nomological* and the *inductive-statistical* forms. In terms of organizational action, the deductive-nomological type of explanation has the following form: (a) Actions of type A always produce consequences of type C in a given class of situations, (b) Person X takes action A in a particular situation, thus (c) A consequence of type C occurs. In a deductive-nomological expla-

nation, sentence (a) must state a general law about the consequences of human action, while (b) cites a particular fact or event. Sentence (c) (the explicandum) is derived from sentences (a) and (b) (jointly the explicans). Sentence (a) is considered to be a strictly universal form. It asserts that in all cases in which certain specifiable conditions are realized, the action A implies consequence C (that is, the outcome is certain to occur).

The inductive-statistical type of explanation asserts that if certain specifiable conditions are realized, then a particular event will occur with a certain statistical probability. Inductive-statistical explanations have the following form: (a') The likelihood that a consequence of type C will follow action of type A, is some value L, (b') Person X takes action A, thus (c') A consequence of type C will occur with a particular likelihood.

The value of L is not any particular mean of a sampling distribution that represents a long-run frequency with which events of type A are followed by consequences of type C. Rather, it refers to the "degree of rational credibility" (Carnap, 1950) or logical inductive probability which sentence c', the explicandum possesses relative to sentences a' + b', the explicans.

Hempel considered the deductive-nomological model the more desirable, since it provides a higher degree of certainty in the explanation of events. Furthermore, if the explicans precedes the explicandum in time, the model is called a causal model (Evered, 1976). On the other hand, the inductive-statistical model is superior in that any single falsified prediction will not invalidate the explanatory model, as it would for the deductive-nomological model.

Although most contemporary organizational research uses the inductive-statistical model of explanation, Hempel considered it less desirable than the deductive-nomological on these grounds: (1) It cannot predict an outcome with certainty; (2) It cannot explain why any unpredictable outcome has actually occurred, and is therefore, strictly speaking, a noncausal model; (3) Statistical regularity does not allow one to make a specific choice in a concrete situation; and (4) Statistical regularities do not explain why two kinds of events or things are strongly associated.

Although Hempel believed that the logic of all scientific explanations is of the covering-law variety, he did not believe that all empirical phenomena were scientifically explainable or that they are all governed by a system of determinable laws. He acknowledges that there are other ways by which we may explain why some thing or event exists or happens; he just would not call them scientific explanations. On the other hand, he considered it the task of the philosopher to determine together with the scientist whether or not these other forms of explanation could be translated into covering-law terms and be tested. Hempel did not believe we could determine which explanations were scientific a priori.

We will now examine whether actions and their consequences can be subsumed under covering laws, thus permitting them the status of scientific explanation by positivist criteria.

Status of an Action as a Thing or Event

The search for generalizations about the relationship between actions and consequences is ill-conceived if actions are assumed to have a meaning independent of their associations with the outcomes they are intended to produce. Unlike behavior that follows a caused event, i.e., the man trips over a crack in the sidewalk (Anscombe, 1958, confers causal status on events like these), actions are undertaken because of beliefs concerning the ends they are intended to produce, i.e., I am shuffling through the papers on my desk in order to find my glasses. As Hempel pointed out, we cannot explain the actions undertaken without reference to the ends pursued or vice versa, e.g., why is he shuffling through the papers on his desk? He is looking for his glasses. Or the question, Is he looking for his glasses? Well, he is shuffling through papers on his desk. Answers to our questions about ends or actions are provided by considering beliefs about actions and about the ends pursued, in conjunction with an appraisal concerning the rationality of actions undertaken. In Hempel's words, beliefs, ends, and rationality are "epistemically interdependent."

Malcolm (1964) doubts that actions undertaken to pursue intended outcomes can be properly understood in terms of functional laws. He challenges stimulus-response (S-R) laws of association that join actions and consequences based on their prior association. Instead, purposeful actions are connected to their intended outcomes by logic, that is, by their "in order to" quality. For example, "I am rummaging about my desk in order to find my spectacles." The action derives its meaning from the end pursued. Malcolm demonstrates (p. 151) how strange it would sound if a person were to reason in strictly S-R associationist terms:

Here I am rummaging about my desk. When I have done this in the past my activity has terminated when I have caught hold of my spectacles. Therefore, I am probably looking for my spectacles!

Action Taken in Concrete Setting

Statistical studies that relate two or more organizational variables may increase our understanding of the structure and functioning of organizations if (1) the variables refer to things or events that can be defined independently of the variables to which they are to be related, and (2) the form of the relationship is invariant with respect to the definition of the situation in which the variables are embedded. Studies relating certain aspects of organizational structure to other aspects within the organization or in its environment generally meet such criteria, e.g., size and structure (Blau and Schoenherr, 1971) or technology and structure (Hickson, Pugh, and Pheysey, 1969). These criteria are not met when one of the variables refers to a planned intervention, i.e., human action in a social system.

Furthermore, planned interventions usually take place in only one organization at a time and would not be interpreted within different organizations in the same way. However, suppose such actions could be classified into categories of actions and that the consequences of these actions were observed in 50 different organizations and shown to produce desirable consequences at better than a chance level. The

change agent who reads the report of such a study still has to make an intervention in the one organization in which he or she had been invited to intervene. His or her chosen action would be judged good or poor, right or wrong in the singular concrete setting in which it was undertaken. He or she does not intervene in 50 organizations so as to judge whether the chosen action produced the desired outcome at better than the chance level, e.g., in 40 organizations out of 50 rather than in 25 out of 50. Reliance on Bayesian notions of subjective probability of success may have limited value. Any system as complex as a social system has a unique configuration of parameters which was not measured, but which would influence where the organization might fall in the sampling distribution. Thus, the intervener without knowledge of the unique configuration of parameters in the concrete setting in which action is contemplated would not know if an action will produce an outcome at the mean of the sampling distribution or perhaps three standard deviations from it. Without such knowledge, the chosen action may produce an outcome that is less desirable than an outcome chosen on the basis of good judgment of the relevant factors in the concrete setting.

Actions Are Seldom Discrete Events

Some thought should be given as to what kinds of human actions can be considered interventions into an organization. An intervention may be construed as a cause when members of a supra-system or other system take actions to alter the internal or external conditions a targeted organization faces without consultation with members of the targeted organization. The interventions of concern to this discussion are acts of communication between two or more self-reflecting subjects, requiring mutual understanding of the meaning of the acts and common consent as to their presumed consequences. Such interventions have an element of surprise or unexpectedness to them so that they are unlike other actions routinely undertaken within the organization. The meaning of the routine actions is understood because they fit in the context created by a history of previous commitments affecting the goals, structure, and technology of the organization and the language and definitions of situations that led to these commitments.

The element of surprise evoked by an intervention results when the change agent offers members of the target organization a new way to conceptualize an old problem and offers it in a language or framework that differs from that by which members of the organization define their present situation (Susman, 1976).

Interventions may be much less direct. Change agents may serve as catalysts to help organizational members define a problem or reconceptualize an existing one. In these cases, acts of communication take the form of helping organizational members to articulate a desired future against which to compare the present situation (Blake and Mouton, 1974), or pointing out discrepancies between stated intentions and actual behavior (Schon and Argyris, 1974). In areas such as these, successful interventions break patterns of shared expectations and codes of conduct. It must be recognized,

however, that the history that produced such expectations and codes, also produced the decisions that limit the possibilities for new action in the immediate future because of previous commitment to physical plant, technology, and current personnel.

Unlike deterministic physical systems, the nonrandomness or the structuredness of a social system results from shared codes of conduct or rules of its members. Even if the intended target of an intervention were changing the physical aspects of a system, e.g., layout, machinery, etc., it still would be mediated by communicating such intentions to members of the social system and gaining the consent of at least its most influential members. Thus, initially, the target of most proposed change efforts concerns the conceptions and ideas of members of the system. If we also consider the personal investments that organizational members have in a particular structure, technology, etc., because of how these arrangements have allowed them to accommodate to conflicts over power, prestige, and attention, we can see that the social system is open ended with respect to the consequences of any proposed change. Acts of communication are unlike actions taken toward physical objects in that acts of communication may simultaneously convey multiple meanings, i.e., manifest and latent content, conscious or unconscious, or they may be subject to different interpretations by sender and receiver. Also, the targets of a proposed change will not know what their reactions will be to a proposed change until they have a chance to contemplate their reactions by mentally rehearsing them or by experiencing the changes first hand.

Positivist Science and Action Research: Contrasting Conceptions of Science

We have shown that actions and their consequences cannot be explained according to the positivist criteria of a scientific explanation. This leaves us with the choice as to whether we ought to declare action research ascientific, or reconsider using positivist criteria to judge the scientific status of action research. We have chosen the second alternative and, on this basis, we propose that action research can be legitimated as science by locating its foundation in philosophical viewpoints which differ from those used to legitimate positivist science. We also propose alternative criteria of science and alternative methods as appropriate for action research. Finally, we consider what action research can contribute to the growth of knowledge.

PHILOSOPHICAL VIEWPOINTS THAT LEGITIMATE ACTION RESEARCH

While adherents of positivist science can cite several philosophical viewpoints as a foundation for legitimating its methods, action researchers can do the same with different philosophical viewpoints. These viewpoints are as follows:

Praxis. The concept of praxis, originally from Aristotle, refers to the art of acting upon the conditions one faces in order to change them. From Aristotle's writings, Bernstein (1971) interprets praxis to deal with "the disciplines and activities predominant in man's ethical and political life" (p. x).

Aristotle contrasted praxis with *theoria,* "those sciences and activities that are concerned with knowing for its own sake" (p. ix), and presented them as two necessary dimensions of a "truly human and free life" (p. x). Aristotle also contrasts praxis with *techne,* which is the "skillful production of artifacts and the expert mastery of objectified tasks" (Habermas, 1973: 42). While *techne* may be improved by training and informed by mathematical calculation, praxis is cultivated and guided by good judgment or "prudence" (p. 42). Marx made praxis the central concept in his theories of alienation, economics, and society. He enlarges upon Aristotle's usage of praxis in that by taking action to change conditions one is personally changed in the process (Marx, 1963).

Hermeneutics. Hermeneutics originally referred to the art of interpreting texts, mainly of biblical, judicial, and, more generally, historical texts (Gadamer, 1975). Contemporary references to hermeneutics focus on its role in the interpretation of languages, culture, and history. It has been a more influential approach to the social sciences on the European continent than positivist approaches have been, with its leading forerunners being Hegel, Dilthey, Weber, and, more recently, members of the Frankfurt school, e.g., Habermas, Horkheimer, Adorno, and Marcuse.

Its most important contribution to action research is its concept of the hermeneutical circle. The idea of the circle is that no knowledge is possible without presuppositions. This idea has been recognized also by philosophers not associated with hermeneutics as, for example, in Popper's (1959) acknowledgement that the framing of any scientific question assumes some foreknowledge of what it is we want to know. In the social sciences, the hermeneutical circle takes the form of attempting an initial holistic understanding of a social system and then using this understanding as a basis for interpreting the parts of the system. Knowledge is gained dialectically by proceeding from the whole to its parts and then back again. Each time an incongruence occurs between part and whole, a reconceptualization takes place. The learning process is not unlike the spiral formulated by Lewin. The frequency of reconceptualization decreases as the match improves between the researcher's conception of the social system and that held by its members. The hermeneutical tradition strengthens the action researcher's methodological position by forewarning him that his interpretation of a social system will never be exactly the same as that held by the members of the social system. This provides the action researcher with a base for understanding his own preconceptions better and by contrast, those held by system members, and also allows him to see possible solutions not seen by system members.

Existentialism. Action research has much in common with existentialism. Both arose out of concern with the limitations of rationalistic science, both assert the importance of human choice and human values, both are keyed to the importance of human action, and both avoid giving traditional causal explanations of human actions.

The existential viewpoint was first articulated by Kierkegaard in the 1840s and Nietzsche in the 1870s, and systematically

developed by Heidegger, Sartre, and Jaspers, among others (see Reinhardt, 1952; Barrett, 1958). Central to the existential position is the theme that behind every action, individual choice is based on human interest. The possibility of choice is central to taking action, and the necessity to choose is central to human development.

Pragmaticism and pragmatism. Pragmaticism, as Peirce called it, and Pragmatism, as developed by James and Dewey, belong to the positivist tradition in that they accepted an empirical base as the ultimate source of scientific knowledge. However, their adherents considered the role of scientist as actor within the world rather than a spectator of it. Instead of focusing on formal criteria for establishing the truth of a statement, they shifted the criterion of truth toward what human difference it would make if an action were taken based on a tentative acceptance of the statement; that is, what are the practical consequences for adopting a particular statement. Dewey applied such methods to determine the practical consequences of accepting certain values.

Process philosophies. One of the most salient features of organizations is change. Where Heraclitus observed that "you cannot step into the same river twice," his modern counterpart could comment that you cannot step into the same social system twice. Although action research derives much of its epistemological power from this viewpoint, it is only in the twentieth century that the epistemological implications have been articulated by Bergson (1911), Smuts (1926), Whitehead (1929), Cassirer (1957), and Heidegger (1962), among others.

Phenomenology. Phenomenology, in its broadest sense, insists on the primacy of immediate subjective experience as the basis for knowledge. As Schacht (1972) pointed out, a person may proceed by minimizing the constraints of preconceptions (Husserl, 1931), or by acknowledging one's preconceptions (Heidegger, 1962) so that, by contrast, one allows another's experience to be communicated in relatively undistorted fashion. Phenomenology has been applied in the social sciences by Lewin (1946, 1951), Rogers (1961), Merleau-Ponty (1963), Perls (1965), and Schutz (1967); each of these researchers has developed psychological theories based on the concept of the phenomenological field of an individual or group. Whether the focus is a person or group, the ends that each pursues to bring about a more desirable future as well as the values and norms that guide the actions undertaken have no objective reality that can be empirically determined as required by positivist science, if such concepts are to enter its domain of inquiry legitimately. However, such ends, values, and norms have a phenomenological reality from the perspective of the person or groups taking action, and knowing them is essential to the action researcher in predicting and understanding the behavior of the person or groups engaged.

ALTERNATIVE CRITERIA AND METHODS OF SCIENCE

Explanation versus understanding. Human behavior can be explained in other ways than subsuming it under a covering

law. Dray (1957) considered the covering law model as "peculiarly inept" for use in explaining human action and urged its replacement in applications to human action by what he called "principles of action." These express a judgment of the form: when in a situation of type S, the action to take is A. Dray called this kind of explanation a "good reason" explanation. Silverman (1971) drawing on Weber and Schutz to describe explanations of this type stated that they were easiest to apply when one could assume that actors were rational and continuously weighed the means, ends, and secondary consequences of their actions. Bateson (1972) had a similar type of explanation in mind with his expression "cybernetic explanation" in which all explanations (save one in the limiting case) were deemed improbable because they were mismatched with what was known of the context within which action was taken.

Reliance on an empirical base alone for explaining behavior can lead an observer to search for a cause of an action taken. When an empirical base is used, changes in behavior are sought through manipulation of the cause of the behavior instead of through the consent and understanding of those whose behavior is to be changed. Trist, Susman, and Brown (1977) have commented that the language and metaphors used by organizational researchers reveal that organizational change is conceptualized as externally caused. Change is often described with energy metaphors, as if it were a force aimed at those parts of an organization the researchers wish to displace while holding other parts of the organization constant.

From a phenomenological perspective, behavior is understood by knowing the ends toward which the action is taken, as well as by sharing the same time frame and universe of moral concerns.

Prediction versus making things happen. Positivist science encourages two conceptions of the researcher's role in prediction in organizational science: (1) the researcher is sole possessor of knowledge from which actions will be drawn and (2) the researcher is sole originator of actions to be taken on an essentially passive world. The degree to which these conceptions are at variance with taking action within a social system is evident from the extraordinary precautions undertaken in many controlled experiments to ensure that human beings will react to the researcher's treatment rather than to the researcher as another human being.

The action researcher, on the other hand, coproduces (Ackoff and Emery, 1972) solutions through collaboration with the client system. Friedmann's (1973) concept of transactive planning provides a basis for synthesizing the contributions that action researcher and clients can bring to solving a problem. The action researcher brings theoretical knowledge as well as breadth of experience to the problem-solving process. The clients bring practical knowledge and experience of the situations in which they are trying to solve problems. Neither client nor researcher has better knowledge; in a sense, they are both experts.

According to positivist conceptions, once the researcher predicts that an outcome will follow taking a particular ac-

tion, he or she then takes the action and waits to see if the predicted outcome occurs. Any interference by the researcher in the events that intervene between action and outcome nullifies the significance of the prediction. The action researcher collaborates with clients in diagnosis, selection of alternative actions, and evaluation of outcomes. The objective of the collaboration is to bring about a better future, i.e., with a problem solved. The values that guide the client's choice of goals and objectives are ones with which the action researcher becomes "directively correlated" (Sommerhoff, 1969) to increase the relevance of his or her contributions. If the researcher is effective in such circumstances, the hoped for outcome will occur because of the researcher's involvement not from trying to avoid it.

Deduction and induction versus conjectures. Peirce (1955) was one of the earliest to criticize the Formalist and Reconstructionist conception of the manner in which knowledge is advanced. For example, he felt that the deductive mode offered no new knowledge about the world as one uses this mode only to work out the consequences of what one already accepts. Popper (1962) criticized the inductive mode as not having been really the basis for significant advances in knowledge. A Popper-like example of the shortcomings of the inductive mode would be; question: Why does ice float on water? Answer: Because it always does! I've seen it do that a thousand times! Popper claims that significant advances in knowledge occur when the inquirer goes beyond the data; performs a conceptual leap of the imagination to consider analogies, metaphors, models, myths, etc. as a way to explain the data. Popper called such leaps of the imagination conjectures. Leach (1961) has a similar process in mind with his term "inspired guesswork." According to Popper, conjectures are created in the same manner as myths are. He distinguishes conjectures from myths in that tests can be devised for conjectures that could potentially falsify them. They gain in scientific stature the more they survive such tests.

We believe that most of our significant knowledge about social systems has grown by conjecturing, e.g., by conceptualizing the social system as a biological cell (as in general systems theory) or as a machine (scientific management). We make assumptions about organizations by pattern recognition (organizational climate), or by imagining the whole from knowledge of some of its parts. Consistent with an action mode of inquiry, we often test out the consequences of our conjectures by taking actions and either strengthen or weaken our belief in such conjectures as a result.

Detachment versus engagement. The positivist assumption of a detached, neutral, independent, objective researcher is incompatible with the requirements of action research. Once one accepts organizations as artifacts, created by humans for the purpose of serving human needs, then one cannot escape the realization that actions in an organization have moral consequences that must be faced. The success of action research hinges on understanding the values of the relevant actors since such values guide the selection of means and ends for solving problems and develop the commitment of the actors to a particular solution. Empathy,

taking the role of the other, participant observation, etc. may be the most effective means for making the theoretical or practical knowledge the researcher possesses really useful and accepted by clients.

Contemplation versus action. If the world were structured logically as Formalists and Reconstructionists assume, then one could work out possible consequences of taking an action without ever having to take the action. Within the context of taking action in an organization, only the most trivial of consequences can be known in this way. By contrast, in action research, not only is knowledge gained by acting in the real situation, but the situation itself is simultaneously a product of the current level of knowledge. Torbert (1972) captures the process with the phrase "Inquiry in action can lead to learning from experience" (p. iv).

CONTRIBUTIONS OF ACTION RESEARCH TO GROWTH OF KNOWLEDGE

If action research has its own legitimate epistemological and methodological base, then it can contribute to the growth of knowledge differently from what positivist science can contribute. The focus of organizational knowledge may shift from prescribing rational rules of operation (as with machines) to the emergence of action principles or guides for dealing with different situations. Action research provides a mode of inquiry for evolving criteria by which to articulate and appraise actions taken in organizational contexts. Our relative lack of understanding of action and its effects is further evidence of the epistemological shortcomings of positivist science.

Action research facilitates the development of techniques which we will call "practics" (to distinguish from positivist techniques). Practics would provide the action researcher with know-how such as how to create settings for organizational learning, how to act in unprescribed nonprogrammed situations, how to generate organizational self-help, how to establish action guides where none exist, how to review, revise, redefine the system of which we are part, how to formulate fruitful metaphors, constructs, and images for articulating a more desirable future. Such know-how is difficult to develop or even consider within the positivist framework.

Action research is directed toward the development of action competencies of members of organizations, and can be described as an "enabling" science. Typically, the kinds of skills which action research develops are interpersonal and problem-defining. Competence is developed in interpretation and judgment, in establishing problem-solving procedures, acting in contingent and uncertain situations, learning from one's errors, generating workable new constructs from one's experiences. Such skills are needed by persons in organizations, and positivist science has generally made negligible contributions in providing such skills.

The action researcher establishes conditions for the development of others. He or she acquires increasing skills at developing organizational infrastructures and networks for enabling members of organizations to plan, organize, learn,

and help themselves. The action researcher learns how to use earlier infrastructure efforts as models so that persons in other organizations can learn from and improve upon their example. The researcher's own behaviors are even more influential and become a model of how to act in unprescribed nonprogrammed situations.

Collaboration between the researcher and the client system enlarges the domain of inquiry in organizational research from them to us. The knowledge we generate affects us not others; the researcher is necessarily a part of the data he or she helps to generate.

A CONTINGENCY VIEW OF SCIENCE

The Table summarizes the differences between positivist science and action research we have discussed. As we have seen, the differences are extensive. We now consider the question of which approach is better. Our answer is that it all depends on the phenomena one wants to study and the conditions under which they are to be studied. It would be very difficult to state definitively when positivist science is appropriate. However, like Vaill (1976) who questions the use of positivist science ("the expository model of science") for designing organizations, we suggest that the researcher ought to be skeptical of positivist science when the unit of analysis is, like the researcher, a self-reflecting subject, when relationships between subjects (actors) are influenced by definitions of the situation, or when the reason for undertaking the research is to solve a problem which the actors have helped to define.

Table

Comparisons of Positivist Science and Action Research

Points of Comparison	Positivist Science	Action Research
Value position	Methods are value neutral	Methods develop social systems and release human potential
Time perspective	Observation of the present	Observation of the present plus interpretation of the present from knowledge of the past, conceptualization of more desirable futures
Relationship with units	Detached spectator, client system members are objects to study	Client system members are self-reflective subjects with whom to collaborate
Treatment of units studied	Cases are of interest only as representatives of populations	Cases can be sufficient sources of knowledge
Language for describing units	Denotative, observational	Connotative, metaphorical
Basis for assuming existence of units	Exist independently of human beings	Human artifacts for human purposes
Epistemological aims	Prediction of events from propositions arranged hierarchically	Development of guides for taking actions that produce desired outcomes
Strategy for growth of knowledge	Induction and deduction	Conjecturing, creating settings for learning and modeling of behavior
Criteria for confirmation	Logical consistency, prediction and control	Evaluating whether actions produce intended consequences
Basis for generalization	Broad, universal, and free of context	Narrow, situational, and bound by context

SUMMARY

We have examined the scientific merits of action research both in the narrow terms of positivist science and more broadly in terms of its capacity to generate knowledge for use in solving problems faced by members of organizations. We find that action research is not compatible with the criteria for scientific explanation as established by positivist science. Hempel's covering-law model of explanation would not grant to action research the status of a valid science. However, in action research, the ultimate sanction is in the perceived functionality of chosen actions to produce desirable consequences for an organization. Action research constitutes a kind of science with a different epistemology that produces a different kind of knowledge, a knowledge which is contingent on the particular situation, and which develops the capacity of members of the organization to solve their own problems.

We hope that this article will enable others to assess the scientific merits of action research. We believe that action research is both ascientific in terms of the criteria of positivist science and relevant in terms of generating good organizational science. As a procedure for generating knowledge, we believe it has far greater potential than positivist science for understanding and managing the affairs of organizations.

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