

PROBLEMS OF TEAM ENDEAVOR IN THE STUDY OF CHRONIC DISEASE

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BY TITLE, team endeavor is here restricted to its research potentialities, specifically excluding all relation to operational programs for prevention and control of chronic disease, or for evaluation of control measures. Administrative practice in public health, whether by official or voluntary agencies, has found team endeavor so useful that it has become accepted procedure.

Operational epidemiology, as practiced by health departments, has become a team effort. The basic elements of the team are drawn from representatives of epidemiology and the laboratory, and from clinical skills to include those of the veterinarian and the dentist. The work of the day is largely done by the public health nurse and by sanitarians and other technically trained assistants. The entomologist, the sanitary engineer, the geneticist, and all manner of specialists in both biological and social sciences may participate according to the problem in hand. The accomplishments are such as to suggest to some that team endeavor is the prescription for all ills and all patients, including research.

Chronic disease is widely inclusive of many pathological conditions. Causality, viewed as a problem of populations, rests in many areas. In attempted solution of the unknown, public health has its own basic disciplines with their bodies of verifiable facts and resulting systems of logical inferences. Public health has always drawn heavily on other sciences, and broadly also; from biological, medical and the natural sciences, and more recently from the social disciplines. The practice is usual in science.

The demonstrated value of knowledge and methods derived from other sources led naturally to active collaboration of workers in different fields of science. An interdisciplinary approach to problems has been so successful at times as to give rise to a

new discipline, biophysics for example. Group or team effort in research is the modern trend. It has the danger of becoming a fetish. Like most things, team endeavor presumably has its uses and misuses, its values and its limitations.

Team Endeavor in Chronic Disease. Neither evidence nor reason suggests any more or any less advantage to team endeavor in the study of chronic disease than in other areas of research in public health. Attempt is now made to sort out the attributes of team endeavor and to recognize guides for conduct and procedure best suited to use of that system in study of community disease of chronic nature. Because principle would seem to apply here as elsewhere, examples and experience are drawn from a variety of investigative fields, in the belief that inferences of greater strength are possible than through attention to the restricted and relatively undeveloped interest which has immediate attention.

Research Fields. I find need at the beginning to distinguish two broad fields of research. They are easily labelled, difficultly characterized and perhaps impossible of complete separation. Drawing on that experience to me most expressive of the differences entertained, I should call them strategic and tactical. The first has to do with the origin of an idea, the development of a conceptual scheme, the planning of experiment and the accumulation of the necessary evidence to test a stated hypothesis. The second is the enlargement and extension of knowledge essential to bringing the facts to practical usefulness. Should I use the jargon of the day, I would call the two divisions research and development. I have a liking for simple words and suggest discovery and invention. I might to advantage maintain my academic role, in which case I mean basic and applied research.

I avoid further venture into semantics and turn to well-known illustrations. Banting discovered insulin, although as is usual he built on bits and pieces of fundamental information accumulated by others over many years. MacLeod, Best, Collip, Joslin, and many others made it a useful and practical addition to *materia medica*. Boyle's law was a great discovery, the steam

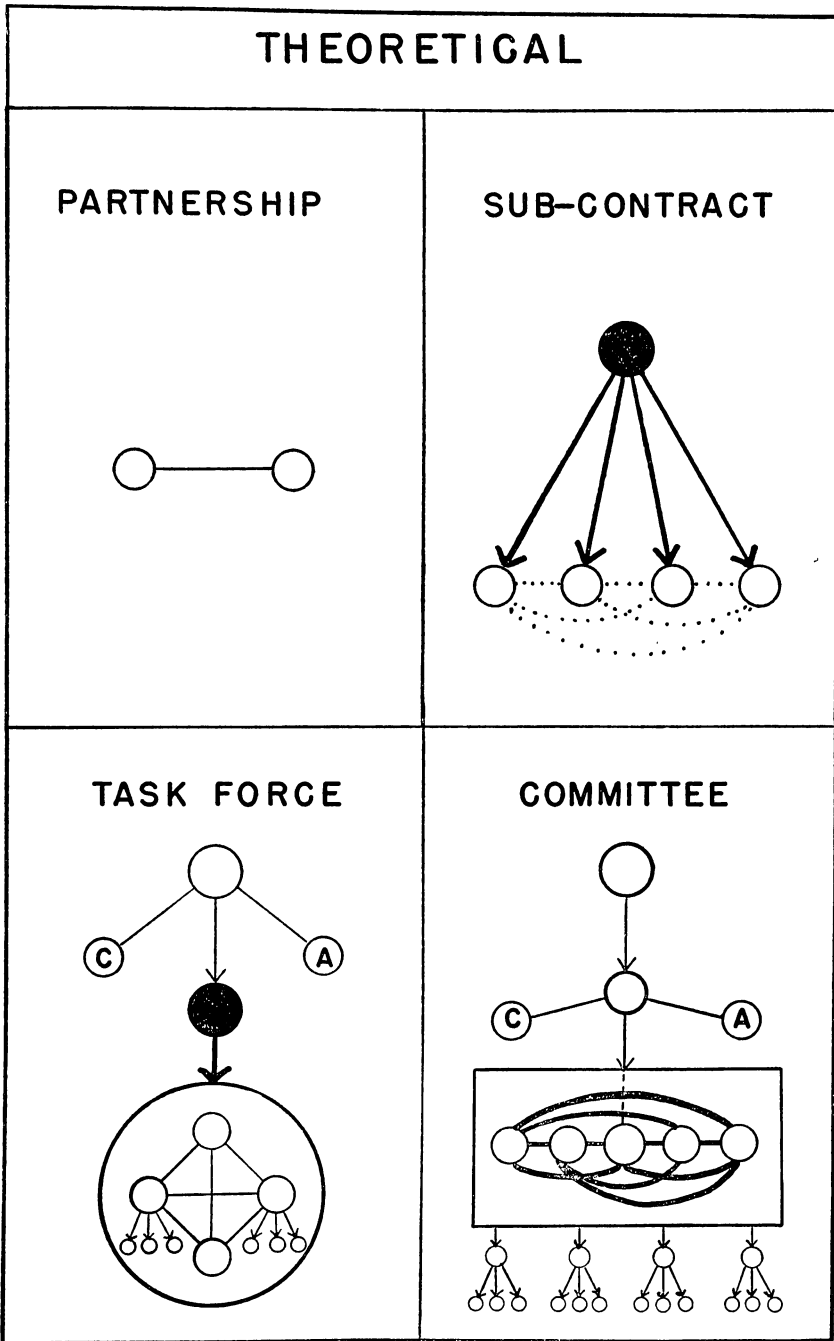


Fig. 1. Team endeavor in research, external and internal reaction patterns; theoretical concept of organizational groups. A is advisory committee, C is consultants. Circles represent individuals within an organization and lines show the direction of authority and interaction. Shading of circles represents degrees of authority and the various lines the strength and frequency of interaction.

engine a most useful invention. Penicillin was a creation of Fleming, but the work of many others brought it to the bedside of patients throughout the world. I rest my case. The distinction is essential to the conclusions I shall reach.

Team Defined. My colleagues have material differences of opinion as to what constitutes a team. Some accept two or more workers skilled in the same discipline and working together on a single problem as a team; others say that is no team at all. The true team in their opinion is an association of workers from a variety of disciplines, combining individual skills in attack on a common problem. By this reasoning a pair of well-matched percherons harnessed together is no team; but an ox and a woman hitched to a plow, which I have seen so many times in the Balkans, fills all requirements. In the interests of a common understanding, the association of workers from a single discipline in a common task is here recognized as group research; those of different skills are termed an interdisciplinary team. I am not happy in the differentiation.

Kinds of Teams. I choose to distinguish four organizational patterns applying equally to the research group and to the interdisciplinary team as just distinguished (Figure 1). They differ in both external and internal interaction of the persons associated.

The first is a partnership, a self-selected team who know each other and have been attracted through mutual respect and by common interests to join in a research. The usual motivation is belief that the study can thus be better prosecuted than by either worker alone. They are responsible only to each other. Theoretically, they work on equal terms but in practice one or the other almost invariably assumes leadership (Figure 2). In the best traditions of partnership, that leadership may shift as the nature or course of the study takes new direction. The chances of productive result are good. From my acquaintance, I find illustration in the partnership of Topley and Wilson; Topley the biologist with his skill in developing conceptual scheme, Wilson the master of methodology and technic.

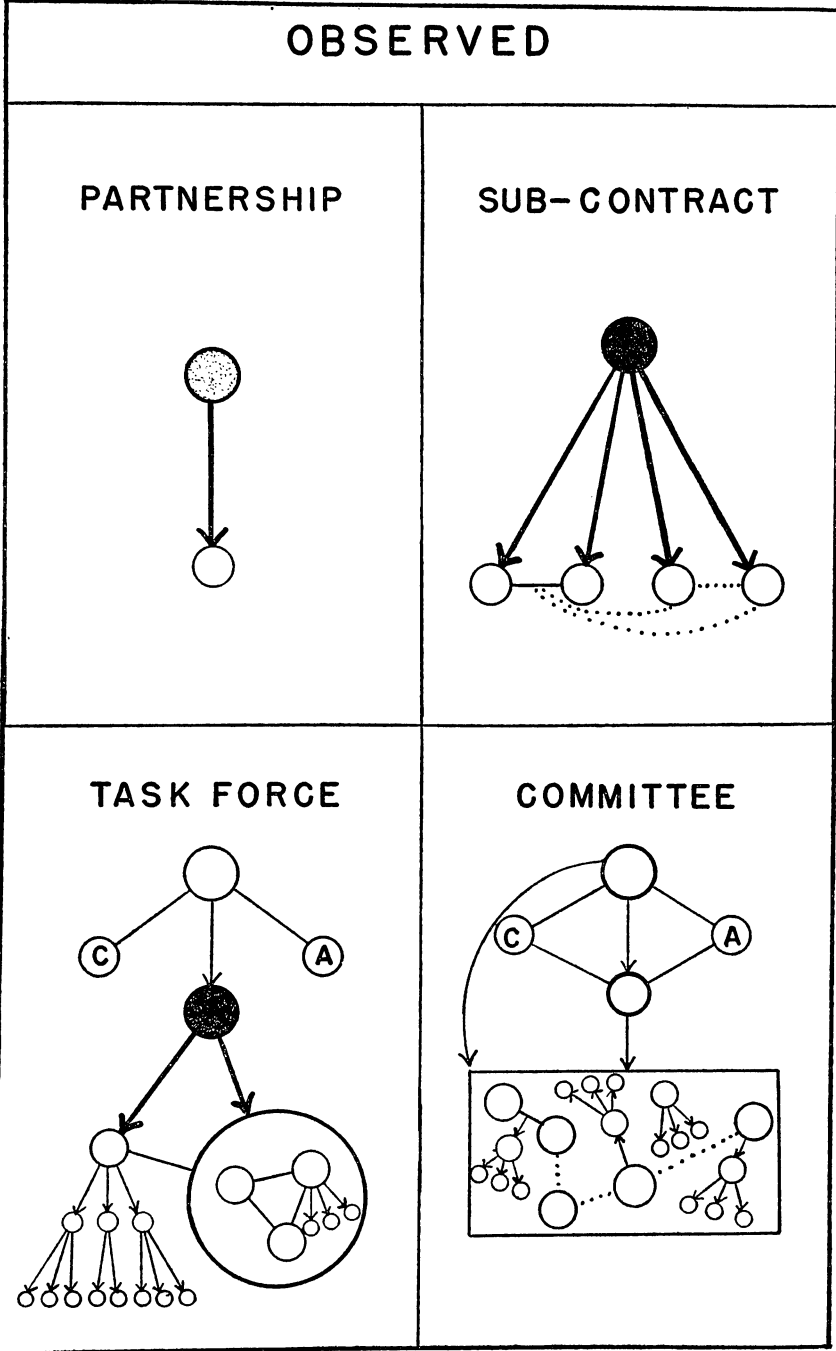


Fig. 2. Team endeavor in research, external and internal reaction patterns: commonly observed deviations in practice. A is advisory committee, C is consultants. Circles represent individuals within an organization and lines show the direction of authority and interaction. Shading of circles represents degrees of authority and the various lines the strength and frequency of interaction.

I distinguish next the sub-contract system. The problem lies within a broad area, for instance, the study of a whole disease. There are separable and distinct facets. Individual investigators are recruited by a director, allotted individual fields, and each is responsible for a particular investigation, usually with a corps of assistants. I think of the Rockefeller Foundation program in yellow fever. One worker takes responsibility for arthropod vectors, another for characteristics of the virus, and so with immunology and animal reservoirs, the qualities of a vaccine and other aspects. Complete coverage may not be attempted. The organizational scheme is in reality a series of individual researches within a large area, conducted by subcontractors and under central organization and control where results are collected and related. Islands of knowledge begin to fuse, and ideally end in generalization. The sum of accomplishment with this organizational scheme is usually large.

The third pattern takes the form of a task force. The problem has been defined, the objective determined. There is work to do and prescribed kinds of people are needed to do particular things. This is development, or applied research, the field of activity in which the team approach has made its best contributions. Realization of the full possibilities of penicillin after Fleming is illustrative. Direction is by a scientist working directly with the team, rather than management from a distance; and indeed authority may change as the character of the research changes, as was the history of terramycin. Subgroups may be delegated to a particular feature of the work. One subgroup may be augmented in numbers and emphasis because of a promising turn in the investigation. Sometimes items are of such nature that place exists for individual effort.

The fourth organization may be termed the committee system. A group of persons of varied training and experience are brought together to investigate a problem of common interest. This is an executive committee, charged with active prosecution of the research. The group is not to be confused with the advisory committee, which is something else with

wholly different functions; nor with consultants who usually function in a part time and special capacity. The committee works through a chairman, selected from or by the group of which he is an active member. Committees do not commonly come into being of themselves. Usually they are appointed by a person or an organization to whom they are responsible. They commonly report to an intermediate authority. Decisions as to approach and course of action in the research presumably rest on group consensus; but often the appointing body or its representative, in relative anonymity, really calls the tune. Operations tend to break down because of decisions weakened by compromise, a feature inherent to the committee system. The success achieved is usually through separation into self-selected partnerships within the larger structure, through work as individuals, or by organized sub-teams responsible for particular parts of the project although representatives of the various disciplines may continue to use each other as consultants (Figure 2). Factors commonly determining such divisions are similarity in background of the disciplines concerned and the personalities involved. This is usually the poorest of the four organizational patterns, whether intended for basic or applied research.

Application of Team Method. This brief analysis should give indication of my beliefs about team practice in research. I state them categorically:

1. That part of study of chronic disease which involves basic research has most promise when pursued through individual effort by a person with skill and imagination, an inherent interest in the field, and freedom to turn his energies in what direction he would. No symphony was ever composed by a committee; nor a great poem written.

Group research by multiple representatives of a single discipline selectively has value in solution of basic problems, that of the interdisciplinary team is likely to be less, and both function to best advantage under the partnership or sub-contract organization.

2. Investigation of chronic disease at the stage of development, as an applied research, is the special sphere of interdisciplinary team effort. The preferred organization is of the subcontract or task force pattern. Group research has a place, functioning variously under the several patterns noted. Applied research by individuals is not outmoded.

Recently I had a part in an interdisciplinary team of two epidemiologists and two social scientists. The objective was to define method for study of mass mental disorder. Suicide provided the material. We found common profit and mutual assistance in many matters relating to the social environment, such as occupation and marital status, matters with which all were more or less familiar through use in our own particular disciplines. Everyone was impressed with the probable importance of social stress as an influence on suicide. Much consideration of how to identify and measure social stress led to full agreement that the question was not to be solved by our particular interdisciplinary effort, but was better suited to the talents of some individual worker from a social science.

Team Operation. The discussion thus far has been directed toward principle, primarily in team organization. Development and function, practical working procedure, leadership and direction, and the correlation of experiment with personality and inclination are such as to warrant separate consideration. These matters are beyond the scope of this presentation. However, they have such determining value in the success of team endeavor, that with little discussion or comment and with no attempt at arrangement in order of significance, I set down some of the factors that have appealed to me and more often to my colleagues, as contributing to comfortable and constructive conduct of team or group endeavor.

1. The theoretical ideal of a democratic association, with all team members having equal voice, rarely works out. Leadership is essential; and to advantage, authority is defined and distributed in such manner as to assure clear-cut direction. Interdisciplinary work brings stress. Where there is stress, all the

more need exists for strong leadership to give supervision, control and guidance. Informal leadership and initiative are, however, to be recognized and encouraged.

The frequent assumption that results and methods contributed by one member of a team are like pieces of a jigsaw puzzle, ready to fit the pieces produced by other members, lacks validity. Responsibility for analysis and coordination of research results and for recognition of suggestive leads, rests to advantage with some one person.

Although leadership is largely an innate characteristic, the director of an interdisciplinary team desirably is a person trained in more than one field. He has experienced some of the difficulties in cross-disciplinary work. The increasing practice of interdisciplinary investigation may have influenced Bode in urging the training of scientific generalists.

2. To collaborate effectively, members of an interdisciplinary team have the obligation to master the basic assumptions of other fields represented. Terms must become interchangeable. Life with our allies in Britain during the war years was much simpler with understanding that the roundabout in British parlance was the American traffic circle. Cross-disciplinary training is an important asset in favoring deeper exploration by single disciplines; but the commoner it is, the less the need for interdisciplinary team research.

3. Disciplines associated in a common investigation should have reached approximately equal stature. A strong discipline cannot always be expected to reinforce a weak one; it often suffers dilution.

4. Research is not done by disciplines but by people, and the problems undertaken come from life rather than the disciplines themselves. Association within a group does not relieve the individual of the obligation to think for himself.

5. Initial basic adjustment between team members requires consideration of (1) the appropriateness of the problem; (2) satisfactory criteria for identifying the unit of observation; (3) the means for measurement of observed phenomena; and

(4) different standards of evidence used by different disciplines.

6. Relatively few members of a team function comfortably and efficiently in all of the different situations in which interdisciplinary work is done. Their experience does not invariably fit, nor do tools of their trade always apply. Some are more at home in the field, others in the laboratory, a lesser number in the clinic and only a few face a mechanical calculator with composure.

7. Program planning with detailed attention to sequence and timing of short term steps toward a goal that has been set, clearly precedes staff recruitment or initiation of team study.

8. Whatever the type of problem and however the team is constituted, a pilot study is fundamentally useful in favoring success of the larger project. No interdisciplinary team comes into being, full-blown and adult, in the manner that Minerva stepped from the brow of Jupiter. At the risk of mixing my metaphors, to assemble a group, give them a football and promptly start the game invites fumbling, stress, and sometimes disaster. The more promising procedure is to start with two or three key members, add others by increments, test team position and capabilities, and then start work.

SUMMARY

Group research is distinguished from interdisciplinary team endeavor. Four organizational patterns are common to both. In basic research no form of multiple effort gives promise of supplanting individual activity, but group study is ranked above the interdisciplinary team. Both find greater usefulness in applied investigations, with this the particular field of the interdisciplinary team. Other than organizational pattern, choice of members, training in team effort and established lines of authority and interaction are factors strongly influencing success. Weaknesses are sufficiently general that I am encouraged to suggest a new kind of interdisciplinary team that might well find general favor. The suggestion stems from a need engendered by the present-day world. I suggest a working team

of two. One member withdraws to office or laboratory and gets on with the work of the day; the other, his chief qualifications being bulk and muscle, stands guard at the door.