AGRO-ETHICS: EXTENSION, RESEARCH, AND TEACHING

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Student unrest and the dissatisfaction of activists with the performance of "the establishment" shook our society to its roots in the late 1960s and early 1970s, as underlying values and accepted concepts of right and wrong were criticized. Agriculture did not escape and is still widely criticized. Agro-ethics was born. Phrases sufficient to indicate the extent of the current concern about agro-ethics include: animal rights, environmental ethics, recombinant DNA, hard tomatoes/hard times, the export of our soil, energy ethics, Nestle and the multi-nationals, feeding the world's hungry, the plight of the small farm, helping the poorest of the poor, farmer-adapted technology, small is beautiful, and who controls U.S. agriculture.

Ethics is conceived here as being evaluative of decisions about right and wrong actions and of decision processes. It follows, then, that ethics is the study, among other things, of rightness and wrongness as well as goodness and badness and, hence, of decisions and decision processes (Runes, p. 98). So conceived, agro-ethics has to do with the adequacy of information, as well as the appropriateness of rules followed to process information into decisions about what ought or ought not to be done about agricultural problems. As such, it is also concerned with knowledge of goodness and badness as well as positivistic knowledge. Involved, in addition, are ethical considerations of the appropriateness of decision rules, including sub-decisions about which rule ought or ought not to be used.

Agro-ethics could also involve a code of conduct for agriculturalists such as has developed for the legal and medical professions. While such codes are important, this paper deals with an equally or more important role for ethics—that of clarifying what various value theories and philosophies of science have to say about making decisions concerning what ought to be done.

There is a close connection between ethics and philosophic value theory, on one hand, and economics, on the other. The optima we define in production, consumption and welfare economics indicate what "ought to be done." The classical literature of economics and philosophic value theory includes such scholars as Adam Smith, John S. Mill, Henry Sidgwick, Jeremy Bentham, Karl Marx, and Vilfredo Pareto. Currently, Nobel Laureate Kenneth Arrow can claim philosophic status on the basis of his work on social choices and individual preferences, while the late C. I. Lewis, Professor Emeritus at Columbia University, could have been classified as an economist because of his conception of rightness as optimal and wrongness as non-optimal.

Land-grant universities and their colleges of agriculture accept responsibility for producing useful information and even recommendations for solutions for practical problems facing agriculture. Thus, agro-ethics, as conceived above, is an integral part of the activities of land-grant agricultural colleges. Within these colleges, departments of agricultural economics have a key logical role to play because of the long-standing close connection between economics and the philosophic sub-disciplines of ethics and philosophic value theory.

In this paper, I examine decision making or problem solving in terms of the kinds of research, extension, and teaching practical in colleges of agriculture, the kinds of knowledge acquired, and the underlying philosophies that facilitate and/or constrain our agro-ethical activities. The third quarter or so of this paper discusses mobilizing and accounting for support, leading, and supervising, and reviewing and evaluating such activities; in short, it deals with administration. The paper concludes with a short summary of requirements for improving decision-making (agro-ethical) research, extension, and teaching in colleges of agriculture.

PROBLEM-SOLVING PROCESSES

Agro-ethics and policy work are particularly involved at the problem-solving end of a spectrum ranging from basic or disciplinary activities, to the problem-solving activities of agriculturalists. Extension workers, the more

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applied researchers, and the less abstract teachers operate at the latter end. Thus, separate attention is given here to problem-solving processes.

Figure 1 contains six problem-solving steps. The two-way arrows in the figure allow for feedback and successive iteration. In addition to the six steps involved in the problem-solving process, the figure contains two information banks. The left-hand bank contains the *normative* information so important to ethics. Normative information is conceived as information about the goodness or badness *per se* of conditions, situations, and things. The right-hand bank is *positive,* containing information about conditions, situations, and elements other than about their goodness and badness. It should be noted that the arrows from each of the information banks to the six processes are also two way to indicate that, at each step in solving a problem, a problem solver may both *draw* on the two banks and *deposit* information in them. There is also an overarching loop labeled "pragmatic interdependence." This loop recognizes the pragmatic assertion that positive and normative information are interdependent in the context of the problem being addressed. (See Johnson, 1977, for a further development of the above classification.) It is worth stressing, at this point, that the output of the decision step is prescriptive knowledge. Prescriptive knowledge is conceived to be about what *ought to be done* in order to solve a problem—about the rightness or wrongness of contemplated future acts. Once a prescription has been formulated, the next step is to execute it, while the final step is to bear responsibility for the consequences of the action taken; this lies with decision makers and those who bear the consequences of actions taken on the basis of decisions. Responsibility bearers monitor the environment affected by the act so as to determine the consequences of the act. Such monitoring requires attention to the goodnesses attained and the badnesses avoided or incurred as a consequence of the action, and includes monitoring in a positivistic or non-normative way. It is difficult to overstress that solving problems (agro-ethics) requires and generates both positive and normative knowledge. Practical problems cannot even be defined, nor can agro-ethics be discussed fully without *both normative and positive* information. The problem-solving process uses normative and positive knowledge to generate *prescriptive* knowledge: agro-ethics, as conceived here, involves both normative and prescriptive knowledge.

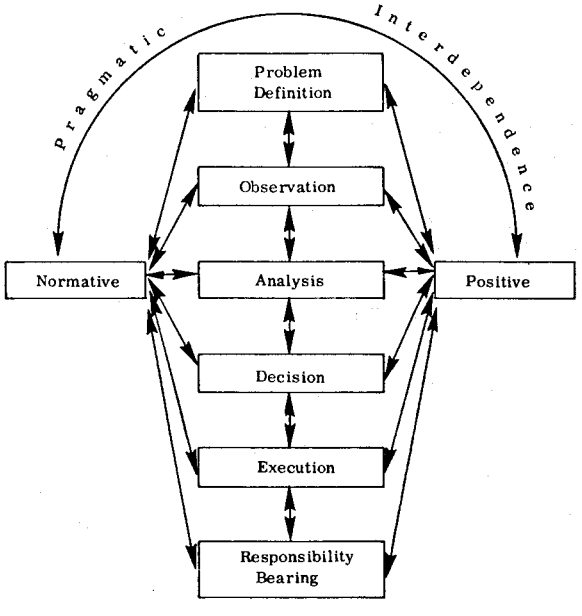

FIGURE 1. Six Steps in Problem Solving Related to Positive, Normative and Pragmatic Knowledge (Johnson, 1976a, p. 226)

Equation (1) is of some help in envisioning the difference between normative and prescriptive knowledge.

(1) prescriptive = f(normative, positive)

The function relating the normative and positive knowledge needed to solve a problem to the prescription to solve that problem is a decision rule, f. Selection of decision rules is a fundamental aspect of ethics. In the case of perfect knowledge, the decision rule is simply one of subtracting badness from goodness (which are normative), subject to constraints specified by positive knowledge, and then maximizing the difference. This is an application of the simple maximizing calculus of static economics, or utilitarian ethics. Use of this calculus requires a normative common denominator among the goodnesses and badnesses involved, the second-order conditions that guarantee the existence of the maximum sought; and also interpersonal validity of the common denominator, if the various goodnesses accrue to and the various badnesses are incurred by different individuals. When knowledge is imperfect, ethics is complicated by a multiplicity of factors, such as (1) maximize the expected difference between goodness and badness, maximin, etc. one of which has to be accepted in a sort of politico-socio-economic covenant; (2) the need to engage in learning that involves the economics (ethics) of the learning processes inherent in Figure 1; (3) varying degrees of interpersonal validity in knowledge of the normative common denominator; (4) the infinite cost of perfect knowledge of both the positive and the normative and, hence, the need to include in "f" various distributions of police, military, market, social and political power, if conflicts are to be resolved with any decisiveness.

A THREE-DIMENSIONAL FIGURE

Figure 2 has three dimensions, each of which is given specific attention in the next three sections of this paper. The first, or vertical, dimension has to do with the *kind* of extension, research, and teaching involved. Sometimes we concentrate directly on solving a *specific problem;* at other times, our work provides information on a subject, such as environmental quality or small farms. When we conduct *subject matter* research, extension, and teaching, we ordinarily provide information from a number of disciplines or departments relevant to the subject. At other times, we engage in *disciplinary* work and confine ourselves to one of the traditional academic disciplines, such as economics, chemistry, sociology, or genetics.

The second dimension of Figure 2 concerns the three *kinds of knowledge* discussed earlier. Sometimes we deal with *positive* knowledge. At other times, we deal with *normative* knowledge, and, on occasion, we deal with *prescriptive* knowledge, i.e., knowledge about "what ought to be done." The last two kinds of knowledge are crucial for agro-ethics.

The third dimension of Figure 2 has to do with the *underlying philosophies* that strengthen and/or constrain our ability to produce the kinds of knowledge just considered and to carry out the three kinds of work considered in the first paragraph of this section and, in more detail, in the next section. While there are many philosophies that could be considered, Figure 2 is confined to three. *Positivism* is the philosophy that supports much of the work of the biological and physical scientists who produce the technologies so important for agriculture. The second philosophy considered is really a group of philosophies that can be subsumed under the rubric of *normativism;* these philosophies have to do with the production, validation, and verification of knowledge about goodness and badness *per se.*

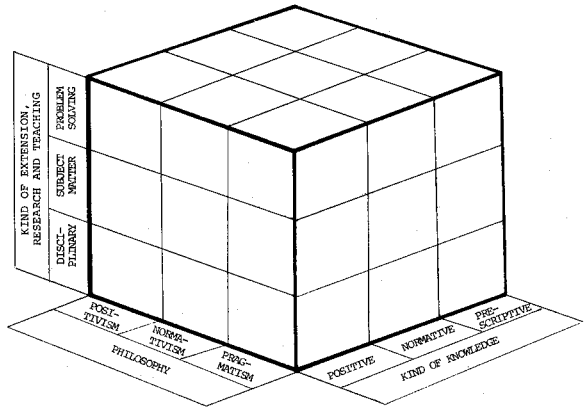

FIGURE 2. Kinds of Work, Main Philosophies and Knowledge Important in Agro-Ethics

The third philosophy considered is that of *pragmatism.* Pragmatism is an important philosophy undergirding much of the thinking that one encounters in colleges of education and in extension training programs. It also provides important support for the work of institutional economists who have been effective over the years in addressing policy questions and in serving as advisors and consultants to public decision-making agencies, and is thus relevant for agro-ethics. Pragmatism and various normative philosophies are important for agro-ethics.

Not all of the 9 vertical and horizontal slices, 18 horizontal rows, 9 vertical columns, and 7 cells in Figure 2 are of equal importance. Some are contradictory; some appear void as viewed from one or more dimensions. For instance, a positivistic philosophy precludes the problem-solving row included in positivism's vertical slice. Pragmatism tends to preclude the two vertical columns in its slice that are concerned with independent positive and normative knowledge. However, the problem-solving slice requires the positive knowledge of concern to positivists, particularly when carried out by non-pragmatists. Space limits for this paper do not permit discussion of all of the relationships among the slices, rows, columns, and cells. The reader can investigate them after becoming acquainted in the following pages with the different dimensions of the figure, which, in a sense, provides much of the structure of this paper.

THREE KINDS OF EXTENSION, RESEARCH, AND TEACHING

We need to define the three kinds of work presented in Figure 2 before discussing their characteristics and roles in colleges of agriculture. The three kinds of work—disciplinary, subject matter, and problem solving—range across the spectrum, from the purely academic to the very practical.

Disciplinary work has to do with the disciplines of traditional European or American universities—improving or teaching the theoretical, empirical, and methodological structure of disciplines, such as economics, chemistry, botany, physics, music, and philosophy. Disciplinary research and teaching are often referred to as basic. There are two varieties of such work, that of known relevance, and that of unknown relevance for solving practical problems. Some disciplines—economics, architecture, medicine, law, engineering and military science—deal with decision making and are more concerned with ethics, as conceived here, than disciplines such as chemistry and physics whose efforts primarily generate positive knowledge.

Intermediate on the spectrum from academic to problem solving work is *subject matter work.*

Such activity is multidisciplinary and is often carried on in multidisciplinary institutes, or in "institute-like" departments. Examples include research and teaching relative to environmental quality, small farms, energy, world hunger, or rural manpower. Such subjects do not confine themselves to the bounds of a single traditional university discipline; also, they may be specified as including both positive and normative information. Subject matter work can be defined as dealing with a subject important to a *set of decision makers* facing a *set of problems*. If the two sets (decision makers and problems) are well defined, a subject matter area is well defined. Many departments in the typical college of agriculture are more like multidisciplinary subject matter institutes than the disciplinary departments of a traditional university. For instance, agronomy is a mixture of chemistry, physics, bacteriology, genetics, entomology, and so on. Agricultural economics, too, is multidisciplinary; in addition to economics, it draws on agronomy, animal science, sociology, political science, statistics, mathematics, and more.

Problem solving research concentrates on a particular problem of the decision maker (or makers) who face this particular problem. Problems do not respect the domains of traditional academic disciplines and are typically multidisciplinary. Ethics is fundamental to problem solving and, without problems, ethics would be of little importance.

Because problem definitions are crucial for problem solving, there is always a normative dimension to problem solving work. The normative dimension is sometimes present for subject matter work and is much less in evidence in the disciplinary work of the biological and physical scientists, although reputable scholars (Rudner; Georgescu-Roegen) argue that the normative is an essential element of positivistic research even in the biological and physical sciences. Because prescriptive knowledge is the direct object of problem solving work and the indirect objective of subject matter and relevant disciplinary work, aspects of ethics are involved in all three.

Colleges of agriculture tend to be made up of multidisciplinary, problem solving, and/or subject matter departments. The agricultural extension services of colleges of agriculture devote much of their time to the dissemination of recommendations to solve particular problems, and to furnishing subject matter information to groups of farmers who use such information to solve the sets of problems they face. Ethics is crucial to the formation of those recommendations. Research work in colleges of agriculture tends to concentrate on multidisciplinary subjects related to the agro-ethical issues of the time. As problems and issues change, past groupings of disciplines into the departments of colleges of agriculture sometimes becomes obsolete, leading eventually to re-definitions of the subject matter of the multidisciplinary departments. Within colleges of agriculture, some members of such departments sometimes try to specialize in one discipline. Thus, we find among agricultural economists, some who specialize in theory, techniques, or basic measurements that are important to the traditional discipline of economics. Similarly, some biological and physical scientists in colleges of agriculture are attracted to the basic biological and physical science disciplines. These tendencies are encouraged by the activities of the National Academy of Science and the National Science Foundation. As individual researchers and teachers in colleges of agriculture tend toward the disciplinary to the exclusion of subject matter and problem solving efforts, there is a grave danger that they will lose both their financial support from organizations of farmers and their reason for being part of a land-grant college of agriculture.

THREE KINDS OF KNOWLEDGE

Figures 1 and 2 indicate that three kinds of knowledge are involved in agro-ethics—positive, normative, and prescriptive. Machlup's survey of the multitudinous ways these three terms are used by economists makes it necessary to define these terms specifically.

Following the thinking of positivists, *positive knowledge* is defined as that purporting to be about those characteristics of conditions, situations, and things other than their goodness and badness: positivists assert that there can be no objective descriptive knowledge about goodness and badness.

Normative knowledge is defined as knowledge about those characteristics of conditions, situations, and things having to do with their goodness and badness. Such a definition flies in the face of positivism, but is consistent with the long-standing interest of economists in utility, welfare, consumer surpluses, the labor theory of value, and, currently, the expected utility hypothesis.

Prescriptive knowledge is defined as knowledge about what ought or ought not to be done in order to solve a problem, and is generated by processing positive and normative information according to a decision rule to determine the most advantageous procedure. Prescriptive knowledge is the direct object of problem solving work, an indirect object of subject matter and relevant disciplinary work, and the focus of a great part of ethics.

It is important to draw a sharp distinction between the normative and the prescriptive, as economists and many others often use the words interchangeably (Machlup). The late C. I. Lewis distinguished between the good and the bad, on

one hand, and the right and the wrong, on the other hand. We can grasp his distinction by noting that it is not always right to do that which is good, if something better can be done at the same cost. Conversely, it is sometimes right to do that which is bad, if it is the least bad we can do. As economists, we maximize the net good or minimize the net bad. We define what we "ought to do" as either the act with the greatest net good or with the least net bad. Clearly, in Lewis' view, goodness and badness, which we define as normative, are distinctly different from right and wrong, which we define as prescriptive. (See Johnson, 1976a, for a somewhat different way of viewing the three kinds of knowledge.)

There is also the important distinction that the prescriptive deals with that which "ought" or "ought not to be done" in *the future,* rather than with *existing* conditions, situations, and things. Even when a past act is evaluated, the act itself does not exist apart from its consequences. Thus, prescriptive knowledge, unlike positive and normative knowledge, is not about situations, conditions, and things, and the positive/normative dichotomy can be exhaustive with respect to knowledge about what exists.

With extension work at the practical end of the spectrum of work carried on in colleges of agriculture, we find that workers are particularly concerned with prescriptive knowledge, and with positive and normative knowledge having a direct bearing on what ought to be done in order to solve problems. Generally speaking, extension does not conduct basic disciplinary education. The same is true, but to a lesser degree, for much of the resident teaching in colleges of agriculture. Much resident teaching is done in departments better described as subject matter institutes than as traditional academic disciplines. Agricultural experiment stations concentrate on subject matter and problem solving research, with a somewhat greater emphasis on subject matter work than one finds in extension. Also, there is research and resident teaching that cover those parts of the basic disciplines most relevant to the problems faced in agriculture. In summary, agro-ethics is more germane at the problem solving than at the disciplinary end of our research, extension, and resident instruction work.

THREE PHILOSOPHIC STANCES

Figure 2 presents three underlying philosophies important for agro-ethics—positivism, normativism, and pragmatism.

Positivism: Positivism is a philosophy that holds that the source of descriptive knowledge is experience; in its highest form of development, it is referred to as logical positivism. In logical positivism, experience provides primitive, undefined terms that are introduced into logical (or analytical) sentences to produce descriptive (or synthetic) statements that purport to describe the real world. Both positivism and logical positivism have guided the extremely productive work of the biological and physical sciences.

An empirically untested premise of positivism is that there is no normative reality to be experienced. This eliminates for positivists the possibility of there being normative primitives to combine with logic to produce synthetic (descriptive), normative statements. Concepts of goodness and badness are regarded as merely emotive and are not accorded scientific or descriptive status from the logically positivistic view.

Many social scientists have tried to make their sciences positivistic. In economics, John Neville Keynes, Lionel Robbins, and Milton Friedman are important thinkers who have striven to make economics into a positivistic science. There have been similar developments in sociology and psychology.

Logical positivism probably reached its zenith at about the beginning of World War II. At that time, many members of the logically positivistic "Vienna Circle" left Vienna to escape Nazi persecution. Logical positivism began to wane at about that time, but not as the result of the dispersal. Philosophers began to doubt the idea that there ever can be a purely logical or analytical statement, devoid of empirical content and, conversely, that there can ever be a purely experiential primitive concept, devoid of theoretical content. Others began to doubt the empirical validity of the premise that there is no normative reality to be experienced in formulating indefined primitive, normative terms. Still further, Gödel (Runes, p. 118) demonstrated that no logical system is entirely provable wholly within itself. An important, fairly recent book entitled *The Legacy of Logical Positivism* (Achinstein and Barker), and an article in volume 12 of the *International Encyclopedia of Social Sciences* by A. Kaplan put logical positivism in the past tense. Nonetheless, many economists and operating biological and physical scientists are loyal to logical positivism. Logical positivism merits considerable, if not exclusive, allegiance in that it has been extremely productive in helping both physical and social sciences produce positivistic information. Its main drawback is the unrealistic constraint that it imposes on our ability to research normative questions in an objective manner. Positivism puts ethics beyond science—normative and prescriptive (ethical) questions are regarded as non-scientific in logical positivism, this being essentially what positivistic ethics is all about. For instance, in jurisprudence, "analytical positivism" is concerned with positivistic questions about whether or not a law was violated, with little or no concern for prescriptive questions about "what ought to be" the law (Bodenheimer, Ch. 7).

It is probably relevant to indicate what positivists mean by objectivity. Basically, an objective concept is one that has been subjected to three tests and has not failed, while an objective researcher is one who is willing to subject his concepts to the same three tests and abide by the results. The *first* test is that of *correspondence*—a test of consistency between the concept being tested and another concept based on experiences not used in formulating the concept being tested. This trial is closely related to the concept of "degrees of freedom" in statistics. The *second* test is that of *coherence*. We ask whether the concept being tested is logically consistent with other concepts in the generally accepted body of logic of which it is a part. The *third* test is that of *clarity*, or the absence of ambiguity. This test is necessary in order to apply the first two. If a concept cannot be stated in a clear, unambiguous manner, then its double or multiple meanings may permit some, but not all, of its meanings to be consistent with experience, or with other concepts. When positivists prescribe that their tests of objectivity or truth "ought to be employed," they are operating metaphysically, i.e., outside of or prior to their own positivism. In so doing, they are prescribing a code of conduct for scientists.

Logically positivistic knowledge is never entirely proven, because of problems involved in interpreting sense impressions and because of Gödel's problem with logic. It is always possible for a concept to be false, even though it is apparently unambiguous and has passed tests of correspondence and coherence. Further, as knowledge improves, new concepts may be accepted that cause previously accepted concepts to fail tests of correspondence and coherence. Thus, positivistic knowledge—yes, even that of physand chemistry—must be regarded as culture and time dependent.

Normativism: Normativism is not a single philosophy—rather, it is a group of philosophies concerned with answering questions about goodness and badness. As noted earlier, classical and modern economists have contributed to literature on philosophic value theory.

Normative, as defined in this paper, does not include the prescriptive, although it contributes to it [see equation (1)]. Unfortunately, some forms of normativism do not maintain a sharp distinction between the normative and prescriptive, which leads, in turn, to considerable confusion (Machlup).

It is possible to conceive of an objective normativism following arguments developed by G. E. Moore and C. I. Lewis. Moore (Ch. I) argues that goodness and badness are undefined terms. This implies, even though Moore might not agree, that they are experienced and are subjectable to the test of correspondence. If primitive, undefined terms based on experience are available, it is a relatively easy matter to conceive of combining such undefined terms with logic to produce synthetic or descriptive normative statements. Such statements, like their counterparts in positivism, can never be completely proven. They, like their positivistic counterparts, can be conceived to be objective in the sense of having been "adequately tested" for purposes at hand. Also, like their positivistic counterparts, they are culture and time dependent.

Pragmatism. This is an important philosophy, particularly in the United States. It undergirds much of the work done in colleges of education and has influenced extension and resident instruction. Within economics, it underlies much of the methodology and thinking of the institutionalist school of economics. For pragmatists, the truth of a concept depends upon its consequences (Runes, pp. 245f). They hold that when one knows the difference between the consequences of two different concepts, he knows all the truth there is to know about the difference between the two concepts. This makes normative and positive concepts interdependent in the contexts of the problems they are used to solve. This is the first characteristic of pragmatism. A second characteristic is reliance on the test of workability in judging the truth of a concept. In a sense, this last characteristic is but a special case of the pragmatic position that truth depends upon consequences, and the correspondence test discussed above in connection with logical positivism.

Pragmatists tend, perhaps, to be more interested in prescriptive than in either positive or normative knowledge. At any rate, pragmatists tend to concentrate on problems and their solutions. The problem-solving figure at the beginning of this paper reflects a considerable amount of pragmatism. In pragmatism and pragmatic methodologies, truth is often approached iteratively and interactively, the interaction being between the investigator, on one hand, and decision makers or affected persons on the other. Pragmatists are interested in process as are institutionalists, industrial organization analysts, and many general systems science analysts. The concern of pragmatists with problem solving makes their ideas particularly relevant for agroethics.

THE CONDUCT AND ADMINISTRATION OF DISCIPLINARY, SUBJECT MATTER, AND PROBLEM SOLVING WORK

The three kinds of work examined above differ greatly with respect to (1) financing and accountability, (2) leadership and supervision, (3) review and evaluation, and (4) stability and durability. These differences require that the work be conducted and administered in very different

KIND OF EXTENSION, RESEARCH, AND TEACHING	CONDUCT AND ADMINISTRATION			
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DISCIPLINARY				
SUBJECT MATTER				
PROBLEM SOLVING				

FIGURE 3. Schematic Relating Kinds of Work to Administration and Conduct of Research, Extension and Teaching in Colleges of Agriculture

ways. Consequently, land-grant colleges of agriculture, with their stress on problem solving and subject matter work, require procedures and administrative structures markedly different than do institutions that stress disciplinary work. It is important that agro-ethicists, college of agriculture workers (including agricultural economists), and agricultural college administrators know and understand these differences.

Financing and Public Accountability

When problems are serious, the people and agencies facing these problems actively seek the assistance of researchers, consultants, advisors, and extension workers; they are typically willing to exert political pressure to mobilize appropriations for such assistance. In many instances, they are also willing to pay the costs of obtaining such assistance directly rather than through public channels. When large numbers of decision makers face sets of problems that require a common body of knowledge for their solution, similar demands and financing opportunities arise for subject matter efforts. The same is true of *relevant disciplinary research,* provided that those persons and agencies with the problem know enough about the problem and academic disciplines to be able to see what basic disciplinary research is needed to achieve a solution. *Disciplinary research of unknown relevance* seldom has direct support from agencies and persons with problems. More generally speaking, such research is financed out of general support for universities and basic research institutes, and is provided in the conviction that society benefits from the development and extension of the basic disciplines of interest in intellectual communities.

Along with differences in financing go differences in demands for public accountability. Agencies and people who provide private support or who lobby for public support of problem solving and subject matter work expect results. Therefore, they demand that those receiving such support deliver the goods. The same is true if they provide support for disciplinary research of known relevance, although the demands of those providing the funds normally are not nearly as stringent. In the case of disciplinary research of unknown relevance, it is likely to be disciplinary peers who hold each other accountable for the resources used to advance the respective disciplines.

Leadership and Supervision

Leadership and supervision are forms of administration. Administrative requirements for the three kinds of work differ in kind and amount. Problem solving work requires the most administration. For the most part, this arises out of the multidisciplinary nature of problem solving work and the continual change in problems that makes it necessary to restructure administrative arrangements. As problems emerge, are solved, and replaced with new problems, different supervisors are required to administer very different mixes of personnel from various departments and disciplines.

One of the problems faced by colleges of agriculture in the 1970s was that the traditional multidisciplinary departments of the colleges were not organized to develop information on such topics as energy, depopulation of rural areas, environmental quality, food safety, animal rights, and other issues associated with agro-ethics. Administrative structures in colleges of agriculture changed less rapidly than problems and issues. It has been difficult to establish new agro-ethical projects involving personnel from various existing departments within colleges of agriculture, and it has been difficult to change the departments themselves. Probably, however, colleges of agriculture, with their multidisciplinary "institute-like" departments, have had less trouble than have the more traditional colleges and disciplinary departments in non-land-grant universities and in other colleges of land-grant universities. A specific obstacle has been the loyalty of individual researchers, teachers, and extension workers to their multidisciplinary and disciplinary departments; tenured personnel are particularly difficult to reallocate. Further, as budgets have shrunk and tenured salaries have taken up increasing proportions of available budgets, administrators have found it hard to restructure research and teaching programs through control of operating monies. Much of the redirection that has taken place has arisen from the soft monies available from agencies and decision makers facing practical problems.

At the disciplinary end of the spectrum, the problems of leadership and supervision are simpler. In the case of relevant disciplinary knowledge, leaders and administrators are required to know only what kinds of disciplinary information are needed and to be able to determine who can produce it and then assign responsibility to those persons. Administrative structures are not re-

quired to bring together persons from a number of different disciplinary or institute-like departments. In the case of disciplinary research of unknown relevance, it is mainly the disciplinarians who know the deficiencies of their disciplines and the needed remedies. In a very real sense, administrators of disciplinary work have mainly hired competent disciplinarians and turned them loose. On the other hand, administrators who do this can be expected to fail miserably when administering problem solving and subject matter work.

Review and Evaluation

Proposals for research, resident instruction, and extension programs need to be reviewed and evaluated before being implemented; once implemented, such projects need to be reevaluated. The project proposals and projects require vastly different reviews, depending on whether they are disciplinary, subject matter, or problem solving.

Within the *disciplinary category,* different reviews and evaluations are required, depending upon whether research is of known or unknown relevance. Disciplinary work of known relevance should be reviewed and evaluated by persons facing the problems that establish relevance, as well as by disciplinary peers (Gibson; National Commission on Research; Johnson, 1976b). Even in the case of relevant disciplinary research, disciplinarians are often better judges than are the users of the research with respect to the adequacy of research proposals and efforts.

Problem solving research is multidisciplinary. Therefore, the academic peers for reviewing project proposals and project accomplishments come from the set of disciplines and "institute-like" departments involved in carrying out the project; however, that is not the end of the matter. We have already seen that problem solving projects are accountable to those who mobilize financial and political support for them. Thus, affected persons and the decision makers of supporting agencies are also relevant peers. There is often need for various advisory committees made up of the clients who are being served.

The same is true of multidisciplinary *subject matter work,* except that the group of affected persons and decision makers is likely to be much larger, inasmuch as this activity serves *sets* of decision makers and affected persons, rather than *single or limited sets* of decision makers.

Stability and Durability

The results of *disciplinary work* are much more enduring than the results of problem solving and subject matter work whether it involves research, teaching, or extension. The disciplines of the traditional universities have long been in existence and have proven their durability by successfully organizing information and transmitting it from one generation to another for decades. At the other extreme, *problem-solving research and work* is not very durable. Once a problem has been solved, the information needed to generate the solution is of little value, at least in the mix required for solving that particular problem. Intermediate between disciplinary and problem solving work is *subject matter work.* Contributions on such subjects as energy, environmental quality, and animal rights are more enduring than problem-solving prescriptions, but not as enduring as disciplinary contributions.

Closely related to durability is stability. Problems are unstable things. They change through time, and as they change, administrative structures for subject matter and problem solving research, extension, and resident teaching programs must change. Problem solving work is quite unstable, as contrasted to disciplinary research and teaching, while subject matter work is intermediate in stability.

METHODOLOGICAL AND PHILOSOPHIC REQUIREMENTS FOR IMPROVING AGRO-ETHICS IN COLLEGES OF AGRICULTURE

We have noted that colleges of agriculture tend to teach, and carry on research and extension work of the practical, problem solving or subject matter type, rather than of a disciplinary nature; thus, they are deeply involved in agro-ethics, as that subject is treated in this paper. We have examined the kinds of knowledge required to contribute to problem solving, as well as the philosophic underpinnings for dealing with positive, normative, and prescriptive knowledge, the last two of which are in the realm of traditional ethics. We have also noted the substantial differences involved in doing and administering such work. The remaining task is to consider philosophical requirements (with methodological implications) involved in problem solving and subject matter (agro-ethical) work.

Our examination of problem solving processes indicates that normative as well as positive information is required. Further, our examination of underlying philosophies indicates that logical positivism constrains our ability to work with the normative. Our examination of positivism also indicated that, in some senses, it is obsolete, while our examination of various normative philosophies indicated the distinct possibility of working objectively with the normative. Therefore, agro-ethical work at the problem solving and subject matter end of the spectrum requires, first, that we free ourselves from positivistic constraints on working with the normative, and, *second,* that we attempt to work with the normative in an objective manner. The latter is essential for an objective agro-ethics.

However, the argument in the preceding paragraph does not imply that we should abandon the philosophy of logical positivism and the powerful methods that have been associated with it to practice agro-ethics. Positivistic methods have been very productive of new positive knowledge in the biological and physical sciences and are also proving productive in the social sciences. We need to reject the constraints of positivism on agro-ethics, while retaining the strengths of positivistic methods for producing the positive knowledge essential for the practice of agro-ethics.

Pragmatism is a powerful philosophy underlying much of the training we have received relative to resident instruction and, especially, extension methods and techniques. Most teaching and extension personnel in colleges of agriculture have philosophies reflecting both logical positivism and pragmatism. Within agricultural economics, the important school of thought known as institutional economics is undergirded by a pragmatic philosophy, which, in turn, causes agricultural institutional economists to rely heavily on pragmatism and its methods. This approach tends to concentrate on problem solving and, as such, comes nearer than the other two philosophies considered herein to providing a complete basis for agro-ethics. Pragmatism regards positive and normative knowledge as interdependent in the contexts of the problems they are being used to solve. It seems clear that the agro-ethical work in colleges of agriculture at the problem solving end of the spectrum should continue to emphasize pragmatic methods. One caveat must be made, however. The pragmatic view of positive and normative truth as interdependent in the context of problems leads to a complicated, holistic view of the world. Oftentimes, important positivistic questions can be answered in the biological and physical sciences, especially, but also in the social sciences without involvement in the complicated, holistic, pragmatic approach. In such cases, a pragmatic philosophy imposes an unnecessary constraint that should be rejected along with positivistic constraints on working with the normative if our agro-ethical work is to be effective.

The above arguments indicate that an eclectic approach to agro-ethics is needed, philosophically and methodologically. We must be general enough to draw on, but not be constrained by, logical positivism, various forms of normativism, and pragmatism as dictated by the problems and subjects that we research, teach, and extend. Philosophic eclecticism, in turn, implies a parallel eclecticism with respect to the techniques and methods associated with the three underlying philosophies that we have considered.

Still further, we have noted that problem solving and subject matter work are multidisciplinary. Thus, we are required to be general not only with respect to disciplines, but also with respect to the various multidisciplinary (institute-like) departments found in the typical college of agriculture.

Because agro-ethics is at the problem-solving end of the spectrum, and because problems are both changeable and multidisciplinary, a great deal of flexibility is required. Administrators, administrative structures, and individual researchers need to be flexible. We need temporary administrative units to address the problems and issues that are currently important. The structures need to be flexible enough to disappear once the problem is solved, thereby releasing personnel for recombination into new configurations appropriate for the next problem or problems that comes over the horizon (Johnson, 1971). Individuals need to be flexible enough to join different teams as projects and administrative structures are changed to adjust to the solution of old problems and the emergence of new ones. We must be willing to fit into various teams and administrative structures, sometimes as a minor contributor, at other times as an important contributor and, in a few cases, perhaps as administrators. When we are project leaders for a time, we have to be prepared to drop such leadership once we have succeeded in solving the problem for which the project was established.

REFERENCES

Achinstein, P. and S. F. Barker (eds.) *The Legacy of Logical Positivism.* The Johns Hopkins Press, 1969.

Bodenheimer, Edgar. *Jurisprudence: The Philosophy and Method of the Law.* Harvard University Press, 1967.

Friedman, M. *Essays in Positive Economics.* The University of Chicago Press, 1953.

Gibson, J. E. "Performance Evaluation of Academic Research." *Science* 206(1979).

Johnson, G. L. "The Quest for Relevance in Agricultural Economics." *Amer. J. Agr. Econ.* 53 (1971):728–39.

Johnson, G. L. "Philosophic Foundations: Problems, Knowledge and Solutions." *European Rev. Agr. Econ.* 3(1976a): 207–34.

Johnson, G. L. "Who is a Peer?" *Amer. Sci.* 64 (1976b):124.

Johnson, G. L. "Contributions of Economists to a Rational-decision-making Process in the Field of Agricultural Policy." *Decision-Making and Agriculture*. Oxford: Agricultural Economics Institute, 1977.
Kaplan, A. "Positivist Ethics," in *International Encyclopedia of the Social Sciences,* Vol. 12, D. L. Sills (ed.), New York: Macmillan Co. & The Free Press, 1968.
Keynes, J. N. *The Scope and Method of Political Economy*. 4th ed. New York: Augustus M. Kelley, Bookseller, 1963.
Lewis, C. I. *The Ground and Nature of the Right*. The Columbia University Press, 1955.
Machlup, F. "Positive and Normative Economics," in *Economic Means and Social Ends,* R. Heilbroner (ed.). Englewood, N.J.: Prentice-Hall, 1969.
Moore, G. E. *Principia Ethica*. New York: Cambridge University Press, 1959; first printing, 1903.
National Commission on Research. "Review Processes: Assessing the Quality of Research Proposals." Washington, D.C., May 1980, pp. ix, x and 1, 2.
Robbins, L. *An Essay on the Nature & Significance of Economic Science*. 2nd ed. London: Macmillan and Co., Ltd., 1949.
Runes, D. D. *Dictionary of Philosophy*. Paterson, N.J.: Littlefield, Adams & Co., 1961, p. 118.