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THE ADVANCING STATISTICAL FRONT*

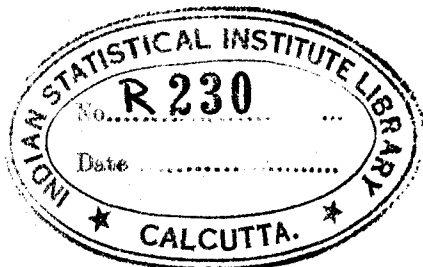
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THE ATOMIC BOMBS on Hiroshima and Nagasaki have made the world conscious, as perhaps no other event has done, of the potential significance of applied science. This war revealed to all that the co-operation of scientists on a gigantic scale literally revolutionized the method of carrying on wars. By the grace of God, the nations of the world have been given another chance to live in peace—another chance to explore the endless frontier of science in search of new ways of constructively serving mankind.

Most people will agree that the problems of war are inherently simpler than those of attaining the full advantages of science in a world at peace. For war is a simple business in the sense that the objectives are clear and heartily supported by an overwhelming majority of the citizens of a nation; whereas peace-time problems do not have the same dramatic intensity, immediacy, and urgency to each citizen. However, the atomic bomb has brought people to appreciate the importance of the *end* to which science is applied. All shudder at the thought of the destructiveness of another war; all like to dream of the world of tomorrow in which the object of applied science is the satisfaction of human wants. However, these wants cannot be scientifically determined without appeal to the sampling procedures of the statistician. To the citizen of a democracy there is certainly some dramatic significance in the fact that the statistician must be called in to sample human wants in order that science may be applied effectively in peace.

It seems fitting that, at this first annual meeting after the catastrophic war through which we have just passed, our attention should be directed toward the role that statistics can play in the years ahead in

* Address as retiring president of the American Statistical Association, Cleveland, Ohio, January 26, 1946.



making science *serve* humanity and toward the role that statisticians can play in giving each individual some appreciation of the dramatic intensity, immediacy, and urgency to him of some of the problems that the statistician alone can solve. With this thought in mind, I have chosen to speak on the advancing front of statistics in its service, directly and through other scientists, to the members of society as *individuals*.

If statistics can be made to minister to *all* the people, if the majority of the people can be made to realize this contribution of statistics, if those who practice statistics follow a strict code of conduct, if statisticians assume their responsibility for the proper training of neophytes before turning them loose as statisticians, then the future of the statistical profession is assured.

In the established sense of the term "profession" as applied to law, medicine, and religion, there is an implication of a devotion to a higher purpose than that of personal profit or the earning of a livelihood. Tonight I wish to keynote ministering to the people at large as an essential requirement of any profession. At some time or other between the cradle and the grave, every one of us calls upon members of the medical, legal, and religious professions. In so far as these serve us well, we come to appreciate them as members of their profession because we recognize that through long years of study and training they have placed themselves in a position to do for us what we cannot do for ourselves. If statistics can be made to serve each of us in a way that we individually recognize and appreciate, statisticians will no longer be referred to in some quarters as the showgirls of the market place because they live by their figures alone.

The high purpose of a diverse group can be built up and maintained only by an effective organization. By getting a perspective of the advancing research front and the vast armies of pure and applied scientists with whom we must cooperate if we are to make our greatest contribution to the service of science, we can come to realize fully the need for a strong professional statistical organization.

THREE TYPES OF SCIENTIFIC RESEARCH

As a background for what follows, it is essential that we distinguish between three broad and somewhat overlapping categories of research. In the recent report,¹ "Science, the Endless Frontier," by Vannevar Bush, Director of OSRD, to the President of the United States on a

¹ United States Government Printing Office, Washington, 1945.

program for post-war scientific research, the following three categories of research are recognized and briefly described: pure research, background research, and applied research and development.

Pure research is there defined as research without specific practical ends. It is directed toward the acquisition of knowledge and the understanding of nature and its laws. *Background* research is typified by the collection of economic, business, census, meteorological, and other types of data; the determination of physical and chemical constants; and the establishment of standards of quality for foods, drugs, and other manufactured materials. *Applied* research is generally directed toward some practical end determined by human wants and it is usually expected that the cost of such research will be met through the benefits that accrue from the research itself.

THE STATISTICAL FRONT IN THE THREE FIELDS OF RESEARCH

Pure Research. Since the turn of the century, great progress has been made in extending the statistical front in pure research. Advances have been made in the field of the statistical description of stellar phenomena by Chandrasekhar and others; in the development of statistical mechanics by Einstein, Bose, Fermi, Dirac and others; in the statistical description of meteorological phenomena; and in the development of statistical theories in genetics and many other fields. Statistics has progressed also in psychometrics and econometrics. But perhaps the greatest progress within the past two decades has been in the field of mathematical statistics along the lines typified by the abstract material published in the *Annals of Mathematical Statistics*.

Such work has been highly individualistic. Much of it has been done by those unknown to most of the members of the American Statistical Association. In fact, many of those who have done most to extend the frontiers of mathematical statistics are not known officially as statisticians: Even R. A. Fisher, Hotelling, and Wilks are not listed as statisticians in their college registers. Likewise the men who have contributed to the knowledge of nature through the application of statistics are seldom known to their fellow scientists as statisticians but rather as professional men in the subject matter field wherein they contributed. Statistics, in other words, has no particular subject matter field solely unto itself.

Moreover, most of the contributions of statistics to the different subject matter fields are mathematical in character; and in so far as such contributions are mathematical, it is little wonder that fellow scientists often question the existence of a statistical front as such.

Many think simply of the different subject matter fronts while others think of statistics as a part of the mathematical front.

Let us pause to examine the significance of this situation from the viewpoint of professional organizations in the field of statistics. To maintain an advancing front in *pure* statistical research both in the subject matter fields and in mathematics requires support as does pure research in every field. It is perhaps true that each subject matter field, in so far as pure research is concerned, can obtain support for the development of the statistical aspects of nature essential to that field. Those engaged in pure research in the separate fields will undoubtedly recognize the need for courting the mathematical statistician engaged in extending the boundaries of mathematical statistics per se, for perhaps never before in the history of science have scientists in the subject matter fields appreciated so wholeheartedly the contributions of mathematics. In fact, scientists are coming more and more to realize that most, if not all, theories of nature are mathematical in character at least to the extent that the idealized abstract models of natural phenomena are described in mathematical terms. There is, of course, a need for the mathematical statistician to come into contact with the problems revealed by nature in the separate sciences if mathematics is to contribute to the solution of such problems.

Those working to extend the boundaries of mathematical statistics need to have an organization such, for example, as the Institute of Mathematical Statistics to serve as a go-between for pure mathematics on the one hand and *pure science* on the other. To their fellow researchers in other fields of pure science men working in this realm of statistics will probably always be known primarily as mathematicians. Certainly to those working in the fields of background and applied science and to the public, such statistical research workers will probably always be known as mathematicians. Hence, so long as we think of the contributions of statistics to pure research, we may question the need for an organization beyond that of mathematical statisticians. When, however, we consider the service to the public of pure statistical research through its contributions to background and applied research, we find that an organization representing the common interests of all statisticians is a necessity. Otherwise we cannot fulfill our obligations to the public upon which we must depend in the end for recognition and support.

Background and Applied Research. Turning to the fields of background and applied research, three points should be kept in mind: 1) such research must involve the *cooperation* of many individual ap-

plied scientists, sometimes literally hundreds, 2) such research is directed toward obtaining knowledge useful to many individuals and sometimes to practically the whole public, and 3) the usefulness of such work must be recognized by those who receive the benefits in order to gain their financial and other support: applied research must pay its own way.

What I want to do is to indicate in some detail the endless field open to the statistician in applied research and to indicate briefly some of the problems involved in obtaining the cooperation of individual applied scientists and of groups of applied scientists in carrying out a few major lines of application that are of significance to the public.

First, let us consider simply the background research of standardization as carried on by groups like the American Standards Association and the American Society for Testing Materials. Work on standardization projects often requires the cooperation of many different kinds of scientists representing the public, industry, and government: the number of such projects runs into thousands. Each such standard is, in general, arrived at through committee action often extending over several years: many compromises must be made, some because of a lack of scientific knowledge, some because of economic requirements, and some because of other limitations. Each standard must be, as it were, a tailor-made job that is satisfactory to different group interests. Most of the applied scientists cooperating in such a project are not familiar with statistical theory and application; many of them are, in fact, antagonistic to the statistician. Yet these scientists are in the saddle and decide what shall be done.

Even if we assume that we have the ideal condition in which a standardizing committee is completely sold on the applications of statistics, there remains the problem of translating the contributions of the statistician into the written specification in a way that will be understood by those who use it—a group that often includes hundreds of people; indeed in the case of a consumer standard, thousands of people. The problem of putting statistics to work in standardization, one of the fields of background research touching all of us as consumers of foods, drugs, and other manufactured goods, is a tremendous job calling for the cooperation of applied scientists working not only as individuals but as groups. *This is not a problem that can be solved by statisticians working independently*: yet in its solution there is room for hundreds of scientists with basic training in statistics.

In applied research, let us consider only industrial research. In 1942 there were 2254 industrial research laboratories: today there are many

more. Yet I doubt that many of the directors of these laboratories have any appreciation of the potential contributions of statistics. In 1939 there were 184,230 manufacturing firms in the United States: today there are perhaps as many or more. Yet I doubt that management in any but a few of these firms is aware of the potential contributions of statistics. Of course, many employ statistical clerks and a few may even employ one or more persons called statisticians but their statistics is usually limited to business and economics. There is a big gap to be filled between the contributions of the mathematical statistician in the *Annals*, for example, and the appreciation of the value thereof on the part of management in any large percentage of industrial laboratories and manufacturing firms. Nevertheless, statisticians have a great opportunity in this almost unlimited field to serve the public at large as users of the manufactured goods turned out.

The contribution of statistics in these two fields of applied research lies not so much in solving the problems usually put to the statistician by those not statistically trained as in helping to coordinate the steps of specification, production, and inspection. This may be considered as a scientific experiment for making the most efficient use of human effort in the production of goods to satisfy human wants. The long range contribution of statistics depends not only upon getting many highly trained statisticians into industry but also upon creating a *statistically minded new generation of those physicists, chemists, engineers, and others* who will develop and direct the mass production processes of tomorrow.

Let us look at the problem of interesting the members of professional organizations in the three fields of pure, background, and applied research. Broadly speaking, professional scientific organizations may be classified under these three headings although the boundaries are not distinct. At the pure research level, we have those organizations representing the basic natural and social sciences; at the level of applied research, we have large professional groups such as the engineering societies, several of which have memberships of 20,000 or more; at the level of background research we have the American Society for Testing Materials, The American Standards Association, and certain trade associations. By and large, these professional groups with a combined membership of more than a hundred thousand are responsible for the development of the scientific research front. These groups in the end will determine to what extent, if any, statistical methods will be used in their work. We must first get the membership of these scientific groups to give us a chance to show how statistics can help. Then we must work in close cooperation with these groups in putting statistics to work for

the public good. Statisticians must assume a large part of the responsibility for finding out how they can best serve the thousands of scientists in the different subject matter fields and then they must cooperate with other professional groups in the different subject matter fields to see that statistical method is applied wherever it will yield useful results.

THREE WAYS OF SERVING FELLOW SCIENTISTS

Three ways of serving fellow scientists are through joint meetings, through joint committees, and through publications. For years our Association has been accustomed to holding joint meetings with other groups, particularly in the social sciences. More recently joint meetings have been held with the Institute of Mathematical Statistics and the Biometrics Section has held many joint programs with groups having interests similar to theirs. By and large, however, there have been no joint meetings with the majority of the scientific groups primarily responsible for pure research in other than social science fields nor with the many large groups responsible for background and applied research.

A joint committee type of approach to applied research in engineering was started in 1929. In that year E. B. Wilson, then President of the American Statistical Association, cooperated with a small group of statisticians in getting the interest of certain professional engineering groups in setting up what was and is called the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing. This committee was actively sponsored by the American Statistical Association, the American Society for Testing Materials, The American Society of Mechanical Engineers, and the American Mathematical Society. The membership was made up of two representatives from each of these societies. This committee, working in cooperation with the officers of the sponsor societies, has been largely influential in initiating most of the activities that have taken place since then in organizing statistical effort in the engineering field.

It was also realized at that time by the same group of statisticians that it was desirable to launch a committee interested in the application of statistics to the background research of standardization. Such a committee was set up and has been active ever since in the American Society for Testing Materials. A short time before the war another small group of statisticians recognized the desirability of getting formal action on the application of statistics in quality control through the standardization of simplified methods. With the cooperation of the War Department and the American Standards Association a committee

was set up under the auspices of the American Standards Association. This committee turned out three emergency war standards in statistical quality control and these were used extensively not only in America but also in Australia, Canada, and England.

During the early years of the war, there were often discussions by the Board of the American Statistical Association about the need for a joint committee representing some of the major fields of war research, more nearly on the pure research level, to act in an advisory capacity on the applications of statistics. Nothing was done officially by the Association, but statisticians working independently in cooperation with the officers of the National Research Council and particularly with Dean Eisenhart, chairman of the Division of Physical Sciences, organized in 1943 a committee on applied mathematical statistics with subdivisions on physics, chemistry, psychology, economics, mathematical statistics, biology, and engineering. This committee has had from the beginning liaison members with the War and Navy Departments and the War Production Board. More recently, liaison representation has been secured on the part of the National Physical Laboratory of Great Britain and the Council for Scientific and Industrial Research of Australia. The latest development in this organized committee effort is the establishment of a committee, under the joint direction of the National Research Council and the Social Science Research Council, charged with the study of the scientific problems of measuring public opinion, attitudes, and consumer wants.

Much of the work of these committees has been of an advisory nature. For example, the joint committee on engineering, which is now sponsored not only by the original sponsors but also by the Institute of Mathematical Statistics and the American Institute of Electrical Engineers, has cooperated with different engineering groups in setting up special committees on the application of statistics within these groups and in arranging for the presentation of papers on applied statistics on the programs of many of the engineering societies. Just recently such a committee was set up in the American Institute of Electrical Engineers.

Some of these committees have operated to secure not only national cooperation but also international. For example, the Joint Committee, through its sponsors, was influential in starting the movement in Great Britain that led to the organization of a committee under the auspices of the British Standards Institution. Interest thus aroused has been credited by our English friends as the spark that started the movement which led to the formation of the Agricultural and Industrial Research Section of the Royal Statistical Society.

To date, however, such effort has been largely individualistic even perhaps to the extent that few statisticians in either the American Statistical Association or the Institute of Mathematical Statistics are aware of it. Furthermore, these committees have only scratched the surface of the work that needs to be done by way of cooperation with other scientific groups. Perhaps they set a pattern, however, that deserves more study on the part of those interested in the statistical profession. In passing, it may be remarked that in setting up such joint committees it seems desirable that at least two representatives be chosen from each participating group. One should be an "elder statesman" in the subject matter field of the group, in addition to being a person who is broad-minded and interested in all new developments that might contribute to the work of his profession. At the same time he should be a sympathetic but hard-boiled critic. The other representative should not only be qualified in the particular subject matter field but also in the technical applications of statistics in that field.

Let us turn now to the problem of serving our fellow scientists by means of publications. At least two media must be considered: journals of the many different scientific organizations, and a thoroughly up-to-date statistical journal containing methodological and subject matter articles of general interest to statisticians working in the three fields of research. To date, statisticians working as individuals have published articles in many professional journals, and the editorial board of the *Journal of the American Statistical Association* plans to provide a journal of high calibre that will carry material of broad general interest. For example, the article by Wald in the September issue of the *JASA* is of potential interest to members of many professional organizations in the field of pure and applied science. Hence progress is being made. However, we still have a long way to go in developing a well-thought-out plan for reaching the thousands of scientists in different subject matter fields.

THREE WAYS OF SERVING THE PUBLIC

Let us now consider some of the ways in which statisticians serve the public. As already noted, it is essential for the existence of a strong professional organization that the public recognize to some extent the service rendered by its members. If, for example, the public becomes aware that by extending the use of statistics in many fields of research the potential contributions of that research in satisfying human wants may be maximized, it will not only appreciate the statistician but it may also bring pressure to bear wherever necessary to see that desirable applications of statistics are made.

Since, as already noted, the professional scientific groups in the separate subject matter fields mainly determine the extent to which statistics will be used, I shall use the three-fold classification of contributions of research that are essential to the public proposed in Dr. Bush's report. These are in the war against disease, in the maintenance of national security, and in increasing public welfare. By adopting this classification we may more easily see how the need for the contribution of the statistician fits into the picture of the need for scientific progress presented in this report and now being discussed so extensively in scientific literature.

War Against Disease. The study of vital statistics, including the study of epidemics and the causes of disease, was one of the earliest fields to which statisticians contributed. Statistical studies to determine hereditary susceptibility to disease have long been of interest from the viewpoint of preventive medicine. The determination of the effects of drugs and medical treatments is inherently a very complicated sampling process. Statistical methods, of course, have been long used in studying the effects of specific drugs in the laboratory. Here statistics plays an important part not only in the interpretation of results but also in the design of efficient experiments. Statistics also plays an important role in the study of the effects of different kinds of bacteria, climatic conditions, and the like, on health. It should not be hard to get across, even at the high school level, some appreciation of such uses of statistics. In the whole field of foods and dietetics the public could be made to appreciate something of the importance of statistics.

National Security. For years government agencies have employed most of the statisticians. Their services have long been recognized as of great importance in the collection and assembly of factual information about the supply and demand of labor as well as the supply and demand of manufactured goods and agricultural products. The statistician has for years played an important part in agricultural experimentation, in the study of social trends and in the general field of economics. In so doing, he has made available information of great value to those responsible for planning national security.

However, at the beginning of the present war there was little appreciation of the value of the statistician in government other than in the fields mentioned above. Even in setting up the National Roster, the profession of statistics was given little recognition. However, during the war this situation was greatly modified. Within such agencies as the War and Navy Departments, the War Production Board, the Office of the Surgeon General, and the National Defense Research Committee,

statisticians were given a chance to make important contributions. These extended beyond the business and social fields into the fields of background and applied research in the natural sciences. If and when the record can be made public, we will find a surprisingly large contribution to the war effort in the fields of personnel placement, operational research, development of improved war materials, and the control of the quality of much of the material used by the Armed Forces.

However, the organization of such statistical effort depended primarily upon the initiative of small groups of statisticians. Had we had at the beginning of the war, a strong professional organization interested in all fields of applied research, I think that our contribution would have been even greater. Prior to the war statisticians had not given sufficient attention to the developing front of statistics along new lines, particularly in the field of applied natural science. Organized planning was so inadequate that there were not enough statisticians qualified even to teach the large numbers of technicians required.

From the viewpoint of future security, a strong professional organization is needed to keep building sufficient public support for the many *new* fields of application that are likely to be of use in developing our national security. Moreover, if the potential contributions of statistics in this field are to be realized, much remains to be done in getting across to a large percentage of the public the part played by statistics in this war. Professional organizations in other fields of applied science have already taken steps to get recognition for their work. In the American Statistical Association, the officers and many of the members have given much consideration to this problem. One of the steps being considered is the publication of technical articles in the *JASA* to acquaint all statisticians with war-time contributions. This, however, is not enough. We need to reach great numbers of people who never see the *JASA*. Through short articles and editorials in the press and popular magazines, an effort should be made to indicate in an understandable manner not only the contributions that statistics made in the war but also the necessity of continually developing such applications as a part of any plan for security.

Public Welfare. In a democracy, public opinion and attitudes play an important role. In so far as public policies are determined upon the basis of public opinion, it is certainly of interest to everyone that such opinion be measured *in the best possible way*. All of you are well aware of the complicated statistical sampling problems as well as the psychological, economic, and other problems involved in the measurement of public opinion. However, it would not be extremely difficult, I believe,

to make most people have an appreciation for some of the more elementary statistical problems involved.

Even a group of men sitting around an old pot-belly stove in a backwoods general store could be made to see the fallacy in the *Literary Digest* Poll. If the public can be convinced of the importance of using adequate statistical care in such work, is it not reasonable that they would support a professional organization that would assume the responsibility for providing adequate statistical techniques for those working in this field and for acquainting the public with information that will help individuals to form valid judgments on questions involving public opinion. It seems to me that this is one of the public services that the Association can render.

Another example of the usefulness of statistics to all individuals is the establishment of consumer standards of quality. One aspect of this problem of particular interest is that it requires the cooperation not only of applied natural but also of applied social scientists. Much work, of course, has been done by members of the Marketing Research Association, by certain government agencies, and by standardizing groups. Success in this field is, of course, closely tied up with success in solving the problems involved in measuring public opinion and attitudes. So far, a large part of the work in consumer standards has been in determining preferences between things known to the consumer. In many cases, more needs to be done by way of determining what *might* sell, and what might give even greater satisfaction to customers. Here I am thinking primarily of what might be done at the applied research level by a team composed of physicists, chemists, psychologists, economists, market research men, statisticians, and possibly physiologists in solving some of the problems of establishing consumer standards. During the past two years, these problems have been discussed in several issues of the *Bulletin* of the American Society for Testing Materials and the American Standards Association publication.

To make further progress it is essential that statisticians, familiar with what is known at the present time about the science of measuring opinion and attitudes, cooperate with professional groups like the American Standards Association and the American Society for Testing Materials to establish standards in terms of physical, chemical, and other properties. More than this, it would be highly desirable if we could find some objective physiological measure of human reactions that would be more reliable in many instances than verbal expression.

The problem of standardization is difficult even when considered in

terms of theoretically measurable characteristics of a product: when we couple with this the problem of determining in a quantitative manner the correlation between human reaction and physically measurable characteristics of manufactured goods, it is obvious that the problems are vastly more complicated. All of these problems are inherently statistical and unless statisticians as a professional group assume their responsibility in helping to solve them, statistics will have lost one of its great opportunities to serve the public in a way that the public can understand. If, on the other hand, these problems are attacked in a half-hearted manner and are muffed, the day of full public recognition and appreciation of the statistician will be greatly delayed. In other words, we have here a frontier for applied statistical research of the highest order. We have here a problem in which the public is greatly interested not only as individuals but as organized groups—we have here a problem that the public *wants* solved.

In closing this section on public welfare, let us consider briefly the question: What can statisticians contribute to general education? The recent report on *General Education in a Free Society*, published by Harvard University, gives the following definition of general education: "It (general education) is used to indicate that part of a citizen's whole education which looks first of all to his life as a responsible human being and citizen; while the term 'special education' indicates that part which looks to the citizen's competence in some vocation."

I have recently read not only the Harvard report but many other discussions on general education and I am pleased to find that several emphasize the importance of some knowledge of scientific method as a part of general education. In a few cases, the authors mention statistics but not in a way that indicates any relationship to scientific method. This is not surprising because there has been little effort in statistical teaching to emphasize how statistical method is related to the three steps in scientific method, namely, hypothesis, experiment, and test of hypothesis. If the student were made to appreciate that, because of the statistical nature of observable phenomena, it is often necessary to replace the three steps by statistical hypotheses, statistically designed experiments, and statistical tests of hypotheses, he would appreciate the developing growth of scientific method and the contribution of statistics thereto.

From the viewpoint of general education, statistics is *not* simply a tool as is so often stated but *a scientific way of looking at the universe*: statistical method is not something apart from scientific method but *is* scientific method adjusted to the generally accepted view that science

is not exact but only probable. Statistics is like the well-dressed bride in that statistics "wears":

Something old: scientific method.

Something new: *improvements on each of the three steps in scientific method.*

Something borrowed: Mathematics and logic.

Something blue: Contributions in the "blue chip" class in every subject matter field.

CONCLUDING REMARKS

The statistical front is the whole field of science. Outposts of that front exist in every subject matter field of research. Many outposts are manned by small scouting parties of pioneering souls; others are well-organized groups like the Biometrics Section of the American Statistical Association, the Econometric and Psychometric Societies, the Institute of Mathematical Statistics, and the American Marketing Association. Some of these outposts have already advanced out of sight of the others; in no instance are the lines of communication adequate—even worse, there is no available map showing the location, personnel, and objectives of these outposts.

Picture these outposts on the scientific frontier each with a mission to perform that is of vital interest to the public, but without any *one* headquarters statistical organization to which appeals can be directed for the latest statistical results from the similar outposts in other fields of pure, background, and applied research; without any one headquarters organization to stimulate the training of new recruits in the separate subject matter fields; without any one headquarters organization to maintain adequate public support for their work vital to our national security, war against disease, and public welfare.

To insure continued advancement on the statistical front, we need a strong professional organization backed by *all* statisticians working in the many different subject matter fields: an organization whose purpose shall be to foster in the broadest manner the *science* of statistics and its applications; and to promote a unified, effective, organized effort in advancing the common interests of all professional statisticians.

To this end, such a professional organization needs to conduct joint meetings and conferences with many organizations in the fields of pure, background, and applied research with whom official contact has never been made in the past; to establish joint committees with other scientific groups wherever necessary; to produce and distribute publications

devoted to statistical methodology and statistical knowledge of common interest to all professional statisticians; to provide the public through the press, lecture platform, and radio with reliable information about the science of statistics and its contributions; and to stimulate statistical research and promote high professional standards in all statistical work.

I hope and believe that the American Statistical Association with the cooperation of other organized societies interested in statistics, can be developed into a strong organization to serve the common interests of *all* professional statisticians in these groups.

