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The present status and future prospects of social statistics in relation to social science and social engineering is the subject of this essay. This subject has been selected for two reasons. First, it touches upon the roles of social statistics that engaged Sam Stouffer's mind, heart and much of his prodigious energy; and second, it represents an effort to minimize overlap with what I anticipated would be comprehensive and excellent papers by Fred Stephan and Nat Keyfitz focused more directly upon social statistics <u>per se</u> and on Sam Stouffer's significant contributions to their development.

The framework for my discourse was well set forth over fifty years ago by Richmond Mayo-Smith, Professor of Political Economy and Social Science at Columbia College. \underline{L} After some preliminary discussion he observed:

"We get from statistics indications of relations which maintain themselves with a persistence and constancy that give us an impressive sense of the reign of law in the social actions of men. It is this reign of law which we desire to see revealed." (p. 15)

Mayo-Smith also observed that "We are surrounded by sociological or social problems which urgently demand solution. We cannot wait for the completed science; we must seek to understand the conditions affecting the particular problem before us. This may be called practical sociology. Everywhere in this domain we find statistics a useful instrument of investigation. . . ." (p. 16)

The first of these quotations serves admirably as a concise summary of the role of social statistics in social science; and the second, their role in social engineering. As a preliminary to consideration of social statistics in relation to social science and social engineering it is well to define the term as used in this paper. "Social statistics" is considered here as embracing not only the figures which flow from tabulations of census, survey, registration, administrative records, and the like but, also, the statistical methodology which is employed in social research and the substantive findings of social research stated in quantified form.

SOCIAL STATISTICS AND SOCIAL SCIENCE

Social science like any science has as its objective the achievement of knowledge independent of the "caprice" and "willfullness" of man, in contrast with knowledge based on the methods of "tenacity," "authority" and "intuition" as discussed by Morris R. Cohen and Ernest Nagel.²/ Such knowledge, which can more explicitly be stated as consisting of predictability and explanation, can be achieved only by means of the method of science, the method of "reflective inquiry"³/ or research. Statistical methods wherever applicable provide more efficient and effective prediction than alternative social science methods. The fact that a quantified projection or prediction is to be preferred to a non-quantified one needs no elaboration. It may also be argued that "explanation" based on statistical research is also to be preferred to alternative forms of explanation in social science. Social science explanation based on social statistics produces "probabilistic" explanation of a type not as rigorous as the "deterministic" explanation possible in branches of the natural sciences. But it constitutes a more rigorous and objective explanation than other types of explanation possible in the social sciences, which in the sense discussed by Nagel, include the "functional," "teleological" and "genetic" forms of explanation.⁴/

The Experimental Method. The most efficient and rigorous method for obtaining knowledge that science has yet devised is that represented by the controlled experiment -- a method that necessarily involves measurement. $\frac{5}{}$ That is, to detect the impact of an experimental variable on a dependent variable "before" and "after" measurements are necessarily involved; as is also the measurement of the experimental variable itself. Even though the use of the controlled experiment has relatively limited application in social science, its use is by no means inconsequential. On the contrary the experimental method employed in social researches has resulted in important gains in knowledge--as, for example, in small group research.67

The use of the experimental method even though limited, then, is the first of the ways in which we may note social statistics are involved in social science. In the employment of the experimental method the social variables utilized in the experiment are quantified and change is measured. Moreover, in the conduct of the experiment not only are the various scales of measurement and descriptive statistics employed but, also, the techniques developed by statisticians for the design of experiment and statistical inference. Although the use of the experiment in social science is limited, the statistical methods employed in conjunction with the experiment may well be viewed as a point where statistics on its most sophisticated level contributes to social science. And the knowledge which flows from experimental studies in the form of predictability and explanatory propositions may appropriately be considered a part, even though as yet a limited part, of the fund of "social statistics" as well as, simultaneously, of social science.

Statistical Method. Most social science research necessarily utilizes methods other than the controlled experiment. These methods best achieve the objectives of science, however, to the extent that they approximate the experimental method. Thus, the method of the controlled experiment has great indirect utility in social science in serving as a yardstick by which all other methods may be evaluated and their strengths or weaknesses assessed. Stouffer in his classical article, "Some Observations on Study Design,"-' has provided an excellent demonstration of the manner in which the experiment can serve as a framework for assaying other methods.

The research methods which come closest to the controlled experiment in the study of social phenomena are the methods of statistics. Mathematical statistics has produced a wide spectrum of specific techniques for the study of social phenomena which in varying degree approximate or simulate the experimental method. It may be argued that the research methods involved are mathematical statistical methods not "social statistics." But generic statistical methods utilized in social research may appropriately in this context be considered as included in the methodological component of "social statistics," and the product of research based on these methods is appropriately included as part of the substantive body of "social statistics." This is, after all, usage analagous to that of the generic term "statistics" itself, which possesses both substantive and methodological connotations.

Social science research is becoming increasingly quantitative either by means of statistical methods or direct mathematical approaches.⁸/ It is possible, therefore, to say that social science is becoming science, in contrast to its 19th and early 20th century philosophical state, largely by reason of the impact of the statistical method. The application of statistical method to social phenomena and the body of propositions and theory emanating therefrom are playing a major role in the advancement, or perhaps more accurately the achievement, of social science.

It must be acknowledged that there are still some scholars who feel that social science cannot be pursued in the imagery of natural science, and that the experimental method and statistical techniques approximating it are not applicable to social phenomena.²/ But it is probably true that they are a dwindling minority and that the view I am presenting is now the modal position in a number of the social science disciplines, e.g., psychology, social psychology, economics, sociology, demography; and is gaining ground in others, e.g., anthropology and political science.

The specific ways in which social statistics has contributed to the emergence of social science may be simply set forth to serve as a frame for pointing to future developments. The social statistician has done much to measure the phenomena in which the social scientist is interested; to collect, process and tabulate social data; to describe and analyze the data ("explain"); and to project discerned patterns or sequences (trends) into the future ("predict"). Much has been achieved over the years, as Stephan and Keyfitz at this meeting, and others from time to time have shown in respect to each of these areas of activity.

Statistical Bottlenecks. Although much has been achieved, much, also, remains to be done, as I am sure the other papers in this session will agree. For my part I should like to point to a few of the obstacles to the development of social science which urgently require the concerted efforts of social statisticians.

<u>Measurement</u>. The first of these bottlenecks constitutes, in my judgment, the greatest contemporary obstacle to the development of social science. It lies in our inability successfully to measure many of the phenomena we wish to treat as dependent or independent variables. Our conceptual frameworks are in a number of areas ahead of our ability to obtain adequate metrics. As a result we are often able to explain only pitifully small proportions of the total variances of our dependent variables, not necessarily because the hypothesized relationships are not there but, rather, because we work with such confounded variables that we cannot detect the relationships. There is a great need to concentrate on obtaining better measurement of our variables-to get measurements that more clearly match our concepts, as Stephan noted two years ago in a paper before this section. 10/

A good example in point is to be found in our classification of urban and rural population. Urbanization has had profound effects on man's way of life, and many efforts have been made to trace its impact by means of the census type of measurement of "urban" as an independent variable. But "urban" as measured in a census includes persons of third or subsequent urban descent together with newly arrived in-migrants from generations of living in the Appalachian highlands or the Mississippi delta. It includes persons who have been relatively segregated in ethnic enclaves within the urban place as well as persons of similar origin who have become completely assimilated. It includes residents of the central city and of the suburb; of persons in, as well as outside metropolitan areas and so on. There can be no doubt that the classification "urban" as we generally use it in social research is a badly confounded variable that obscures much of the order and regularity we seek, and that impairs our ability to improve our predictability and explanation.

There is at the present time considerable variation among the social sciences in the attention and energy devoted to measurement. The psychometrician who devotes several years to the development of a single scale certainly stands in sharp and meritorious contrast to the social survey operator who develops a 30-page questionnaire in several weeks-or even a few days. There can be little doubt that the sample social survey, which has been one of the most effective research instrumentalities developed in social statistics, is also producing a mass of spurious information by reason of poor measurement of the type described.

As another aspect of the problem of measurement much more work is needed to achieve higher order measurement scales in working with social phenomena. Success in this effort would have the salutary dividend of increasing the power of the methods of analysis and inference which may be employed in social research; and may result, therefore, in higher orders of predictability and fuller explanation. In general, it is probably true that a large proportion of social scientists remain unaware of the great differences that obtain in the power of admissible statistical operations when, for example, a ratio-scale can be utilized in lieu of a nominal scale.

<u>Error</u>. Many of our statistics still contain relatively large elements of error which can be eliminated. Sampling error has, of course,

become the easiest component of error to manage. But the various other types of error, as enumer-ated by Deming some years agoll/ can certainly be better controlled than they yet are, as a result of the quality control methods which have evolved, of the post-enumerative survey, and of other developments. $\frac{12}{}$ Data that do not meet as high standards of reliability, validity and precision as may be required for our research objectives stand as obstacles to the advance of social science. Perhaps the time has come when all social statistics, and especially those based on a canvass of the population, should routinely carry in addition to a report of sampling error some indication of the magnitude of other elements of error. Certainly we now possess enough knowledge to do much more of this than ever was possible before.

Longitudinal Data. Another bottleneck in the development of social science which the social statistician can help to break is to be found in the disparity between social science projections and the actual course of events. The demographer has learned the hard way to label his efforts to foresee the future as "projections" rather than "predictions." What can be done to improve social science predictability? At least part of the answer, I believe, lies in the expansion and elaboration of longitudinal, as opposed to cross sectional, statistics.

One of the greatest weaknesses of social science, in general, lies in the drawing of diachronic conclusions from synchronic and, therefore, inadequate data. Longitudinal conclusions are always dangerous when based on cross-section data, and especially so when the information is also inadequate in various other ways. Yet most of the data which the social scientist uses for projection or prediction are of this character. They consist of cross-section information drawn from a relatively small number of points in time, containing gross and confounded categories with volatile and often conflicting components. A good illustration is given by the many attempts to predict fertility behavior from current statistics. Just as the demographer has learned the limitations of crosssection birth-rate data and the value of the cohort approach, so the social scientist, in general, with the assistance of the social statistician, must greatly increase his fund of longitudinal data. $\frac{13}{2}$ In this manner dynamic patterns and sequences could be discerned that would undoubtedly provide a better basis for projection and prediction.

Methods of Analysis. Less of a bottleneck, but, nevertheless constituting some obstacle to the advance of social science is the uneven development of statistical methods for the analysis of social, as compared with natural, science data. Mathematics and mathematical statistics, both, were in large measure produced by scholars concerned with physical and biological science and with engineering problems. Only relatively recently, as social science has achieved the ability to pose new problems for the mathematician or mathematical statistician, has concerted effort been devoted to the evolving of techniques specifically oriented to social science types of research problems. $\underline{14}$ /Such effort, it may confidently be expected, will increase and, especially, as more social scientists achieve high mathematical and statistical competence. The social scientist himself, <u>cum</u> statistician, is both more apt to be able to define the problem and to be motivated to find the solution than the non-social science oriented methodologist. $\underline{15}$ /

<u>New Uses of Computer</u>. Another item that merits discussion is the new opportunity for a major inflection point in the advancement of social science by means of social statistics afforded by the advent of the computer. Electronic processing of statistical data has already produced great dividends both in the handling of mass data $\frac{16}{2}$ and in the statistical analysis of social data. $\frac{11}{2}$ But only a beginning has been made. For thus far, the computer has been used largely routinely as a glorified punch-card tabulator or for the conduct of time-honored forms of analysis.

The computer has yet to be fully exploited for social statistical analysis of a type not feasible before its appearance. For example, in addition to n-dimensional cross tabulations of data in which the unit of analysis is the person, household, age-group, geographic area, etc., tabulations are now possible of patterns and sequences of characteristics-of profiles of the units, instead of the units themselves. 18/ Such tabulations would permit utterly new types both of micro- and macro-analysis that could prove exciting and probably greatly improve the power of social science to predict and explain. To gain the most from this possibility the social sciences must cultivate the training of scholars who combine statistical with computer competence.

Use of Theory. The increasing role of social statistics in social science methodologically and substantively, has helped push into the background the type of speculative and philosophical activity usually, but mistakenly in my judgment, called "theory" in the social sciences. Theory, in the imagery of science, is neither "speculation"--the undisciplined drawing of global generalizations without the benefit of empirical research; nor "philosophizing"--the disciplined drawing of generalizations without the benefit of empirical research. Theory in science may be considered as tentative generalization in the form of predictability or explanation based on empirical research and pointing to further research. 19/

At the present time it is correct, I think, to say that a wide gap still exists between empirical research and "theory" in social science to the detriment of both. There can be no doubt but that the advancement of social science is being badly retarded by this gap. No one saw this more clearly than Stouffer who was equally impatient with "talky-talk" sociology, on the one hand, and blind data collection on the other. He felt that progress in social science could be achieved primarily through the interplay of theory and empirical research-either one alone was sterile. He left some brilliant examples of the way in which such interplay could be effected in his work on migration and norms of behavior.²⁰/ The social statistician, having begun the task of using methods of empirical research and building a fund of empirical data, needs increasingly to turn to the construction of theory. The social scientist who specializes in "theory" by the same token, needs increasingly to turn to the use of empirical research. Social Science may be expected to achieve important progress as the interplay between theory construction and empirical research is increased and, it may be hoped, as these two functions are increasingly combined in the person of the well-trained social scientist.

Training. The speed at which many of the specific obstacles to the advancement of social science can be reduced will, in large measure, depend on the extent to which the social scientist obtains improved mathematical and statistical training. Although notable improvement has taken place over the years, the average social science student still tends to grumble about even the limited mathematical and statistical course work now generally required. In many cases it is undoubtedly true that the student just lacks quantitative aptitude -- and that is why he is in social science. But many social science students lack not mathematical aptitude as much as incentive and motivation to obtain the desired competence. Social science faculties could remedy this situation relatively quickly, without undue hardship on students, if more of them would prescribe at least some pathways in social science training in which high mathematical and statistical competence are prerequisites. A number of social science departments have already done this--but the number is still relatively small. Much more needs to be done to encourage social science students to achieve higher mathematical and statistical training.

This is not to say that statistical and mathematical methods are the only methods by which social science may advance. But there can be little doubt that more and better social scientists <u>cum</u> statisticians would greatly improve social science output. Certainly there is no evidence, yet, that we have too many well-trained social statisticians.

SOCIAL STATISTICS AND SOCIAL ENGINEERING

The increased volume and quality of social statistics over the years are more directly traced to social engineering, than to social science, needs. For the demand for more statistics in virtually every realm, including the social, has steadily grown as our society has become more complex and more interdependent.²¹/ As Mayo-Smith stated in 1910 "we cannot wait for the completed science" to find solutions for urgent social problems. Social statistics, in the sense of quantitative information about problems, are collected primarily to provide a sounder basis than is otherwise available for policy formulation and administrative action. In general, there are few realms of social action, in government or out, which are not dependent on social statistics for intelligence about the problems with which they deal, or which would not be better off if they had adequate statistics. I am sure Martin Gainsburgh's Presidential Address on "The Statistics We Live By" will furnish eloquent testimony of the social engineering utility of statistics on a number of fronts.^{22/} And it should be added that statistical developments in respect of decision-making, in general, have greatly increased the utility of social, as well as other types of statistics, for action programs.

Social engineering needs have in large measure generated social statistics. But it is also true, of course, that social science has had an important role in determining the specific form that social statistics have taken. For the social scientist, although he has not had a completely free hand, has typically been the designer and operator of projects to collect and disseminate social statistics. The fact that social statistics often are the direct product of efforts to solve social problems is, on the one hand, the reason for their proliferation; and, on the other hand, the reason for their frequent inadequacies from the standpoint of social science. Social statistics have in large measure taken the form they now possess by reason of the interplay between social engineering and social science needs; and it is likely that a similar interplay will continue to influence the course of their development.

The great bulk of social statistics are government collected--federal, state and local-in response to needs not only of government but, also, of business, labor, education, civic enterprises, health and welfare organizations and a host of other types of organizations and groups.^{23/} Additional social statistics, generally not as widely available, are generated by universities and research organizations; and by various non-governmental activities, largely as a by-product of administration.

Let us first briefly consider government statistics and then turn to the non-governmental.

Government Statistics. Government statistics have greatly expanded since the 1930's when the "bloodless revolution" of the New Deal placed the federal government into a number of new fields of activity. Preparation for, and participation in, World War II, and the requirements of the Cold War have had a similar effect. In consequence, the federal government itself has become the most important and largest single consumer of its own social statistical product. The fact that important policy decisions and administrative action of the federal government are increasingly dependent on the factual picture provided by social statistics has led to great scrutiny of, and much improvement in, many of the specific statistical activities of the government. The improvements effected in the Monthly Report on the Labor Force contribute a good case in point.

The status of social statistics produced by the government was excellently reviewed at a meeting of this Section just a year ago by Bowman, Gall and Rubin.²⁴/ In that paper, as well as in Stephan's paper at this session, some shortcomings of the federal statistical system were noted and indications given for improvement. Stephan makes a good case for furthering the improvement of statistics within the established decentralized statistical and administrative agency framework.^{25/} But it is also appropriate to observe that the federal statistical system was never really planned, that it has relatively few comprehensive reviews, and even fewer comprehensive overhaulings. It may well be that it would be in the interest of social engineering and, also, social science, for the statistical system as a whole to be not only reviewed but, also, overhauled from time to time, although not necessarily every 17 years as prescribed for another matter by Tom Jefferson. An occasional hard look and effective reshuffling could conceivably improve the utility of social statistics for social engineering purposes--as well as increase the statistical output per unit of cost. 26/

Non-Governmental Statistics. Social statistics produced by non-governmental organizations have also proliferated over the years and especially in the post-war period. Advances in the sampling of human populations and in social survey methods, in general, have made it easier for non-governmental organizations to do their own fact finding, or to utilize non-profit or commercial research agencies for the purpose. In consequence, social statistics has become part of the mass communication diet of the American people in an unprecedented way, directly through the public opinion polls, and indirectly, through the increased dependence of action agencies on social statistics for, and explanation of, action.

The quality of non-governmental social statistics varies widely. Some of the statistics, especially those collected by university affiliated organizations such as the Survey Research Center at the University of Michigan and the National Opinion Research Center at the University of Chicago, meet the highest standards. Other batches of social statistics, particularly those collected by commercial agencies under budget pressure, leave much to be desired. Especially distressing is the failure of a number of such organizations fully to publish the details of the designs, procedures and forms that they use. As the nation becomes more and more dependent on social statistics for effective and efficient action, the pressures for improved social statistics from all sources may be expected to increase. Fortunately, most of the important producers of such data have become increasingly professionally minded and strive to maintain and improve the quality of data as may be observed in the activities of the American Association of Public Opinion Research.27

Non-governmental as well as government agencies produce much in the way of social statistics as by-products of conducting their own activites. Some of these data are of high quality and are widely circulated as in the case of the Statistical Bulletin of the Metropolitan Life Insurance Company. Most of such material, however, is compiled and used for specific organization purposes and never enters the public domain. With increasing interdependence and government interventionism it may be anticipated that many of the social statistics now considered private will become public. The statistics relating to employment practices, for example, are in this process now under the pressure of increasing state and federal "fair employment" activities.

In general, the future of non-governmental as well as governmental social statistics may be considered a bright one in the sense that they may be expected both to be improved and to become increasingly important for social engineering purposes. It is hardly necessary to mention that one of the developments that justifies this optimistic outlook is to be found in the growing professionalization of statistical activities, as the growth and programs of the American Statistical Association testify.

CONCLUDING OBSERVATIONS

Social statistics, methodologically and substantively, has played a prominent role both in social science and social engineering. Social statistics, in turn, have proliferated largely as a result of social engineering, especially government, needs. But they have achieved a relatively high level of quality and utility largely as the result of the impact of social science.

Social statistics may be expected to achieve an even more important place than they now possess in social science in the years ahead. The natural sciences can make greater use of the experimental method and a direct mathematical approach than can the social sciences. In consequence, although statistical methods are useful in the natural sciences, they assume a much greater importance in the social sciences in that they represent the major means by which social phenomena can be quantified and the experimental method approximated or simulated. This is likely to remain the situation for many years to come, although direct mathematical approaches are increasing in the social sciences.

Similarly, social statistics is likely to achieve even greater prominence and utilization in social engineering. Our society continues to grow more complex and interdependent, and policy and program, therefore, require ever more intelligence for sound direction. The most efficient form of such intelligence yet devised is afforded by statistics, including social statistics. Moreover, developments in statistics, as well as electronics, have materially increased the efficiency and effectiveness of the decision making process itself.

It is fitting to close this paper at this Memorial Session in Honor of Professor Samuel A. Stouffer with acknowledgement of our indebtedness to him for the remarkable character of his contribution to social statistics both in social science and in social engineering. It is difficult to traverse the field of social statistics over the past thirty years without crossing Sam's tracks--directly or indirectly. No one has done more over this period either to advance the cause, or the science and art, of social statistics. I have not elaborated on his specific contributions here because I have already done so elsewhere, 28/ and because I anticipated the other papers would do so.

Despite his premature death, Samuel A.

Stouffer is still in a position to exert great influence on the future of social statistics. Today, about thirty years after the completion of his own statistical training which he achieved relatively late in his career, he may yet be viewed as a prototype of the well-trained social scientist. It is a sad commentary that the vast majority of social scientists, including even the majority of recent Ph.D.'s, have not matched his training in methods of research. In this thought lies an additional well-deserved tribute to Sam; and a basis for sombre reflection for the rest of us about how much remains to be done to produce competent students really equipped to advance both social science and social engineering by means of greatly improved social statistics.

FOOTNOTES

<u>1</u>/ Richmond Mayo-Smith, <u>Statistics and</u> <u>Sociology</u>, New York: The Columbia University Press, 1910, Ch. 1.

2/ Morris R. Cohen and Ernest Nagel, <u>An In-</u> troduction to Logic and the Scientific Method,

New York: Harcourt, Brace & Co., 1934, Ch. X. <u>3/ Ibid</u>., pp. 195ff.

4/ Ernest Nagel, <u>The Structure of Science</u>, New York: Harcourt, Brace & World, Inc., 1961, Ch 2, 14.

5/ Cohen and Nagel, <u>op.cit.</u>, XIII; E. Bright Wilson, Jr., <u>An Introduction to Scien-</u> <u>tific Research</u>, New York: McGraw Hill, 1952, Ch. 4.

6/ Harold H. Kelley and John W. Thibaut, "Experimental Studies of Group Problem Solving and Process," in Gardner Lindzey, <u>Handbook of</u> <u>Social Psychology</u>, Cambridge, Mass.: Addison-Wesley Publishing Co., 1954, Vol. II, Ch. 21. See bibliography of Ch. 21 for further references.

7/ Samuel A. Stouffer, "Some Observations on Study Design," <u>American Journal of Sociology</u>, Vol. LV (1950), pp. 355-361.

8/ Paul F. Lazarsfeld and Morris Rosenberg (eds.), <u>The Language of Social Research</u>, Glencoe, Ill.: The Free Press, 1955; Paul F. Lazarsfeld (ed.), <u>Mathematical Thinking in the Social</u> <u>Sciences</u>, Glencoe, Ill.: The Free Press, 1954.

<u>9</u>/Herbert Blumer, "Sociological Analysis and the 'Variable,'" <u>American Sociological</u> <u>Review</u>, Vol. XXI (1956), pp. 683-690.

10/ Frederick F. Stephan, "Relations of Some Social Science Concepts to Statistical Data," <u>Proceedings of the Social Statistics Section</u>, 1959, Washington: American Statistical Association, 1960, pp. 170-171.

<u>11</u>/ W. Edwards Deming, "On Errors in Surveys," <u>American Sociological Review</u>, Vol. IX (1944), pp. 359-369.

12/ Philip M. Hauser and Otis Dudley Duncan, "The Data and the Methods," in Philip M. Hauser and Otis Dudley Duncan (eds.), <u>The Study of</u> <u>Population: An Inventory and Appraisal</u>, Chicago: University of Chicago Press, 1959, Ch. 3. See bibliography, especially references to work of Morris Hansen, William Hurwitz, Leon Pritzker and A. Ross Eckler.

<u>13</u>/ E.g., P.K. Whelpton, <u>Cohort Fertility</u>, Princeton: Princeton University Press, 1954. <u>14</u>/ E.g., Robert R. Bush and Frederick Mosteller, <u>Stochastic Models for Learning</u>, New York: John Wiley & Sons, 1955; H.A. Simon, <u>Administrative Behavior</u>, New York: Macmillan, 1947; Leo A. Goodman, "The Use and Validity of a Prediction Instrument. II. The Validation of Prediction," <u>American Journal of Sociology</u>, Vol. LVIII (1953), p. 510; "Measures of Association for Cross Classification" (with William Kruskal), Journal of the American Statistical Association, Vol. LIV (1959), p. 123; "Snowball Sampling," <u>Annals of Mathematical Statistics</u>, Vol. XXXII (1961), p. 148.

15/ The career of Professor Leo A. Goodman of the Department of Sociology and Statistics at the University of Chicago is a good case in point.

<u>16</u>/ The use of UNIVAC by the U.S. Bureau of the Census for tabulation of the 1960 Censuses of Population and Housing is a case in point. See Richard A. Hornseth, "Programming the Population Census," <u>Proceedings of the Social Statistics Section, 1959</u>, Washington: American Statistical Association, 1960, pp. 200ff.

<u>17</u>/ E.g., James S. Coleman, "The Use of Computers in the Study of Social Structure: Interaction in a 3-Person Group," <u>Proceedings of the</u> <u>Social Statistics Section, 1959</u>, Washington: American Statistical Association, 1960, p. 42.

18/ This possibility was proposed by my colleague, Professor O.D. Duncan, in discussions about next steps in the development of tabulations of social data. The idea merits intensive exploration.

19/ Philip M. Hauser and Otis Dudley Duncan, op.cit., p. 15ff. 20/ Samuel A. Stouffer, "An Analysis of Con-

20/ Samuel A. Stouffer, "An Analysis of Conflicting Social Norms," <u>American Sociological</u> <u>Review</u>, Vol. XIV (1949), 707-717.

21/ Philip M. Hauser and William R. Leonard (eds.), <u>Government Statistics for Business Use</u>, New York: John Wiley & Sons, 1956, Ch. 1.

22/ Martin Gainsburgh, Presidential Address, American Statistical Association, 1961. Will appear in March 1962 issue of <u>Journal of</u> <u>American Statistical Association</u>.

23/ Bureau of the Census, <u>Statistical</u> <u>Abstract of the United States, 1961</u>, Washington: Government Printing Office, 1961 (issued annually). See especially "Bibliography of Sources," pp. 957-994.

24/ R.T. Bowman, Alexander Gall, and Israel Rubin, "Social Statistics: Present Conditions, Future Needs and Prospects," in <u>Proceedings of</u> the Social Statistics Section, 1960, Washington: American Statistical Association, 1961, pp. 74-81.

25/ Frederick F. Stephan, "Samuel A. Stouffer and the Progress of Social Statistics," to appear in <u>Proceedings of the Social Statistics</u> <u>Section, 1961</u> of the American Statistical Association.

26/ Philip M. Hauser, "Non-random Observations on Statistics from Washington," <u>The Federal</u> <u>Statistics Users' Conference</u>, Washington: Fourth Annual Meeting, September 1960, pp. 65-74.

<u>27</u>/ See <u>Public Opinion Quarterly</u>, the journal of the American Association of Public Opinion Research.

28/ "Samuel Andrew Stouffer, 1900-1960," The American Journal of Sociology, LXVI (1961), pp. 364-365.