

Samuel S. Wilks: Statesman of Statistics

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The death in his sleep of Samuel Stanley Wilks at his Princeton home on March 7, 1964, ended a life of dedicated service to statistics, education, and the nation. Apparently in the best of health, his sudden death at the age of 57 shocked and saddened the entire statistical community. Those who knew him best recognized that his single-minded purpose was to improve the world, through his own efforts, through his training of young men, through the dissemination and application of the mathematical sciences, and through accepting, in good humor, and enjoying the world he found. Boundaries between disciplines, organizations, and people never lasted long in his mind for he thought in terms of bridges, entrances, and opportunities.

Wilks, son of Chance C. and Bertha May Gammon Wilks, was raised with his younger brothers, Syrrel and William, on a 250-acre farm, small by Lone Star standards near Little Elm, Texas. Though hunting and fishing were childhood pastimes, they say he built a radio at the age of 12, not such an easy task in 1918. Those must have been warm and happy years, for "Sam" always spoke glowingly of Texas, of his family ties there, and, too, he took every opportunity to revisit his home state.

As an undergraduate, Wilks studied industrial arts at North Texas State Teachers College in Denton, Texas, receiving his bachelor's degree in 1926. He was especially interested in architecture, and he and a friend designed a large drinking fountain that was erected on the campus. While teaching mathematics and manual arts in secondary school in Austin, Texas, he studied mathematics at the University of Texas, where he received his master's degree in 1928. At the University of Texas, Professor Edward L. Dodd introduced him to probability and statistics and encouraged him to study with Professor Henry L. Rietz at the University of Iowa, then the center for statistical study in the United States of America. When Sam discussed the Iowa days, he emphasized his good fortune in being thrown together with an outstanding group of young graduate students, including, for example, John H. Curtiss and Allen T. Craig.

His doctoral dissertation (see *Metron*, Vol. 9, pp. 87-126, 1932) dealt with the sampling distribution of statistics of a variable when a "matching sample" has been drawn so as to match an initial sample on a correlated variable—for example, we may match the heights of men in a "matching sample" with those in an initial random sample. Now what is the distribution of weights in the matching sample? What if the matching has been on several variables?

Upon receiving his doctorate in 1931, he was awarded a National Research Council Fellowship in mathematics at Columbia University, where he studied with Harold Hotelling, and, incidentally, lived in the same building that housed, during World War II, the New York branch of the Statistical Research Group of Princeton University, which Sam was to direct. He and Gena Orr of Denton, Texas, were married in 1931.

The following year he was appointed an NRC International Research Fellow, and he worked both at the University of London and at Cambridge University. While in London, Stanley Neal Wilks, their only child, was born to Gena and Sam. Wilks found this again a stimulating period, working with Karl Pearson and John Wishart, and getting

to know the British school of statisticians including R. A. Fisher, Jerzy Neyman, and Egon Pearson, to name a few leaders. During the period of his fellowship he completed at least the following in addition to two other papers:

“Moments and distributions of estimates of population parameters from fragmentary samples,” and “On the sampling distribution of the multiple correlation coefficient” (both in *Annals of Mathematical Statistics*, Vol. 3, 1932, pp. 163-195 and pp. 196-203, respectively), “Certain generalizations in the analysis of variance” (*Biometrika*, Vol. 24, 1932, pp. 471-494), and “Moment-generating operations for determinants of product moments in samples from a normal system” (*Annals of Mathematical Statistics*, Vol. 35, 1934, pp. 312-340).

Among the multivariate criteria proposed by Wilks, the most used today is very likely the one denoted by W [Wilks] in his 1932 *Biometrika* paper. Bartlett in 1947 used the notation W for this statistic applied in a wider variety of contexts than originally proposed by Wilks, and C. R. Rao in 1948 introduced the frequently heard term “Wilks’s W criterion.” This criterion provided a multivariate generalization of what is now called the analysis of variance F test. If the “among” sum of squares in analysis of variance is generalized to a $p \times p$ matrix A of sums of squares and products and the “within” sum of squares is similarly generalized to a $p \times p$ matrix B , then the criterion is defined as a ratio of determinants, namely W or W equals $\det(B) / \det(A+B)$. In 1932 it was quite a feat to determine, as Wilks did, the null distributions of this and many similar statistics.

From the dates of publication of the articles above, one can infer what his students found later: that Wilks thought it urgent to get new results into print, and that he was concerned when people let fine work lie unpublished. These titles, together with his dissertation, show also his early love for problems of multivariate analysis, a field that gave him pleasure all his life, for he was delighted whenever anyone got a new result there. “Kind of a nice result; kind of pretty” was one of Sam’s higher forms of praise at such times.

Upon completion of his two fellowship years, Wilks was called to the Department of Mathematics of Princeton University, the base from which he made so many contributions. From the beginning, he took an interest in the development of the whole undergraduate program in mathematics, while he gradually constructed courses in mathematical statistics. Though he prepared many sets of course notes, he was slow to put them into hard covers. In drafting these notes, he liked to sharpen a couple of dozen pencils for writing on the backs of used mimeograph pages, putting perhaps 10 to 20 words to the page. When he had written a few words and the pencil became slightly blunted, he would take up another. Once he started, the writing flowed quite swiftly, with few words or lines crossed out, but many additions using carats. In this manner, he wrote his orange notes on *Statistical Inference* (Edwards Brothers, 1937, Ann Arbor), his little blue book *Elementary Statistical Analysis* (Princeton University Press, 1948, Princeton, N.J.), and other course notes that were not bound and have not become generally available. The “blue book” may well have been the first carefully developed freshman course in mathematical statistics based on one term of calculus. His big gray paper-bound book, *Mathematical Statistics* (Princeton University Press, 1943, Princeton, N.J.) was partly prepared with the help of his students. Not until 1962, practically 20 years later, did his entirely new book with the same title, *Mathematical Statistics* (John Wiley and Sons, Inc.) come out in hard covers. In a review of the big gray book, R. A.

Fisher criticized Wilks's judgment in presenting such a document in soft covers and not in print. Though I did not appreciate it at the time, I believe Fisher was right and that all Wilks's books could well have been brought out in hard covers and in print, because statistical publications at that time were extremely limited. Indeed Cramér's *Mathematical Methods of Statistics* did not appear until 1946. Wilks failed to see that his principles about immediate journal publication applied as well to books, especially in a young field, and that the "masterwork" idea, which I am sure held him back, did not attend to the need of the times.

He was interested in the whole spectrum of mathematical education. While the Princeton doctoral program in mathematical statistics has never been large in volume the performance of the product has been rather good. Only a few courses are offered there in statistics. In commenting on this, one of Wilks's graduate students said, "What made the experience valuable was that Sam routinely expected so much more of me than I thought I could deliver that he set my sights forever high, once I found out that occasionally one's performance could match Sam's expectations."

In addition to the regular doctoral program, a number of postdoctoral students, not originally trained in statistics, visited for a while with Sam's group and became professional statisticians.

Since he was always attracted by new developments, once the statistical possibilities of IBM machines began to be recognized, he made special arrangements to obtain one for Princeton's statistical laboratory and encouraged his students to learn to compute.

Quite a few senior honors theses written under Wilks's direction became published papers in the *Annals of Mathematical Statistics*, again the combination of a good problem supplied by Wilks, plus high expectations. In discussion, when a student, graduate or undergraduate, asked a question that betrayed that he not only was not following, but also was confused on matters which he had supposedly mastered, Sam immediately became deaf, and if the questioner persisted, first Sam couldn't understand the query, and finally in extremis something always interrupted the conversation before the question could be answered. He found it hard to say that anyone was mistaken. If forced, he might report that he could not quite understand the argument.

At a national level, his report on behalf of a committee on the state of instruction in statistics for the National Research Council ("Personnel and training problems in statistics," *American Mathematical Monthly*, Vol. 54, 1947, pp. 525-528) has had an important influence in the reorganization of the teaching of statistics in colleges and universities, as has his 1957 invited address, to the Mathematical Association of America, "Teaching statistical inference in elementary mathematics courses" (*American Mathematical Monthly*, Vol. 55, 1958, pp.143-153).

To continue with Wilks's contributions to education, his service on the College Entrance Examination Board's Commission on Mathematics 1955-58 must be mentioned. This group made major recommendations for the revision of the curriculum of secondary school mathematics (*Program for college preparatory mathematics*, Report of the Commission on Mathematics, College Entrance Examination Board, New York, 1959). He was a coauthor of the Commission's experimental book for secondary schools on probability and statistics, sometimes called the "gray book" (*Introductory probability and statistical inference for secondary schools*, 1957, New York; in keeping with Sam's preference for anonymity, but through an accident, the authorship of the volume was

omitted, and this error was not rectified until the 1959 revision; since then the work has been translated into Spanish by Professor Marta C. Valincq for the Comision de Educacion Estadistica del Instituto Interamericano de Estadistica Rosario (Rep. Argentina), 1961). After the completion of the Committee's work, he served on the Advisory Board of the School Mathematics Study Group (SMSG). During his final week of life he was considering how much of the following summer he should devote to writing on probability and statistics for SMSG.

For over thirty years, Wilks worked with the College Entrance Examination Board and with the Educational Testing Service (formed in 1948), advising on research design and analysis, on College Board score scaling and equating, on the development of mathematical tests at several educational levels, and on studies of mathematical education. In 1933 Professor Brigham and he worked on the scaling of the College Board achievement tests because of concern about year-to-year fluctuations in the percentage passing. From 1934 to 1941 he helped with studies of the reliability and validity of the reading of essays. In 1938 he prepared a general statistical report on the Mathematics Attainment Test. The NSF Study of High School Seniors and the survey Problems in Mathematical Education (1956) were among those he helped to plan. Again, the scaling and equating of tests demanded study, and for over two years Wilks met frequently with ETS staff members to solve problems leading to a report with both immediate and long range recommendations which have been and are being put into effect. Since then the same study group has taken up new problems, and Wilks met with them March 2, less than a week before his death. He served continuously as chairman of the GRE Mathematics test committee from 1950, and for many years he served as mathematics consultant to the Committee for the Preliminary Actuarial Examination.

He was instrumental in setting up a substantial number of quality control courses both during and after World War II, and, consequently, in making Princeton the site for an annual meeting of the Metropolitan Section of the American Society for Quality Control. World War II canceled his long planned and eagerly awaited sabbatical visit to the University of Chile in Santiago. But he did contribute to South American education as a member of an Advisory Committee to the University of the Andes in Bogota, Columbia during its formative years.

In 1950-51 he again did research at Cambridge University, this time on a Fulbright Research Appointment. In the spring of 1956, under the auspices of the Ford Foundation and the Carnegie Corporation of New York, he visited universities and other research centers in India, Japan, and Australia. In 1963-64 he spent part of his time on tour as a Visiting Lecturer in Statistics for the Institute of Mathematical Statistics. He toured Texas and Oklahoma as a visiting lecturer for the Mathematical Association of America in 1958-59. For both tours, he asked specifically for the Texas-Oklahoma area because of his long-standing interest in its scientific development. He was enthusiastically received wherever he went, and the requests for his visits far exceeded the number that could be satisfied.

Wilks was one of a small group of statisticians who organized the Institute of Mathematical Statistics in 1935 and who negotiated the arrangements transferring the *Annals of Mathematical Statistics* from the private ownership of its founder and first editor, Harry C. Carver, to the Institute. (The *Annals* for the first eight volumes was stated to be a publication of or an affiliate of the American Statistical Association,

depending on which volume one examines.) Thereupon Wilks took over the editorship of the *Annals* (serving from 1938 through 1949) and with it, in effect, the shaping of the long-run future of the Institute. In saying this I only echo Allen T. Craig's remarks in his short history of the Institute of Mathematical Statistics "Our Silver Anniversary" (*Annals of Mathematical Statistics*, Vol. 31, 1960, p. 837):

"Of the many achievements of the Institute, the one that is to me the greatest source of pride is the change in the stature of its journal, the *Annals*. In 1935 the list of subscribers to this journal consisted of the names of 98 libraries and 118 individuals. In accordance with the 1934-35 agreement, the Institute took over the publication of the *Annals* beginning with the June, 1938 issue. The first editor appointed by the Institute served from that time through December, 1949, and the present editor is the fifth to be appointed. An editor of a scientific journal bears a heavy responsibility. He can make or break a journal; and as a journal goes, so goes the organization that supports it."

Between classes, travels, committee meetings, and long-distance phone calls, one rarely could catch Wilks doing his own work, but a glimpse at him getting out final copy for an issue of the *Annals* may provide some insight. Since the Wilks family loved to give hospitality, on a typical evening a visiting fireman would have been encouraged to stay on for yet another train (because Sam had no plans at all for the evening) and the guest was finally taken to Princeton Junction about 10 P.M. As the train pulled out, Sam would begin to express uneasiness about the need to get out the next issue of the *Annals*. He would wonder whether he shouldn't spend a few minutes on that yet tonight, and conviction would grow in him that he should, indeed. He supposed that his graduate assistant would not care to join him because the hour was so late. Surely a half hour or so would do the whole thing. Driving to the office he would begin to list the dozens of little matters that needed attention. And finally after a furious half-night's work the packages would be mailed at the Princeton Post Office around 3 A.M. Next morning he was likely to be on the 7 A.M. to New York City. Probably he did a good deal of work in the morning as well, for he was an early riser.

In 1954, Wilks joined Walter Shewhart in editing the *John Wiley Series* in Statistics, one of the major publication efforts that has helped change statistics from a discipline with a few isolated books in 1931 to a field with a large, solid literature in 1964.

If we are to have a careful appraisal of the research contributions of S. S. Wilks, about forty papers, the time is not now and the place is not here, but some mention is in order. A complete bibliography is expected to appear in the *Annals of Mathematical Statistics*. A number of important papers grew from his interest in tests and measurements. For example, "Sample criteria for testing equality of means, equality of variances, and equality of covariances in a normal multivariate distribution" (*Annals of Mathematical Statistics*, Vol. 17, 1946, pp. 257-281) is motivated in part by the need to assess the equivalence of parallel forms of the same test. Similarly "On the independence of k sets of normally distributed statistical variables" (*Econometrica*, Vol. 3, 1935, pp. 309-326) attacks through the likelihood-ratio approach a multivariate analogue of the question of whether a correlation coefficient is zero. His numerical illustration studies whether measures of the two variables arithmetic speed and arithmetic power as a set are correlated with measures of the three variables intellectual, social, and activity interest taken as a set. "Weighting systems for linear functions of correlated variables when there is no dependent variable" (*Psychometrika*, Vol. 3, 1938, pp. 23-40), presents results that

deserve to be more widely known. Among these is the following, if the items on a test are assigned two sets of positive weights, each set drawn at random from a distribution, then under reasonable restrictions the correlation between the total scores resulting from the two weightings of the test is nearly unity. This knowledge can save a great deal of time; for example, if one is faced with a colleague who believes that one of ten approximately equally weighted items should be scored on the basis of 13 instead of 10, one can yield to him with the calm knowledge that Wilks's theorem on weighting assures that both parties should be satisfied, and by implication that the time otherwise spent in discussing the weighting might be better spent on careful grading.

By now the reader may have correctly deduced from the titles quoted that in scientific papers Wilks preferred titles that explain the content of the paper to those with only brevity or wit.

In "The likelihood test of independence in contingency tables" (*Annals of Mathematical Statistics*, Vol. 6, 1935, pp. 190-196), he derives the appropriate likelihood ratio test, points out that it uses the same order of approximation to the exact distribution under the null hypothesis as the ordinary chi-square test, notes, therefore, that it has as strong theoretical justification as the usual test, and points out that the log likelihood takes fewer operations to compute.

In "The large-sample distribution of the likelihood ratio for testing composite hypotheses" (*Annals of Mathematical Statistics*, Vol. 9, 1938, pp. 60-62) he derives the valuable and famous result that under the null hypothesis $-2 \log \lambda$ has asymptotically the chi-square distribution, with $h - m$ degrees of freedom, where h is the number of parameters in the distribution and m is the number of parameters whose values are specified by the null hypothesis. The paper is briskly written and hard to follow, no doubt because many pages of manipulation were skipped; possibly the fact that he presented it to the American Mathematical Society persuaded him to omit the details, but possibly his work for the Institute and the Editorship of the *Annals* had already begun to nip into the time he had for exposition. He developed the notion of shortest average confidence limits, and with J. F. Daly extended the idea to the estimation of confidence regions.

As a result both of his association with Walter Shewhart and of his interest in order statistics, he developed the notion of tolerance limits. He was able to construct a way of obtaining numbers (called tolerance limits) from a sample of size n that give a stated chance that the fraction of the true population contained between these limits is at least a given size, or the probability that at least M of N further measurements from the population fall within the limits. For example, the value of the smallest member (lower tolerance limit) in a sample of size 50 will be exceeded by at least 93 members out of a further sample of 100 from the same population, in 95% of the occasions. This idea was extended by Wilks and others in a number of publications. As areas of interest, order statistics, combinations, and distribution free methods might have seen more publications by Wilks, had he not encouraged his students so strongly in these fields. Some of his appreciation for the area is shown by his extensive expository address "Order statistics" (*Bulletin of the American Mathematical Society*, Vol. 54, 1947, pp. 6-50), an invaluable introduction.

As a mathematician, he found the relation of the mathematical community to the sciences and the nation a matter of intense concern. Like von Neumann, he feared that

the extreme separation of the more theoretical mathematicians from the applied ones and of the mathematical sciences from their fields of application, a noticeable trend in this country for some years, would weaken and sterilize the discipline. Thus he felt that mathematicians should take special pains to participate in important scientific events, such as an international geophysical year. But loss of vigor was not the only danger he envisaged. As long as the nation understood that mathematics was a huge body of theory and applications woven inextricably into engineering, sciences, and practical affairs, support for the whole institution would be forthcoming. But if the public were to get the mistaken idea that two kinds of mathematics exist, and that these could be recognizably separated into impractical, valueless theory and useful, valuable application, he feared that in the long run the public would wish to attempt to support only the latter and not the former, to the detriment of all concerned. And so along with many others he strove to publicize the notion of a single mathematics and to encourage the mingling of mathematicians of all kinds. His efforts to create and support the Conference Board of the Mathematical Sciences as well as his service as its Chairman represent one of his many activities in this direction. In the same vein his work as a member of the NRC (Physical sciences division 1947-49, Mathematics division 1951-57, chairman 1958-60) was part of the great struggle for unity and progress.

One might suppose, therefore, that he would be deeply concerned with the splintering of statistical organizations. He did want unity in statistics, but he saw the production by the American Statistical Association of a series of societies as a healthy sign of growth in statistics, especially since the ASA itself continued its own growth. Though the ASA was not alone in these developments, it fostered the Institute of Mathematical Statistics, the Biometric Society, the American Society for Quality Control, and if you care to stretch a point, the American Economic Association. Though he did not regard such a pattern as necessary, he thought it a likely pattern because it is always hard to satisfy “young Turks” in the old organization. And so he anticipated that further societies might develop unless the ASA could find ways to meet new developments within the organization, not always an easy matter with rising costs in the lengthy past and the foreseeable future. But he thought it most important that the statistical societies work together. In his obituary of Karl Pearson (*The Scientific Monthly*, Sept. 1941, pp. 249-253), Wilks called him Founder of the Science of Statistics. In our turn I think we may call Wilks Statesman of Statistics.

Beyond the societies already mentioned he belonged to the American Association for the Advancement of Science, Royal Statistical Society, American Mathematical Society, Mathematical Association of America, American Society for Quality Control, American Society for Human Genetics, Biometric Society, Econometric Society, Market Research Council, and Psychometric Society.

In Princeton, he was a member of the Nassau Club and in Washington, D.C., of the Cosmos Club.

While he enjoyed parties, he seemed not to care much for formal games. True, he played bridge very casually, but the games usually slowed to a halt either when Sam was called to the phone, or when he disarmingly asked his opponent a question on which the latter was a worldwide authority. Similarly, he took little interest in the trick problems that flow through every mathematical community. But simple games with a statistical flavor brightened his eyes, such as the match game where each individual conceals a

number of matches in his hand and also guesses the total number of matches the assembled players have concealed, the winner being the one with the closest guess. For a while, he found poker dice played for matches an amusing intellectual challenge.

Physically, always in good shape, he loved to walk at a brisk pace that left his puffier friends behind. He had a boyish pride in his knowledge of the subterranean tunnels of New York City and was disappointed if someone insisted on taking a taxicab instead of walking. His family in Texas recalled his frequent long, early-morning walks there. During the Thanksgiving vacation of 1963 he went for his first hunting trip since his youth, and his brother remarked upon the speed with which he negotiated the woods. He got his deer, too.

Though he was not basically an athletic fellow, he enjoyed a little contest at a party to see who could do the most push-ups. Many a contestant was chagrined to find that Sam had no trouble with the first 50. Perhaps that was a contributing factor to his appearance of extreme youth. He looked younger than many students who had taken their Ph.D.'s with him, and I believe it gave him some secret pleasure. He liked to do things with his hands, such as build furniture in his large basement shop, or repaint his own house. He and Stanley built an elaborate brick and flagstone backyard barbecue next to their vegetable garden, and many a statistician has enjoyed the steaks. In 1949, he was president of the Lawrenceville School Fathers' Association. In recent years, Gena was able to accompany Sam more frequently on his many trips, and thus committee life became a bit more bearable for them both.

[The first few sentences in the original article are published with a mix up in sentence structure. I have taken the liberty to rearrange them.] When he could, he loved to go deep-sea fishing, especially with his son. Indeed, late in the evening before he was to leave Palo Alto's Center for Advanced Study in the Behavioral Science after a pleasant stay, he discovered for the first time that he could go deep-sea fishing at nearby Princeton, California. He immediately changed his plans ("Gina, we're going to Princeton tomorrow, but not to New Jersey!"), and the tale is still told of Sam gaily fishing and smoking his great cigar in the prow of a severely tossing boat, while most passengers were afflicted with upset stomachs in the stern.

During World War II, S. S. Wilks was a member of the Applied Mathematics Panel of the National Defense Research Committee (OSRD). His help was constantly sought by Army and Navy officers, and by other scientists working on weapon design and use for the military services. Through his efforts, in association with Warren Weaver and other members of the Panel, leading American statisticians were organized into several "Statistical Research Groups" whose study and advice were available to improve weapon design and to aid in production tests (for example, sequential analysis was developed by Abraham Wald while he was a member of the Statistical Research Group of Columbia). American efforts in Operations Research benefited extensively from his contributions. Indeed he was tireless in making his statistical insight and experience available in support of the American war effort. Wilks directed the Statistical Research Group of Princeton University which solved problems for both the Army Air Force and the Navy. In 1947, he was awarded the President's Certificate of Merit for his war-time contributions toward antisubmarine warfare and the solution of convoy problems.

His services were widely sought as an advisor to governmental agencies and research organizations, and he rarely refused an assignment. To mention a few posts, he was a

member of the United States National Committee for the United Nations Educational, Social, and Cultural Organization, and of the Mathematics Committee of the Department of the Army.

Wilks was a “charter member” in 1951 of the American Statistical Association’s Advisory Committee on Statistical Policy to the Office of Statistical Standards of the Bureau of the Budget. He had attended an all-day meeting of that Committee in Washington, D.C. two days before his death and a witness says[,] “displayed there the characteristic personal charm, keen perception, and dynamic intellect that had always won friendship and recognition for him among his associates.”

In the Federal Government he worked effectively with and for at least three widely separated parts of the Executive Office of the President; in the Office of Science and Technology, for example, he was, at the time of his death, a member of task groups under two panels concerned with quite different problems. In the Department of Defense and in many, if not all, of the statistical agencies, he advised often and on many subjects. He was for a long time a trusted consultant and advisor to the National Security Agency.

He served the National Science Foundation from 1951 through 1955 as a member of the Mathematical, Physical Sciences, and Engineering Division, and from 1957 through 1962 as a member of the Division Committee of the Social Science Division (it became a division in 1960). From 1948 through 1963, he served on the Selective Service Scientific Advisory Committee, which developed the present deferment system for college students. As a member of a “task force” of the Hoover Commission, he aided in the study of the statistical agencies of the Federal Government, work which led to major policy recommendations for the development of federal statistics. For many years Wilks was secretary of the Committee of Applied Mathematical Statistics of the National Research Council. Through his belief in the potential value of the finished product, his appreciation of the magnitude of the task, and the need for its support, a major contribution to statistics sponsored by the Committee was finally achieved in the recent *Guide to Tables in Mathematical Statistics* (J. Arthur Greenwood and H. O. Hartley, Princeton University Press, 1962).

The list of his committee memberships for professional societies is lengthy; a short search in one society locates over 50. A recent one of considerable importance to statistics is that on the American Statistical Association’s Committee on the Relationships Among Statistical Societies, which has led to the formation of the highly successful Committee of the Presidents of Statistical Societies (COPSS). Through COPSS, he finally succeeded in having created, in the last year of his life, a National Committee on Statistics which he envisaged as serving a role for statistics comparable to that performed for the physical sciences by sections of the National Academy of Sciences.

Recruitment concerned him also, and he was the Chairman of the IMS Representatives on the Joint ASA-IMS Brochure Committee, under whose auspices the booklet *Careers in Statistics* was successfully produced, so successfully that Bernard Greenberg is bringing out a new revised edition, news that pleased Sam in January. Fortunately, prophets are occasionally honored at home, and so as a member of the Faculty at Princeton, he was more frequently called upon for advice by Princeton’s administration than most of his colleagues knew or suspected.

Just the thought of “trouble” or friction between people or organizations upset Sam considerably. Since he was sensitive to the feelings of others and had his fingers on so many pulses, he was often able to prevent difficulties by taking extensive preventive action usually in the form of lengthy long distance phone calls as well as letters and meetings. But much as he disliked trouble, when it came he was often in its midst trying to straighten matters out. For example, he was the President of the American Statistical Association who was asked to appoint a committee to appraise the statistical methods of the Kinsey Report. He was the chairman of the Social Science Research Council’s Committee on Analysis Pre-Election Polls and Forecasts that investigated why the major public opinion polls erroneously predicted the outcome of the 1948 Dewey-Truman presidential election. There was fear at the time that the forecasts might discredit in the public eye the contributions of survey research. Sam took the lead in the preparation of a careful report. The report of the committee, *Pre-election polls of 1948*, (SSRC, New York, 1949), led to improved research and the development of better techniques as well as a clearer understanding of the special difficulties of pre-election forecasting in this country. Again he was a member of the National Academy of Science’s Committee on Battery Acids appointed by Secretary of Commerce Weeks to appraise the work of the National Bureau of Standards in the famous battery additive case. A manufacturer of an additive designed to lengthen the life of an automotive battery charged that the National Bureau of Standards had erroneously dismissed his claim for the value of the additive, and in the resulting political and newspaper furor, the competence and scientific integrity of the Bureau were challenged. The committee reported that the National Bureau of Standards had acted appropriately and with scientific care.

Why was Wilks so much in demand as a committee man? For one thing he always took his assignments seriously and worked at them until some positive result emerged. His attendance record was excellent. While he liked a good joke, he was never witty at the expense of another. Did a draft need to be written? Yes, if no one else wanted to do it, Sam would take a pass at it. No, he didn’t care who polished it or revised it, nor did he see any real need for his name to be on it. Then too he was a one-man liaison team. When no one knew what program X was about, and the chairman asked for information, if no one else volunteered, Sam would explain that he did not know either, but that it went “something like this,” and soon it would turn out that Agencies A, B, and C had formed two committees with three programs, and program X was one of these; then its four-point plan would be quickly stated together with the names of important persons connected with it, all brought out with as much help from the audience as Sam could persuade them to give, because he was sure that Joe, there, knew much more about it than he did.

Wilks rarely talked at meetings unless he had a point to make. When he had a message, he tried to restrict himself to one point which he explained with considerable care and, if necessary, hammered away at [it] throughout the meeting. He may have felt that one major point per meeting was as much as a man could hope to get across.

Since 1945 Wilks has served the Social Science Research Council (SSRC), an organization founded in advance research in the social sciences. Seven societies elect members of SSRC, including the American Statistical Association. The SSRC is not a foundation, but its funds usually come from foundations. Some of its major tasks are to recognize the needs for, to develop, and sometimes to administer programs that will aid

the training of scientists, promote new fields of research, and relate people and organizations in the context of research problems and the public interest. The SSRC itself has many committees and tasks. Wilks's average number of jobs held per year over the 18 years is 2.7, with a minimum of 0 in 1960, maximum of 5 in three other years. He was Chairman of the Board of Directors in 1954-[5]5, of the Committee on Problems and Policy in 1952-54, and of the Executive Committee from 1961 until his death. On the research side he served the Joint Committee on Measurement of Opinion, Attitudes and Consumer Wants (NRC-SSRC) from 1945-54 as vice-chairman. The officers of SSRC feel that while Sam's willingness to work and his quick aid in a crisis have been valuable assets to SSRC, of the greatest significance has been his steady success over the years in building closer ties among the disciplines both in the social sciences and in the natural sciences where the approach and skills of the mathematician provided connecting tissue. By his own work and by his encouragement to others he was truly a statesman for the social sciences. They say that he was ready to work not only on the challenging intellectual questions at the frontier of research; he also gave generously of his time to dealing with the mundane administrative problems that are so crucial to the advancement of the social sciences.

The Russell Sage Foundation was also fortunate to enjoy Wilks's services as a member of the Board of Trustees from 1953 and as a member of its Executive Committee from 1955 until his death. Wilks was deeply interested in the efforts of the Foundation to promote productive working relations between the social sciences and the practicing professions. His wide knowledge and understanding of the problems of the application of scientific theory and research, and his rich personal experience in this field, made him an invaluable critic, guide, and counselor in all aspects of the Foundation's program. No *pro forma* member, he spent many hours beyond the call of duty in the careful scrutiny of programs, projects, and manuscripts as well as in the consideration of projected plans. The Board and staff found him to be a warm and trusted friend whose memory will long be treasured.

Among his many honors were his presidency of the American Statistical Association in 1950, with Presidential Address on "Undergraduate statistical education" (*J. Am. Stat. Assn.*, Vol. 46, 1951, pp. 1-18), and he was president of the Institute of Mathematical Statistics in 1940, as well as its Rietz Lecturer in 1959 (The problem of two samples from continuous distributions). He was a member of the American Philosophical Society and in 1963 was elected to the American Academy of Arts and Sciences. He was a member of the International Statistical Institute. In 1947 the University of Iowa honored him with one of its Centennial Alumni Awards.

Obviously many individuals and organizations have helped the author prepare this material; their instant response, their attitude that it was a favor to be asked, present active testimony to the high esteem in which Samuel S. Wilks was held; had there been more time, more would have been asked.

The funeral service for Samuel S. Wilks was held at Denton, Texas, March 11 [1964]. The honorary pallbearers were Frank Anscombe, Henry Chauncey, Churchill Eisenhart, Luther P. Eisenhart, Irwin Guttman, Pendleton Herring, Solomon Lefschetz, Frederick Mosteller, Walter Shewhart, Albert W. Tucker, John W. Tukey, John Turkevich, and Donald Young. He was buried at Little Elm Cemetery near Little Elm, Texas. A

Princeton University memorial service is planned for 12:45 p.m. Sunday, April 19, 1964 at the Princeton University Chapel.

Professor Wilks leaves his widow, Gena Orr Wilks, a son, Stanley N. Wilks of Washington, D.C. , two brothers, Syrrel S. Wilks of San Marcos, Texas, and William W. Wilks of Denton, Texas, three granddaughters and a host of friends.

Retyped/keyed by Pat McClellan February 2004 for inclusion on the American Statistical Association's Statisticians in History page at <http://www.amstat.org/about/statisticians/>