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VIRGINIA TECH DEPARTMENT OF STATISTICS: THE FIRST FIFTY YEARS

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Deciding what to include in this paper has been very difficult since there is so much that one could discuss concerning the development of statistics at Virginia Tech. I would like to acknowledge the report written by Boyd Harshbarger in 1972 after stepping down as department head. The report is an unpublished monograph titled STATISTICS and PERSONAL REMINISCENCES, VPI & SU, 1927–72. I have borrowed considerably from this report for early facts and incidents related to the early years of the department. These early years give, I believe, a good picture of how the department developed.

Though the department is celebrating its fiftieth anniversary, statistics activities at VIRGINIA TECH that are related to Boyd Harshbarger actually started much earlier. We will therefore begin our review of the history in 1935, fourteen years before the formal beginning of the department.

The presentation will be broken into three time periods consisting of the EARLY YEARS (1935–1972), the MIDDLE YEARS (1973–1999), and the FUTURE ERA (1999–infinity).

Keywords: History; statistics; anniversary

THE EARLY YEARS (1935–1972)

In 1935 Boyd Harshbarger taught his first course in statistics in the department of mathematics at what was popularly know as **VPI**. He had earlier taken a statistics course during pursuit of his M.S. degree in mathematics at the University of Illinois. In 1940 Harshbarger obtained a Rockefeller Fellowship and left VPI for further graduate work at George Washington University and Iowa State College. The distinguished Professor W. G. Cochran supervised his dissertation.

After completing his Ph.D. degree, Dr. Harshbarger returned to VPI in 1942. He then organized mathematical statistics courses for the Mathematics department and applied statistics courses for the Agriculture Economics department. A statistics option was offered jointly by the two departments.

According to Dr. Harshbarger's monograph, the second statistics faculty member hired at VPI was Professor T. A. Bancroft. He was hired in June and then resigned to return to Iowa State university in September. The replacement for Professor Bancroft was Dr. Dan DeLury from Toronto.

In 1947 the first Regional Statistics Summer Session in the United States was held at VPI. This was a joint effort with Iowa State, North Carolina State, the Survey Center of the University of Michigan and the U.S. Department of Agriculture. The conference was a huge success with over one hundred students registering from thirty-seven states and six foreign countries. The distinguished faculty were as follows:

Earl Houseman, Bureau of Agricultural Economics of the U.S.D.A.
Raymond Jessen, Professor at Iowa State
Maurice Kendall, University of London
Walter Hendrick, Bureau of Agriculture Economics of the U.S.D.A.
Renis Likert, Survey Research Center at the University of Michigan
H. L. Lucus, Professor at North Carolina State
George Snedecor, Professor at Iowa State
George Brown, Professor at Iowa State
R. C. Bose, Indian Statistical Institute
Boyd Harshbarger, Professor at Virginia Polytechnic Institue.

The courses offered at this 1947 summer session and their respective instructors are given below.

1. Statistical Methods – Snedecor
2. Design of Experiments – Lucus
3. Schedule Design and Interview Techniques for Sample Survey – Likert
4. Sampling Design and Analysis – Housman and Jessen
5. Mathematical Theory of Sampling – Hendrick
6. Mathematical Statistics – Brown
7. Experimental Design – Bose
8. Engineering Statistics – Harshbarger

In addition to the distinguished faculty there was a very distinguished list of seminar speakers at this conference. They included M. G. Kendall, G. W. Snedecor, Gertrude Cox, W. F. Callendar and W. E. Deming.

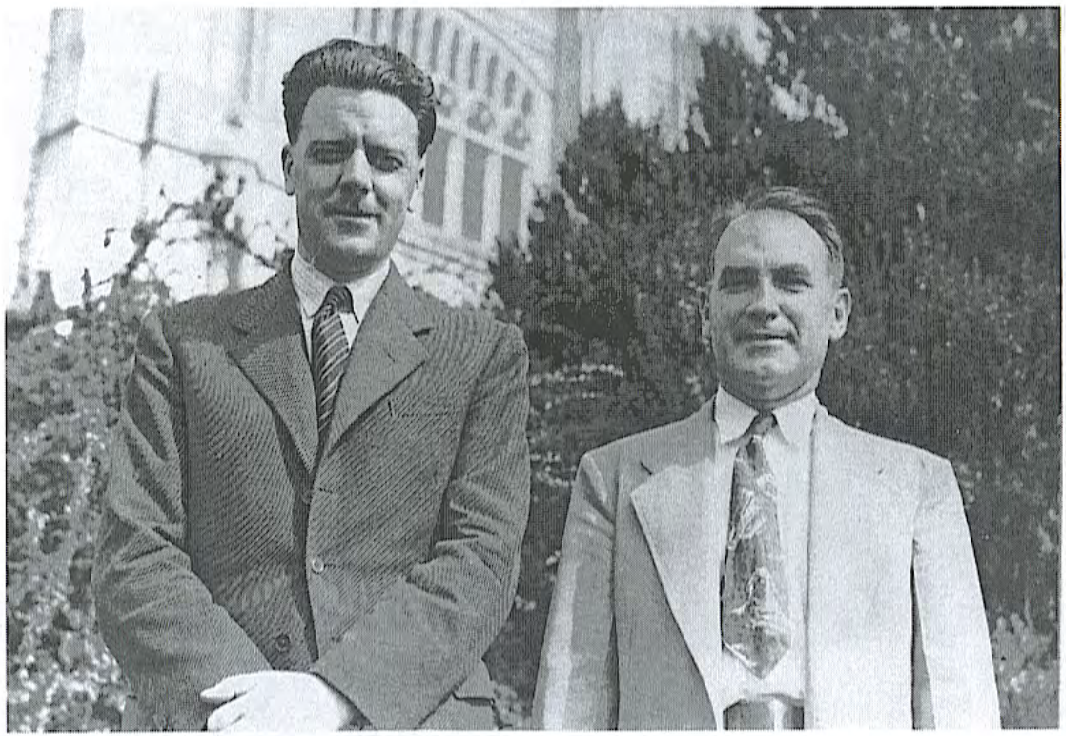
The list of faculty and speakers at this first summer conference was almost a Who's Who in statistics at the time. The following three pictures show some of these summer conference faculty members. The first Picture (1) shows Boyd Harshbarger, George Snedecor, Helen Boscovich, M. G. Kendall and a person unidentified. The second Picture (2) taken at about the same time is of Boyd Harshbarger and M. G. Kendall. Picture (3) is of Professor Harold Hotelling and Boyd Harshbarger.

There were several interesting incidents that happened during the 1947 summer session. The first was that the Atomic Energy Commission had sent two of their employees to the summer session. They were required to report daily on their activities. One weekend one of the men had to return to Oak Ridge Tennessee. When he failed to report in on Monday morning the FBI and the Virginia and Tennessee state police were alerted and the buildings and grounds of VPI were searched. It happened that the gentleman left Oak Ridge at night and stopped in a parking lot to sleep and did not arrive until noon on Monday. The second incident was based on the fact that a Russian spy was a student attending the session and was not discovered until after the summer session. He left a forwarding address that turned out to be a vacant lot in New York City. The FBI said that they had been trailing him for some time and that the information he gave to the college had been forged.

After the successful summer session, momentum toward a formal department of statistics picked up. In 1948 the Statistics Section and Statistical Laboratory was organized with a separate budget in the university's Agriculture Experiment Station. Shortly thereafter, in 1949, a separate department offering an M.S. degree in Statistics was approved. The department was housed in the College of Arts and Sciences. In this same year Milton Terry was hired as a new faculty member. Dr. Terry came to VPI from the University of North Carolina.

In 1950 Ralph Bradley and David Duncan were hired to bring the faculty size to four (Harshbarger, Terry, Bradley, Duncan). The formal approval of the Ph.D. program came in 1951. The first M.S.

PICTURE 1 Professors Harshbarger, Snedecor, Boscovich, Kendall and Unidentified. (*Courtesy of the Department of Statistics at Virginia Tech, Blacksburg, Virginia*).



PICTURE 2 Boyd Harshbarger and M. G. Kendall. (*Courtesy of the Department of Statistics at Virginia Tech, Blacksburg, Virginia*).

PICTURE 3 Harold Hotelling and Boyd Harshbarger. (*Courtesy of the Department of Statistics at Virginia Tech, Blacksburg, Virginia*).

and Ph.D. degree recipients, after formal approval of the graduate degree programs, were Edwin L. Cox, M. S., 1949 and R. Lowell Wine, Ph.D., 1955, respectively.

The 1951 VPI catalog showed a typical M.S. program for the department. The college was on a trimester system then. The program shown in the university catalog is given below.

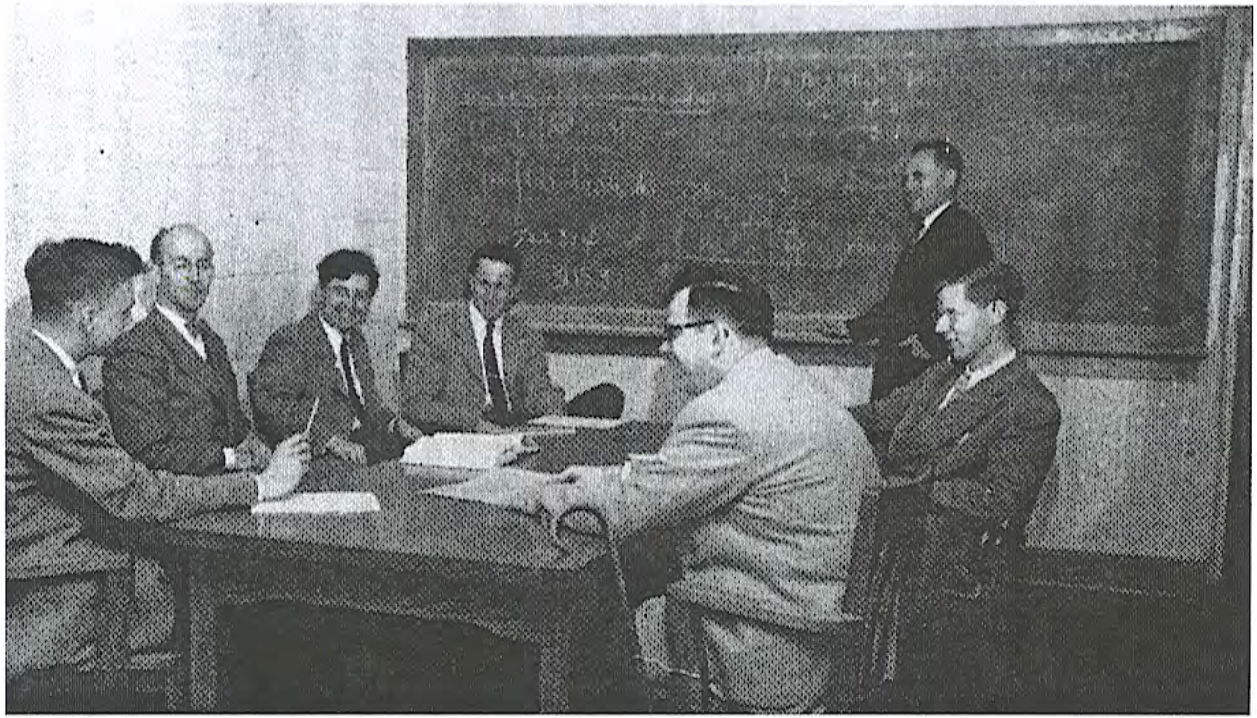
M.S. Program, 1951 Catalog

FIRST GRADUATE YEAR	I	II	III
Stat. 410–420–Statistical Methods or Stat. 516–526–Engineering Statistics	3(3)	3(3)	–
Stat. 505–Probability	3(3)	–	–
Stat. 503–Statistical Inference	–	3(3)	–
Stat. 504–Theory of Least Squares	–	–	3(3)
Stat. 402–Sampling or Stat. 403–Experimental Design	–	– 3	3(3)
Stat. 514–524–Research and Thesis	–	3(3)	6(6)
Math.503-Introduction to Modern Algebra	3(3)	–	–
Math. 512–522–Complex Variables	–	3(3)	3(3)
Electives (to include 3 hours in statistics)	(6)	(3)	–
Credits each quarter	(15)	(15)	(15)

The following two pictures show the faculty in 1953 (Picture 4) and 1955 (Picture 5), respectively. As can be seen, the faculty size increased rapidly during those years.

All of these gentlemen had distinguished careers but I would make special mention of a few. Ralph Bradley left VPI after about ten years to start a new department at the Florida State University. He also served later as President of the American Statistical Association. David Duncan was a prolific researcher who gained fame for his paper on multiple comparisons. Clyde Kramer's extension of Duncan's work was also widely used world-wide. John Freund was highly regarded for excellent textbooks.

A summary of the early faculty appointments is given in the following table. We also indicate the prestigious Horsley Award winners. These awards are given by the **Virginia Academy of Science** for the most outstanding research paper in the Commonwealth of Virginia. The statistics department has won this award more than its fair share.



PICTURE 4 (Faculty, 1953) R. A. Bradley, D. B. Duncan, M. C. K. Tweedie, P. G. Sanders, C. Y. Kramer, T. Russell Boyd Harshbarger. (*Courtesy of the Department of Statistics at Virginia Tech, Blacksburg, Virginia*).

PICTURE 5 (Faculty, 1955) Staff of the Department of Statistics: R. Bradley, L. Wine, H. Sweeny, T. Russell, W. Thompson, J. Freund, M. C. K. Tweedie, C. Kramer, P. Somerville, Boyd Harshbarger. (*Courtesy of the Department of Statistics at Virginia Tech, Blacksburg, Virginia*).

Early faculty appointments (up to 1962): Department of Statistics

Dr. Boyd Harshbarger*	1935–1976	Dr. Paul Minton	1955–1956
Dr. T. A. Bancroft	1944	Dr. Rudolph Freund	1955–1962
Dr. Dan DeLury*	1945–1947	Dr. Lowell Wine	1955–1956
Dr. Milton Terry	1949–1952	Dr. Willard Ash	1955–1957
Dr. Ralph Bradley*	1950–1959	Mr. Charles Clunies-Ross	1956–1958
Dr. David Duncan*	1950–1954	Dr. H. A. David*	1957–1964
Dr. Clyde Kramer	1951–1981	Dr. James Duffett	1957–1959
Dr. M. C. K. Tweedie*	1952–1956	Dr. David Hurst	1957–1965
Dr. W. A. Thompson	1953–1955	Dr. Rolf Bargmann	1958–1961
Dr. Paul Somerville	1953–1955	Dr. Geoffrey Watterson	1959–1962
Dr. Hale Sweeney	1953–1955	Dr. John Saw	1961–1965
Dr. Thomas Russell	1953–1956	Dr. Leonard Shenton	1962–1965
Dr. John Freund	1954–1957	Mr. Whitney Johnson†	1962–1964

* Horsley Award Winner.
† First director of University's Computing Center (1966).

In 1957 the Bachelor of Science degree in statistics was approved. The department was one of the first to place an emphasis on the B.S. program. It was typical of early departments to have graduate programs before undergraduate programs.

Professor Harshbarger was a proponent of joint appointments in departments outside of statistics. Those have been in the School of Forestry, Economics and Agriculture Economics. An interesting story related to joint appointments was in regard to the possible appointment of a new assistant professor jointly with Forestry. One of the faculty members questioned Dr. Harshbarger about the qualifications of an applicant, pointing out that the applicant had never even had a course in foresty. Dr. Harshbarger quickly said that it was a perfect fit because the applicant's father was in the lumber business (His father built houses).

The statistics department at VPI played a major role in the development of statistics in the South. These activities were developed through the Southern Region Education Board (SREB) Committee on Statistics. The fourteen southern states from Maryland to Texas organized to promote graduate programs in the South. One such activity was the annual Graduate Summer Sessions held by the various major programs so that graduate students from any southern school could obtain good courses that could be credited on the program of study at their home institution. These were outstanding courses taught by outstanding people. The first such summer session was

held at VPI in 1954. The sessions for the first several years were held at the following institutions:

1954, Virginia Polytechnic Institute
1955, University of Florida
1956, N. C. State University
1957, Virginia Polytechnic Institute
1958, Oklahoma State University
1959, N. C. State University
1960, University of Florida
1961, Virginia Polytechnic Institute
1962, Oklahoma State University
1963, N. C. State University
1964, Virginia Polytechnic Institute
1965, Oklahoma State University
1966, University of Georgia
1967, Virginia Polytechnic Institute.

Professor Harshbarger was very instrumental in the SREB Committee serving as its first Chairman. The original Committee on Statistics consisted of Harshbarger (Chairman, 1955–1959), Gertrude Cox (N. C. State), E. B. Brown (Georgia), G. E. Albert (Tennessee), Dana Card (Kentucky), T. W. Hildebrandt (Oak Ridge Labs), Carl Marshall (Oklahoma A & M), Herbert Meyer (Florida), George Nicholson (North Carolina), John Stockton (Texas) and Rutledge Vining (Virginia).

In 1972 Dr. Harshbarger resigned as head of the department of statistics. Professor Clyde Kramer served as interim head for the next seven months. A summary of the early years under the leadership of Dr. Harshbarger is given below:

- Harshbarger's organizing the department
- Successful first summer sessions in statistics
- Distinguished early faculty appointments
- Heavy faculty turnover
- Relative emphasis of theoretical *versus* applied statistics remained rather constant in graduate program
- Administration of department was with an iron hand but in a benevolent way

- Harshbarger frequently called congressmen when help was needed for visa's, *etc.*
- Brought in one of the university's first University Distinguished Professors.

THE MIDDLE YEARS (1973–1999)

In 1973 Professor Jesse Arnold was appointed the second head of the department of statistics. This represents the beginning of the post Harshbarger years. One significant program change in the early 1970's was the establishment of the departmental **Statistical Consulting Center**. Up until this time the consulting service offered by the department was largely only for the College of Agriculture and the Agriculture Experiment Station. The department decided to expand the consulting services across the university and to involve all departmental faculty and graduate students. In addition to the service offered to researchers at the university, a major concern was to develop a program to train graduate students in consulting. Professor Raymond Myers became director of the center in 1974. The consulting center has been very active as can be seen from the following table.

Department of Statistics Consulting Center

Year	*Hours*	*Projects*
1983	7180	635
1984	5046	774
1985	3087	491
1986	3555	510
1987	3298	502
1988	4237	542
1989	3388	509
1990	2646	475
1991	2092	437
1992	1959	417
1993	3470	606
1994	2521	240
1995	2652	200
1996	3012	254
1997	4999	338
1998	5657	336

PICTURE 6 (Standing) Jerry Mann, Clyde Kramer, Jack Good, Marvin Lentner, Larry Lee, Jesse Arnold, Marion Reynolds, Don Jensen, Ray Myers, Dick Krutchkoff, Klaus Hinkelmann; (seated) A. Katiyar (visitor), Walt Pirie, Tom Bishop, Keith Lee, Bob Schulman, Eugene Seneta (visitor). (*Courtesy of the Department of Statistics at Virginia Tech, Blacksburg, Virginia*).

The following Picture (6) shows the departmental faculty during the 1976–1977 academic year. Of the 15 tenure track faculty members shown, all except three spent or will spend all or most of their professional career at Virginia Tech.

In honor of Boyd Harshbarger, the department established the **Boyd Harshbarger Library** within the department in 1976. It is maintained with up-to-date copies of major journals and reference books.

Professor Klaus Hinkelman was appointed the third head of the department in 1982. In 1984 the **Sir Maurice Kendall Library** was established in the department and furnished with Kendall's personal library which he donated to the department upon his untimely death. Professor Kendall had a long association with the department. During his last visit he indicated that he had visited VPI, in various capacities, fourteen times. The departmental computing laboratory was established in 1985. This facility was partially funded by NSF.

In 1993 Professor Marvin Lentner was appointed the fourth head of the statistics department. During 1995–1997 there were substantial upgrades in departmental computing facilities for students, faculty, and staff.

The "Middle Years" ended June 30, 1999. A summary of the major accomplishments follows.

- More departmental structure for governance, graduate student policies, graduate and undergraduate administrators appointed
- Consulting center changed to train graduate students and to become available to entire university
- More emphasis on undergraduate program
- Harshbarger and Kendall libraries established
- Greater faculty stability than in early years
- Computing laboratory established
- Loss of some positions due to state budget cuts
- Greater departmental computing resources
- Larger proportion of Ph.D.'s going to industry.

The department has had a wonderful group of distinguished speakers at our colloquium series over the years. The list looks like a Who's

Who in Statistics as indicated from the partial list given below.

R. L. Anderson,
University of Kentucky
David Blackwell,
University of California
R. C. Bose,
University of North Carolina
George Box,
University of Wisconsin
W. J. Cochran,
Harvard University
Jerome Cornfield, NIH
Gertrude Cox,
North Carolina State
W. E. Deming, Census Bureau
Churchill Eisenhart,
Bureau of Standards
Walt Federer, Cornell University
D. J. Finney,
University of Edinburgh
Sir Ronald Fisher, England
H.O. Hartley,
Texas A & M University
Harold Hotelling,
University of North Carolina
Allen T. James,
University of Adelaide
Oscar Kempthorne,
Iowa State University
Sir Maurice G. Kendall,
University of London
Marcel Neuts,
Purdue University
Edwin J. G. Pitman,
University of Tasmania
Maurice Quenouille,
Univ. of South Hampton
Joan Rosenblatt,
Bureau of Standards
George Snedecor,
Iowa State University
John Tukey, Princeton University
Geoffrey Watson,
Princeton University
W. J. Youden,
Bureau of Standards.

During the fifty years of the department there have been many outstanding graduates who have been extremely successful. The department has produced 430 B.S. degree graduates, 546 M.S. degree graduates, and 256 Ph.D. degree graduates. A complete list of departmental graduates at all levels is published in **The Institute of Mathematical Statistics Bulletin, Vol. 28, No. 4, 1999, pp. 277–286**. There have been 32 Fellows of the American Statistical Association among our graduates and many department heads in academia.

To recognize outstanding performance among our students, the department has established several awards that are given each year.

UNDERGRADUATE AWARDS

Whitfield Cobb – Scholarship
Clyde Kramer – Undergraduate Service Award
Statistics Club Professor of Year – Student Award.

GRADUATE AWARDS

Boyd Harshbarger – First Year Scholarship
Jesse Arnold – Graduate Student Teaching Award
Klaus Hinkelmann – Graduate Assistant Award.

The department has had many successes, most of which have come through individual faculty recognitions. A summary of some of these achievements follows:

- Graduates are in great demand and have always made the department proud
- Faculty have been achievers throughout the department's history through editorships, offices in professional societies, national awards, research, elected fellows of **American Statistical Association**, the **Institute of Mathematical Statistics**, and the **International Statistical Institute**
- Good elected to the **American Academy of Arts and Sciences** and given the **Computer Pioneer** award
- Many **Horsley Award** winners over the years
- Commendation letters from the Commonwealth for study of Kepone in the Chesapeake Bay
- Myers recipient of the **Virginia Professor of the Year** and the **Shewhart Award**
- Myers and Vining recipients of the **Brumbaugh Award**
- Reynolds recipient of the **Brumbaugh Award** and the **IIE Transaction Best Paper award**.

FUTURE ERA (1999 – INFINITY)

On July 1, 1999 Professor Geoff Vining was appointed the fifth department head of the department. He is also the first head who was a

previous graduate of the department. This administration will lead the department's entry into **Y2K.** The department has a large number of recent and near-future retirements (about one-half of faculty). The department will develop in the immediate future with many new faces. The new and continuing faculty suggests that the future will indeed continue to be one that alumni and the profession will be proud to recognize.