

HARRY C. CARVER, 1890-1977¹

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Harry Clyde Carver, a pioneer and a leader in the development of mathematical statistics in the United States, died on January 30, 1977 in Ann Arbor, Michigan. He was the founder and, for eight years, the editor of the *Annals of Mathematical Statistics*.

Professor Carver was born on December 4, 1890 in Waterbury, Connecticut. He attended the local high school and then the University of Michigan, graduating with a B.S. degree in 1915. At that time, James W. Glover was developing the program in actuarial science which still flourishes in the University of Michigan and he decided that he should add courses in probability and statistics to that curriculum. In 1916 he brought Carver back to the University as an instructor in mathematics to offer such courses. Carver had already done actuarial work for three insurance companies and, at first, his statistics courses were primarily oriented toward actuarial applications. But in the 1920's there were just two schools in the United States where a program in mathematical statistics was offered, the University of Michigan and the State University of Iowa where Professor Henry L. Rietz was giving such instruction.

Carver became an assistant professor in 1918, an associate professor in 1921 and a professor in 1936. The program in mathematical statistics and probability was expanded and the enrollment grew. The staff was increased with Cecil C. Craig and Arthur H. Copeland being added in the early 30's and Paul S. Dwyer in the late 30's. Carver was the thesis director for ten students who earned doctor's degrees in mathematical statistics at Michigan. The last of these doctorates was granted in 1941. After that his main interest became aerial navigation.

By 1930 Carver had become concerned by the fact that the *Journal of the American Statistical Association*, then the only scholarly publication in the United States devoted to statistics, was closed to papers with any real mathematical content, and he decided to start a journal in which papers on mathematical statistics could be published. This was truly a courageous and pioneering venture for at that time there were only a few workers in this field in this country. Not only did Carver edit the new journal, but he personally assumed the financial responsibility for it, and he met considerable deficits out of his own pocket. He did have support from his close friend, J. W. Edwards, the founder of Edwards Brothers, who was developing the lithoprinting process which he used in printing the new publication. The *Annals of Mathematical Statistics*, as it was

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¹ A picture of H. C. Carver can be found in the December 1961 issue of the *Annals of Mathematical Statistics* which was dedicated to him.

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named, survived and gradually gained circulation and scholarly recognition. In 1938 it became the official journal of the young Institute of Mathematical Statistics, which assumed the responsibility for it, and Carver turned the editorship over to Samuel S. Wilks. The 1961 volume of the *Annals* was dedicated to Carver in recognition of his service.

In 1935 Carver had a leading part in the founding of the Institute of Mathematical Statistics which took place during meetings of mathematical societies in Ann Arbor. His students and those of Rietz were the backbone of the new society.

Carver was a truly inspiring teacher who transmitted his enthusiasm for his subject to his students. He was particularly good at devising short cuts and in using symbolic methods. He did not always follow a set schedule of topics that might be expected to make up a given course; instead he might devote a good part of a semester to discussing with a class a line of investigation he found interesting.

One of Carver's earlier tasks was the assistance he gave James W. Glover in his preparation of "Tables of Compound Interest Functions and Logarithms of Compound Interest Functions" published in 1921. He became much interested in the theory of frequency functions and, among other things, this resulted in the chapter on "Frequency Curves" in the "Handbook of Mathematical Statistics" edited by Henry L. Rietz (1924) and in the set of tables for the Pearson Type III function prepared by Luis R. Salvosa as a part of his doctoral dissertation and later included in *Statistical Tables*, edited by Carver (1940). A later major interest was in sampling from finite populations in which the expected values of sample moments were developed as direct concise linear functions of population moments. This led to two papers in the *Annals* and was pursued by his students, most notably by Paul S. Dwyer.

He was one of the first persons in the University or anywhere else to see the potential usefulness of what were then called Hollerith tabulating machines, and he was responsible for the first installation in about 1925 of what became IBM equipment in the University of Michigan. This was under his supervision in a room across the corridor from his office.

As an outgrowth of his enthusiasm for flying, during World War II he turned his attention to methods of aerial navigation and to the teaching of that subject. From 1950 to 1953 he analyzed the instruction given by the Air Training Command, devising new methods of navigation and of teaching navigation. In 1954 he was given a citation and the Exceptional Service Award by the United States Air Force. In 1943 he had published *Air Navigation* which greatly improved existing methods, and in 1955 this was followed by "Distance and Azimuth Computations" for use in the U.S. Air Academy. At the retirement dinner in his honor in 1961, he was awarded the Decoration for Exceptional Civilian Service, the highest decoration given to a civilian by the Air Force in peace time.

He became a Fellow of the American Statistical Association, of the Institute

of Mathematical Statistics and of the Casualty Actuarial Society. He was also an Honorary Member of the Czechoslovakian Statistical Association. He served in a number of faculty and administrative positions in the University, and he was also, for a term, the president of the Ann Arbor Fire and Police Pension Board.

From his high school days on he was always intensely interested in motorized transportation. First, he turned to motorcycles on which he took part in races. In the 1920's he was buying used automobiles, rebuilding them himself, and then driving them fast and skillfully. In the days before paved roads with road signs he saw the Michigan track team off on the train in Ann Arbor and then was waiting for them when they arrived in Chicago. In the 1930's he and his wife used to drive almost nonstop to California, the one sleeping in the back of the car while the other drove. Also in the 1930's, he turned to aviation and soon was flying a plane he owned in partnership with a friend.

By 1942 he had become interested in the methods of aerial navigation, and he applied for admission as a regular cadet in the Air Corps Advanced Flying School in Kelly Field, Texas. Although he lacked a year of being twice the maximum age for admission, he was accepted and he went through the regular training regimen, living with the cadets and taking part in all of their scheduled activities. We have already noted the very substantial contributions he made to science of aerial navigation.

In 1944-1945 he served as Operations Analyst with the Eighth Air Force in England. His chief assignment was the assessment of the effectiveness of the bombing raids carried out by his unit. He was, thus, one of the first to engage in operations research.

Carver was a natural athlete with unusual physical coordination. As an undergraduate he won his letter as a half-miler on the Michigan track team. For years after graduation he regularly worked out with the cross country team. He was a very good golfer who could take a single club, a five iron, and beat ordinary players with it.

This coordination extended to unusual skill at billiards and pool. It is said that when he first arrived in Ann Arbor he was rather a diamond in the rough, and the habitués of the principal billiard hall near the campus thought he should be ripe for the plucking. They were disillusioned for he was good enough at pocket billiards to have made his living at that game had he so chosen. He twice played in the finals of the Western Conference (Big Ten) Faculty Tournament at straight rail billiards, and he was equally good at three cushion billiards.

For years he regularly challenged any of his classes to competition with him in five outdoor sports, golf and track events, and five indoor contests such as pool and billiards and card games. If the class could win a majority of these Carver agreed to buy the class a dinner. He did occasionally lose a single event, such as a dash to the sprint champion of Scotland or a golf match to a native of St. Andrews in Scotland, but he never had to buy a dinner for a class.

When it came time for him to retire from his university position at the age of 70, he decided that he would move to the place in the United States that came the nearest to having an ideal climate. He set up criteria for average temperature, total rainfall, number of days of sunshine, etc., and then conducted a systematic search of the U.S. weather records to find the winning location. His decision was to choose Santa Barbara, California, and he moved there. He remained there though he maintained his contacts with friends he had made in the Air Force and took frequent plane trips with them, once flying over the North Pole. He gave up flying a plane himself at the age of 75 and driving an automobile at 80. Faced with failing health he returned to Ann Arbor in 1976 to be nearer his two daughters. He lived in the Michigan Union until his death.

Carver was an unusually gifted and, in some ways, almost an eccentric person. His diet consisted principally of milk and crackers, and he neither drank nor smoked. He had a real zest for living; he worked hard and effectively at whatever he found interesting and, as a rule, he did not persist long at anything that became boring. He had a warm personality, and he took a very sympathetic interest in his students. Few of his students ever forgot the experience of having a course with him. He was a unique and very valuable contributor to his university and to the science of statistics.

H. C. Carver: Publications

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- [5] Frequency curves. In the *Handbook of Mathematical Statistics* (Henry L. Rietz, ed.) 92-119. Houghton-Mifflin, Boston (1924).
- [6] A mathematical theory of seasonals. *Ann. Math. Statist.* 1 57-72 (1930).
- [7] Fundamentals of the theory of sampling. *Ann. Math. Statist.* 1 102-121 (1930).
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- [10] *Air Navigation*. Edwards Brothers, Ann Arbor, Michigan (1943).
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