

On the Origins of the Institute of Mathematical Statistics

Robert V. Hogg

Abstract. The two persons most responsible for the founding of the IMS in 1935 were Henry Rietz and Harry Carver, and some background about each of them is given. Others who had some important roles to play were Cecil Craig, Allen Craig, Sam Wilks, Al O'Toole, Walter Shewhart, Paul Rider, and Harold Hotelling. Fred Stephan, then the executive secretary of the American Statistical Association, wanted IMS to be one of ASA's sections and worked very hard to smooth the way for that type of relationship. While Rietz also leaned in that direction, Carver did not trust ASA at that time and wanted nothing to do with that arrangement. In 1938, three years after IMS was established, Carver officially turned his *Annals of Mathematical Statistics* over to IMS; and IMS's initial editorial board consisted of Sam Wilks, Jerzy Neyman, and Allen Craig.

Key words and phrases: Rietz, Carver, Michigan, *Annals of Mathematical Statistics*, American Statistical Association, Craig.

INTRODUCTION

The Institute of Mathematical Statistics began about 50 years ago, on September 12, 1935 to be exact. In preparing for some sort of celebration of this 50th anniversary, President Oscar Kempthorne asked me to make a few remarks about the origins of the IMS to be given at the annual meeting in Las Vegas in August 1985. In doing so, he knew that I was not old enough to be at the organizational meeting in Ann Arbor, Michigan; however, he was aware of the fact that I had available a number of letters of Henry Lewis Rietz, who was the driving force in establishing the Institute and served as its first president. In addition, Allen T. Craig, the first secretary-treasurer of the IMS, was my colleague for many years and had provided me with many stories about those early days.

In the course of preparing these remarks I found a list of about 100 statisticians who had been invited to that organizational meeting. It was interesting to note that four persons on that list were still members of the Institute: Joe Doob, Ed Deming, Cecil Craig, and George Baker. I wrote each of them to see if they wanted to pass on any observations about those early days. (I had initially overlooked Professor Baker but later contacted him.) I will use some of their responses in this document, but I must make special note of the circumstances associated with Cecil Craig's reply.

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Cecil served as the first program secretary of the IMS and later as the president for two years, 1942–1943. It is clear from the records that he was a leader in the Institute in those early days. When he received my letter, he wanted to prepare some remarks so that both Harry Carver and the University of Michigan received their fair share of the credit. He did so during the month of May and sent his comments to me on May 30, 1985. Of course, I acknowledged his letter in early June, thanking him for his efforts and assuring him that Carver and Michigan would be credited appropriately in my talk. In late June, I received a letter from Mrs. Craig noting that Cecil had never read my reply because, after a short illness, he died on June 16, 1985. The only reason that I mention this in some detail is so that younger members of the Institute will truly appreciate how much the IMS meant to some of its founders. Cecil Craig was a man who worked for the Institute 50 years ago and was still working for it until he died. There were many more persons like him, and most will be mentioned in this article. It is imperative that we remember those statisticians on whose shoulders we stand.

TWO EARLY LEADERS

Ralph Waldo Emerson wrote, "An institution is the lengthened shadow of one man." In the case of the Institute of Mathematical Statistics, that man would be Henry Lewis Rietz of the University of Iowa. He did most of the work toward organizing the Institute and served as its first president. The Institute now

honors him with the Rietz lecture every other year. However, as I review the history, there is a second man who cannot be overlooked and possibly did more for Mathematical Statistics than did Rietz, namely Harry Carver of Michigan, because Carver was the founding editor of the *Annals of Mathematical Statistics*. He actually started the *Annals* at great personal expense. So Rietz of Iowa and Carver of Michigan were the two leaders in the creation of the IMS. As a Rietz lecture is given every other year, it might be appropriate if we had a Carver lecture in those other years.

To completely understand our statistical roots, let us consider some characteristics of these two men, starting with Rietz. He wrote 156 articles, reviews, or discussions and 11 books, including that delightful 1927 *Carus Monograph on Mathematical Statistics*. Now that's lots of writing! As I review some of those works, most are of an expository nature. I classify Rietz as a very careful writer and truly a "promoter" of statistics and actuarial science. The first publication I could find by Rietz was, when he was at Illinois, in 1904 about primitive groups. (That's not sociology, that's algebra!) But his statistics seemed to start with some publications from the Agricultural Experiment Station at the University of Illinois with titles like "Variability of Corn," "Principles of Breeding," and so on. These articles, for which Rietz had written the statistical or mathematical appendices, were published around 1907 and 1908. So clearly Rietz seemed to get his statistical start before 1910.

Rietz came to Iowa in 1918 as head of the Department of Mathematics. He continued with his writing in statistics and actuarial science. In the *Bulletin of the American Mathematical Society* he wrote "Topics in the Theory of Statistics" in which he considered frequency functions, Pearson curves, Gram-Charlier fits, sampling, joint probability density functions, and multiple and partial correlation. This and similar articles were very expository in nature. And then you would find out that he would apply some of these statistical methods in another article using actuarial data. His actuarial publications continued into the 1930s about risk problems, unemployment, and disability; but I will not say any more about those topics.

The first publication that Rietz had in the *Annals of Mathematical Statistics* was in 1931. It is important to know something about the status of mathematical statistics at that time because the *Annals* was started in 1930. In the 1920s there was not a very good outlet for research in mathematical statistics. Frankly, the mathematicians looked down on the statisticians and were a little suspicious of them, particularly if their work involved any real data. On the other hand, the mathematical statisticians just seemed to be too theoretical for the American Statistical Association; the

Journal was nothing like it is today. So Harry Carver of Michigan, at his own expense in 1930, actually started the *Annals of Mathematical Statistics* and Rietz first published there in 1931 with the article "On Certain Properties of Frequency Distributions Obtained by a Linear Fractional Transformation of Variates of a Given Distribution."

Rietz had a great deal of correspondence with many statisticians, probabilists, and mathematicians, such as Karl Pearson, Neyman, and Frechet. But these letters did not concern the Institute; so they are for another time. However, there is one series of correspondence with Egon Pearson that I must mention because it involves the word "statistic." This is in a letter to Rietz from Pearson. "If you meet suitable people at New Orleans, I wish you would talk with them about the use of the word 'statistic.' Almost everyone agrees that it is a bad word to get established into the terminology, but for lack of any simple alternative it seems likely to get fixed. The thing to be named is I suppose a 'sample estimate of a population parameter,' but is there any single word which will express that?" Of course Rietz in one of his letters mentioned sample parameters like sample mean or sample variance.

There is one telegram to Rietz that really touches me as an Iowan; this particular one was sent in 1942. It reads: "Dear Uncle Henry: We are taking time out from winning the war to send you our very best wishes on your birthday—Sam and Allen." The senders of this telegram, Sam Wilks and Allen Craig, were Ph.D. students of Rietz at Iowa in 1931. Now the dear Uncle Henry bit started, at least according to Allen, because Rietz had a nephew, Louis Rietz, who was a student at Iowa; and he naturally called him "Uncle Henry." I don't know if the graduate students and young faculty called him Uncle Henry to his face, but I can imagine how they picked this up and used it behind his back. To this day many of Iowa's older alumni refer to Rietz as Uncle Henry.

In 1943, a Rietz letter to Wilks reads: "Will you kindly convey to the Board of Directors of the Institute, when a convenient opportunity presents itself, my deep appreciation of the honor done me in the dedication of the 1943 Volume of the *Annals of Mathematical Statistics* to me in recognition of my efforts along the line of Mathematical Statistics." This was written in August of 1943 and Rietz died in December of 1943. How much more appropriate it is to honor a person while he is still living than after he is dead. Clearly Rietz truly appreciated this dedication and the fact that a picture of him appeared in the 1943 *Annals*.

In response to that letter of Rietz, Sam Wilks notes, among many other things, "One of the fields of application which I believe is just on the verge of wide adoption is quality control by statistical methods";

and Rietz, in a return, says that "SQC ought to find great extensions in many fields." These comments were made in 1943 by two leading statisticians. Despite the fact that statistical quality control was started by Walter Shewhart in the 1920s and used a great deal during World War II, we find in the 1980s that American management is beginning to welcome it and the design of experiments as if they were something new. It is a sad state of affairs: either statisticians did not push hard enough or management did not care, probably more of the latter.

Now let us turn to Harry Carver of the University of Michigan. Most of this is taken from those notes of Cecil Craig.*

"Professor J. W. Glover, who set up the actuarial program in Michigan, brought back to Michigan, in 1916, a recent graduate, Harry C. Carver, to develop courses in mathematical statistics. In 1922 there were only two schools in the country, the University of Iowa and the University of Michigan, where courses in mathematical statistics were offered.

"The remainder of the 1920s and the first of the 1930s were marked by a steady growth in this country of the number of people whose principal interest lay in mathematical statistics. By living and working in the city where the new *Annals* were edited and by regular attendance at the national meetings, it was easy for me to become widely acquainted with the members of the new group. I spent the year 1930-1931 in Stanford University where Harold Hotelling was beginning a career in statistics. When I left Stanford to return to Ann Arbor, Hotelling also left to accept an appointment at Columbia University. On my way back across the country I stopped a few days in Iowa City where Egon Pearson was lecturing. There a rather remarkable group of students were working with H. L. Rietz, who deserved to be known as the dean of American mathematical statisticians. These students were S. S. Wilks, A. T. Craig, Selby Robinson, and Carl Fischer. They all earned doctorates under Rietz, and I made friends with all of them. Of these four, only Fischer, who recently retired from Michigan, is still alive.

(Hogg's note: While Fischer's thesis was in statistics,

most of his professional life was devoted to actuarial science.)

"When I left Iowa City, I went to Minneapolis where I spent five weeks listening to my first series of lectures by R. A. Fisher. Sometime in the next few years I became well acquainted with B. H. Camp of Wesleyan.

"In 1935 the summer meetings of the mathematics societies were held in Ann Arbor. The attendees included enough people interested in mathematical statistics to fill the reception room in the Betsy Barbour dormitory on this campus. They were convened to discuss a proposed organization of a new society devoted to mathematical statistics.

"I know that Carver's idea of the proper form to be assumed by an organization of mathematical statisticians was that of the actuaries, with qualifying examinations for different grades of membership. But at the actual organization meeting this form of a society was not seriously proposed and a form very close to what we have today was adopted with only brief discussion.

(Hogg's note: Allen Craig had said that a constitution committee of Al O'Toole, Walter Shewhart, and Paul Rider had suggested taking examinations to earn the status of Associate and Fellow in the IMS like the actuaries do. However, nothing came of this as they found out that many were willing to give the examinations but none was willing to take them. Thus Allen's remark is consistent with Cecil's memory.)

"From his joining of the faculty of the University of Michigan until his retirement in 1960, the dominant figure in statistics at Michigan was Harry Carver. He had a spare well-muscled figure and was more than 6 feet tall, a sandy complexion, and the coordination of a natural athlete. Carver had a very quick mind and he had a warm and sympathetic manner. Taking a course with him was an experience his students did not forget. He directed the work of ten doctoral students. He bordered on the eccentric; his diet seemed to consist largely of crackers and milk. He made a practice of offering to buy a class a dinner if it could beat him at one of five indoor sports—card games or billiards or pool—or at one of five outdoor sports such as running or putting the shot. He never lost."

* Editor's note: The entire text of Craig's correspondence with Hogg is published following this article.

I can never remember meeting Carver, but Allen Craig used to tell various stories about him. He would try anything, like flying a plane or challenging a student to see who could turn the crank of an old calculating machine the most times in a fixed period time. Thus Carver was pretty much of a character while Rietz seemed more like a fairly normal person. But, in any case, we owe much to these two statisticians in the development of the IMS and the *Annals*.

THE FOUNDING OF THE INSTITUTE

There was need of some sort of organization among the mathematical statisticians because the American Mathematical Society and the American Statistical Association did not provide a suitable outlet. So during the Summer of 1935, Allen Craig wrote a letter to about 100 statisticians. Part of it reads as follows:

"You will probably recall that a movement was started several months ago to organize an Institute of Statisticians, with high standards of membership. Some twenty persons were written to ascertain the interest in this movement and, with a single exception, there was a favorable response. More precisely twenty-three letters were written and the twenty-two persons whose names appear on the attached page responded favorably . . .

The "22"

Baten, W. D.	Hotelling, H.
Camp, B. H.	Huntington, E. V.
Carver, H. C.	Ingraham, M. H.
Craig, A. T.	Molina, E. C.
Craig, C. C.	O'Toole, A. L.
Crathorne, A. R.	Rider, P. R.
Dodd, E. L.	Rietz, H. L.
Doob, J. L.	Shewhart, W. A.
Fischer, C. H.	Snedecor, G. W.
Fry, T. C.	Weida, F. M.
Henderson, R.	Wilks, S. S.

"The organization meeting will be held on Thursday, September 12th, 9 a.m. at the University of Michigan in Ann Arbor, in connection with a meeting of the American Mathematical Society. Will you be able to attend?"

In addition to the preceding twenty-two persons, the following received this letter.

Others Invited

Alter, D.	Bennett, A. A.
Baker, C. A.	Berkson, J.
Bailey, A. L.	Berridge, W. A.
Belcher, D. R.	Bowerman, W. P.

Brandt, A. E.	McClenon, R. B.
Burgess, R. W.	McEwen, G. F.
Carmichael, F. L.	Mills, F. C.
Copeland, A. H.	Milne, W. E.
Crum, W. L.	Mowbray, A. H.
Davis, H. T.	Musselman, J. R.
Deming, W. E.	Ness, M. M.
Dunn, W. E.	Olds, E. G.
Eells, W. C.	Ore, O.
Elston, J. S.	Persons, W. M.
Ezekiel, M. J. B.	Pixley, H. H.
Feldman, H. M.	Pollard, H. S.
Fisher, I.	Regan, F.
Forsyth, C. H.	Reed, L. J.
Gafafer, W.	Richardson, C. H.
Cavett, G. I.	Robbins, R. B.
Glover, J. W.	Roos, C. F.
Grove, C. C.	Scammon, R. E.
Hart, W. L.	Scarborough, J. B.
Haskin, C. N.	Schultz, H.
Hildebrandt, E. H. C.	Shohat, J. A.
Holzinger, K. J.	Tewksbury, R. B.
Hopf, E.	Toops, H. A.
Jackson, D.	Uspensky, J. V.
Kelley, T. L.	Walker, H. M.
Koopman, B. O.	White, A. E.
Kullback, S.	Whitney, A. W.
Lawther, H. P.	Wilson, E. B.
Lotka, A. J.	Wolfenden, H. H.
Lovett, W. V.	

When you think back to those early days, I am very much impressed with these lists of statisticians.

This might be a good time to insert the comments of W. Edwards Deming as he remembers this organizational meeting. He wrote the following on May 13, 1985:

"I remember well the founding of the Institute of Mathematical Statistics in Ann Arbor. Sleeping quarters were in a dormitory. It was there that I learned why students avoid dormitories. It was in the summer, Students were not about; so the dormitories were clear.

"I was not a mathematician to match Harold Hotelling, Cecil Craig, Allen Craig, Sam Wilks, but I was accepted in the founding of the IMS for my eagerness to learn.

"Walter Shewhart and Harold Hotelling were voted to be Fellows, and good choices they were."

After the meeting was over, the notice of organization of the Institute was sent out, part of which reads:

"At the meeting, it was decided to form an organization to be known as the

Institute of Mathematical Statistics. A constitution and by-laws were adopted and the following officers elected to serve until December 31, 1936: President, H. L. Rietz; Vice-President, W. A. Shewhart; Secretary-Treasurer, A. T. Craig. A resolution, instructing the officers to investigate the feasibility of the affiliation of the Institute with the American Mathematical Society or with the American Statistical Association, was adopted."

I find this resolution extremely interesting. Let us find out what happened. As with many other mathematical-related organizations, the Math Society was not willing to accept the Institute as a subdivision. This was nothing new—the Math Society urged the formation of the Mathematical Association of America for teachers of mathematics. Then, in later years they were not willing to accept the applied mathematicians nor the computer scientists; so many spin-off organizations have been formed in the mathematical sciences. To emphasize the position of the AMS, Rietz wrote, in a July 27, 1935, letter to E. B. Wilson:

"Nearly all of those who have expressed an interest in this new organization are members of the American Mathematical Society. If that Society and the American Statistical Association would take care of the field of applied mathematics between the two, it would be much better than to form a new organization. Certain members of the American Mathematical Society are interested in applications; but when it comes to practice in accepting papers for publication, it seems not much material is acceptable that is a bit tainted with possible applications to statistical data.

"With respect to a possible union of the *Annals of Mathematical Statistics* and *Econometrica* which you mention, I do not know whether or not that matter has been considered, but I suspect the union would not be very easy to arrange as the *Annals of Mathematical Statistics* was started before *Econometrica*."

Thus not much progress was made concerning any sort of union with the AMS, but on the other hand, the American Statistical Association was very much interested in having the Institute as one of its sections. In particular the ASA's executive secretary, Fred Stephan, had done a lot to encourage this. Here is part of a letter to Stephan from Rietz:

"As you know, the Institute is meeting in St. Louis shortly after December 26, 1935, and it would probably be helpful if we had

some kind of proposition to discuss about the appropriate relationship of the Institute to the American Statistical Association. I have not given up the hope, which you have expressed from time to time, that all our general statistical interested be headed up and coordinated by the Association."

Not only Fred Stephan, but others like F. C. Mills, National Bureau of Economics Research, wanted the IMS to be part of the ASA. He writes in a letter to Rietz:

"May I express the hope that if an organization is effected, it will be one that may operate as a section or division of the American Statistical Association, and not as a separate organization. I am interested in the development of statistics and in the application of statistical methods in the various social and natural sciences. And I greatly fear that the breaking up of statisticians into separate groups will impede this development."

Of course, there was some opposition to forming the Institute at all. In a letter from Dr. M. Ezekiel to Rietz, we find:

"As a result of my recent work I have been very much impressed by the tendency to over-specialization in scientific work, resulting in the extreme narrowing of the horizon of the persons involved. I feel that it was a mistake to form the Econometric Society.

"As you will see, my objections on this point are those of a generalist trying to fit different disciplines together, rather than as a specialist seeing ever larger and larger the problems of a particular field. No doubt those who feel the need of a new society are such specialists, but I wonder if this emphasis on intensive specialization will not prove to be a handicap rather than a gain."

Rietz would pass almost all of this sort of correspondence on to Allen Craig. Both of them would make many comments in the margins of these letters; and, in this one, Craig makes the following observation, in long hand, at the end of the letter, "I believe Dr. Ezekiel fails to appreciate the significance of the fact that historically, research in pure science has almost invariably long preceded applications; that applied science flourishes largely because there is a vast body of theory ready to be exploited."

I cannot read some of Allen Craig's remarks without recognizing what a beautiful expositor he was. This was just a note for Rietz at the end of Ezekiel's letter

and yet one must truly appreciate how well the man expressed himself. It was my great pleasure to work with him for over 20 years. He was a gentleman and a scholar—and a very dear friend.

At the organizational meeting, the IMS did agree to meet about 50% of the time with the AMS and the other 50% with the ASA. In preparation for the first meeting with the ASA, C. C. Craig, as what we would now call Program Secretary, suggested in a notice to the members that “we make a strong showing at our first meeting with the Association, and for that purpose we should have a first rate program.” He asked members to save their good papers until that time.

What about this relationship with ASA? A number of people, including Rietz, seemed to want it. However, Carver had some dealings with the ASA that he did not like. Let’s consider a few of Carver’s thoughts. I must note that sometimes we think that we are busy in our work; well consider Carver’s activities as outlined in a letter of May 26, 1936, to Rietz,

“Frankly, I am so darn busy right now that I wish somebody else was editing the *Annals* for the good of the publication. Due to an unexpectedly large enrollment in Statistics here I am teaching 19 hours per week, running two consulting jobs to get extra funds which I turn over to the *Annals*, and have two Ph.D. students. Have had discussions with Hildebrandt and the Assistant to the President (in charge of our University Press) about the possible transfer of the *Annals* to the University Press here. This would eliminate all the trouble concerning the collection of subscriptions and correspondence with subscription agencies, but I fear might hinder the present relations between the Institute and the *Annals*. I want most of all to have the *Annals* to be the regular official organ of the Institute, but do not want to see the Institute assume that burden until a number of years have passed and they are on a firm financial basis.”

The Econometric Society and Psychometric Society were also being formed in the 1930s. I quote from a Carver letter to L. L. Thurstone,

“Although I know that the steps taken by the mathematical and psychological groups were absolutely necessary since the American Statistical Association in the past has failed utterly to discharge its duties as the custodian of statistics in this country, I cannot help but feel that the formation of additional independent statis-

tical organizations is technically unwise. I believe that our respective interests can best be served and perpetuated by having each important branch of statistical interest attain Statehood in a *real* American Statistical Association.”

Carver who owned the *Annals* was very much afraid of what would happen to his *Annals* if it went over to the ASA and in a letter to Rietz one sentence reads: “. . . I realize that future Boards of Directors of the Association may undo with a single stroke all that we have accomplished since the majority of the membership of the Association are not mathematically-statistically minded.”

So it was really Harry Carver that stopped any formal relationship with the ASA. In all fairness to the ASA, however, they did contribute to the support of the *Annals* for two or three years around 1933–1935. But the financial situation was extremely difficult in the 1930s, and they had to withdraw any future support. This is what concerned Carver, and he thought that the Institute would be better handling the *Annals* on its own.

Carver, in 1938, actually turned the *Annals* over to the Institute of Mathematical Statistics as its official publication. The first editorial board consisted of, Sam Wilks as editor, and the two associated editors, Jerzy Neyman and Allen Craig. Allen said that Carver, when he turned the *Annals* over, piled the back issues of the *Annals* into his car, and drove from Ann Arbor to Iowa City. They then carried these up to the second floor of the old physics building, now the building that houses the Mathematical Sciences at Iowa. Craig, as the secretary-treasurer of the IMS, kept the old back issues.

I would like to include three observations that Allen Craig made in his article “Our Silver Anniversary” that was written 25 years ago because they are certainly true today. The first concerned Fellowships in the IMS.

“I have often regretted our yielding to the notion of having two grades of membership. When one scans the current Directory and finds listed as Members many highly talented persons, he too must share some misgivings about the fairness and the wisdom of these designations.”

The second was about the teaching of statistics.

“With stability assured, the Institute could now employ the energy and talent of its members to attack some of the problems of the day. A particularly acute problem at that time was the state of the teaching of

statistics in the colleges and universities of the United States. Under the able and aggressive leadership of one of our members, constructive suggestions on the improvement of the teaching of statistics were formulated, were officially endorsed by the Institute, and were given wide circulation. The Institute should be credited with having focused academic attention on this problem. To be sure, other forces were at work at the same time, but the action of the Institute seems to have provided the initial jolt. In any event, the teaching of statistics has shown steady improvement and, after all, that is what the Institute wanted."

Of course, the leader to whom he referred was Harold Hotelling. The third quote of Craig's concerned the editors since they can make or break a journal.

"Some manuscripts present such important new results, viewpoints, or solutions of outstanding problems that they do not present difficult editorial decisions. But most manuscripts make smaller contributions—they complete the development of a theory or point out interesting facts that have been overlooked. All kinds of manuscripts are important in that they represent a continued intellectual interest by those who are responsible for the teaching of statistics, the training of future mathematical statisticians, and the carrying out of

statistical research. There are a few manuscripts that present exceptionally important new results, solutions, and viewpoints, while there are many that present less outstanding material. Yet I firmly believe that only editors who appreciate the importance of a constant flow of all kinds of contributions can build great journals that will remain great. Our editors have measured up to this. And on this twenty-fifth anniversary of the founding of the Institute of Mathematical Statistics, I offer to each of our five editors our sincere thanks for the effort he has put forth to make the *Annals*, and inferentially the Institute, incomparable."

I must agree with Craig's remarks and today we can thank the editors and associate editors that followed those first five. Most members of the IMS simply do not appreciate the time and effort given by all of its officers: the Managing Editor, the *Bulletin* Editor, the Executive Secretary, the Program Secretary, the Treasurer, and even the President. We are certainly indebted to persons who have served in these positions.

In closing, I urge that we remember the headwaters of the IMS on its Golden Anniversary. That is, as we drink the water, let us not forget the source. I am certainly proud to be an academic grandson of Henry Rietz—just as Cecil Craig was truly indebted to Harry Carver. So on this occasion, let us remember our "statistical roots" and those great statisticians, like Rietz and Carver, who laid the foundation upon which we build.