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A Conversation With Klaus Hinkelmann by Evan McNear

Klaus Hinkelmann ca 1975

Klaus Hinkelmann is a Professor Emeritus of the Department of Statistics at Virginia Tech, having been an Associate Professor from 1966 to 1972 and a Professor from 1972 to 1999. He was Director of Graduate Studies from 1976 to 1982 and was Department Head from 1982 to 1993. He is a genial man with an obvious passion for statistics. I asked him personally "If not statistics, then what would you be doing?" - a question to which he had no answer.

Mr. Hinkelmann's accomplishments are all the more inspiring when one realizes he was unable to attend school for a year during WWII. Having graduated from high school later than usual he still went on to become an elected Fellow of the American Statistical Association, the International Statistical Institute, and the American Association for the Advancement of Science.

Where were you born and/or raised?

I was born in 1932 in a small town, Bad Segeberg, located north-east of Hamburg, close to the Baltic Sea and not far from Denmark. The town was founded by Kaiser Lothar in 1134 as a center for pursuing the Christianization of the Slavic Eastern Europe [19]. I grew up there, went to Kindergarten, elementary school, and high school (Dahlmann-Schule, named after a famous historian from this part of the country), until I enrolled at a university. And I still return once a year for a visit there.

Are there any special memories you have about where you were raised or any of your earlier years?

In this town with a population of 7000 everybody knew everybody else, so we had lots of friends as we grew up. It was a happy and peaceful time – up to a point. Our town was surrounded by three big cities, Hamburg, Lübeck, and Kiel, which were prominent targets of air-raids by British and American bombers. Usually these happened during the night, and we could hear bombs detonating and see flames reaching high into the skies.

On one occasion, shortly before the end of WW II, a British airplane was chased during the day by a German fighter plane, when the British plane dropped its remaining bombs over our town, and one of those bombs struck the corner of our house and landed in the neighbor's yard. Fortunately, it did not explode.

Who were your parents and what did they do for a living?

My father was born in Bad Segeberg, too. He was an apprentice in a local bank and later became self-employed as a public accountant. I do not have a lot of memories about my father, because he was drafted into the German army in 1940, served in the South of France, was sent to North Africa as a POW, and returned home in 1946. He died in 1950.

My mother then had to take care of the family, my two sisters and me. Fortunately, she had, prior to this event, already operated what you might call a lunch counter in our home, where people working in offices and stores in the town would come to have lunch. In order to make things work out financially, we all had to participate in the running of this enterprise, which meant to help in the kitchen, serve meals to customers, work in the garden to raise vegetables, etc. We thus learned from an early age on what hard work meant, and that was an important lesson.

With sisters and parents in 1942

Anything else you'd like people to know about your family?

Even though my mother was educated in a one-room school in a small village and even though nobody in our immediate family had a college education, there was no doubt in her mind that education was important and that I should attend a university. This involved some sacrifices, especially for my two younger sisters who had careers in banking and in the pharmaceutical industry without a college education. I was always grateful to my mother for her support over the years.

Where did you attend grade school and is there anything in particular you remember about those years?

I attended grade school in Bad Segeberg, and I loved it from day one. I had a great teacher, Herr Steffens, whom I really admired. He was not only my teacher during the four years of grade school, but I kept in touch with him throughout my years in high school, at university and beyond, until his death. Herr Steffens was strict, but kind, and he instilled in us the desire to learn and do good work if we wanted to succeed.

I see on your CV that you attended the University of Hamburg and graduated with a degree in Mathematics. Did you always intend on concentrating in Mathematics or did you start out with a different interest?

Before I answer that question I need to digress and say a few words about my high school days. After four years in high school, at the age of 15, we needed to decide whether to pursue a course with emphasis in foreign languages or mathematical and natural sciences. Although I was always very good in mathematics I reasoned that I would never pursue a career with emphasis in mathematics, so I chose the foreign language option, which meant that I would add French to English and Latin courses. I began to change my mind a few years later – in large measure due to the enthusiasm with which our math teacher, Dr. Kuhn, conveyed to us the beauty of mathematics - but I had to stick with my choice, except that I opted for voluntary courses in mathematics during the last year in high school. By that time my

uncle, who was a high school mathematics teacher in Hamburg, suggested that I might consider a career as an actuarial mathematician. It is with that in mind that, after completing high school, I enrolled in 1953 at the University of Hamburg to major in mathematics.

What sparked your interest in statistics?

As part of the program in actuarial mathematics I had to take a course in probability and also one in statistics. The course in statistics, taught by Professor Schmetterer, was interesting, but quite theoretical. It did not really give me a good idea what statistics was all about. But that would change later and in a strange way.

After I had completed my studies at the university in 1958 I accepted, or nearly accepted, a position with a large insurance company in Hamburg. At the last minute, based on my interview and on work that I had done as an intern with insurance companies as part of the degree requirements for an actuarial mathematician, I convinced myself that the work in an insurance company would not be mathematical enough and, therefore, in the long run not satisfying and fulfilling. So I decided not to accept the job offer, but I had no plan B.

By accident I became aware of a temporary position for a Research Associate at the Institute of Forest Genetics at the University of Hamburg to work on a research project funded by the Deutsche Forschungsgemeinschaft, DFG (the German equivalent to NSF). The project, directed by Dr. Klaus Stern, was concerned with the development of partial (incomplete) mating designs for trees and the evaluation of data from such designs. Even though I only had little knowledge of genetics and statistics I was accepted for the position. To bring me up to speed I was given two books to read, one on elementary genetics and the recently published book "*Introduction to Genetic Statistics*" by Oscar Kempthorne [15]. And the latter got me interested in statistics. I was able to complete the assigned project on partial diallel crosses, with some additional help from a paper by Kempthorne on incomplete block designs with blocks of size two [14]. This resulted in my first publication in *Silvae Genetica* [1].

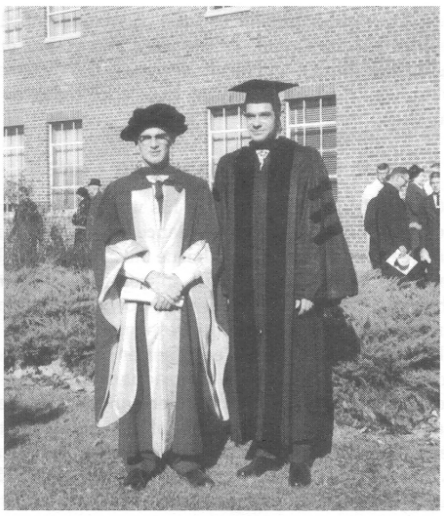
What brought you to the U.S.?

After completion of my project it was suggested to me by Dr. Stern and Professor Langer, the director of the institute, that if I wanted to learn more about genetic statistics I needed to visit with researchers at universities in the United States. They were able to secure the necessary funding for a 9-month visit to the U.S. through the Benson-Lübke treaty (Benson and Lübke were the Secretaries of Agriculture in the U.S. and West-Germany, respectively) for the exchange of researchers in the agricultural sciences. This was in 1960. In April of that year I arrived in New York City on board the *SS United States.* I was to visit several universities, but I managed to visit only the Department of Forestry at Michigan State University and the Department of Statistics at Iowa State University, where I met with Oscar Kempthorne. This meeting turned out to change my life forever.

But even my visit at Michigan State was indicative of the direction in which I was going. One day, my host in the Forestry Department, Professor Wright, asked me whether I wanted to accompany him to set up a field experiment. Judging by German standards I thought he would go out to the field and give directions to the workers. I was surprised when he asked his wife to go with me and buy some work clothes. We then actually planted trees, making sure that the seedlings from different crosses were "randomly" assigned to the individual plots in the rows of the experimental field. This was my first acquaintance with a completely randomized design.

What was your experience at Iowa State and with Oscar Kempthorne?

When I told Professor Kempthorne about my research project and about my solution to the problem he realized immediately that my design was isomorphic to the design he and Robert Curnow had developed for a paper to be published in *Biometrics* [16]. This may have been the beginning of a special relationship between us. I then told him that I wanted to learn more about genetic statistics and that I had many questions about some topics in his book. In spite of his busy schedule he suggested immediately that we should go through the book together, chapter by chapter, and he would explain things to me that I did not understand. In other words, I received private lessons from one of the most recognized expert in this field. Our discussions about genetic statistics then led Kempthorne – or Kempi as he was called affectionately by many - to suggest that I should enroll in graduate school at ISU and get my Ph.D. degree under his guidance.

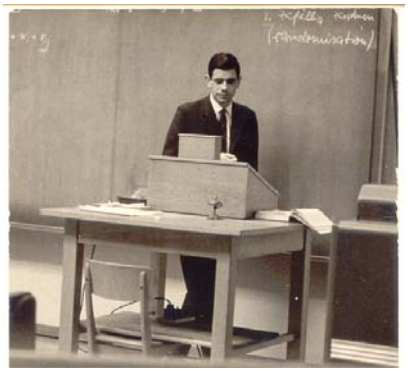


With Oscar Kempthorne 1963

We did not have to think long about a topic: further exploration of my previous work and extensions to three-way and four-way crosses. And even the question of financing my stay at ISU was solved quickly when Kempi secured an NSF fellowship for me and my work. I then enrolled at ISU for the Winter quarter 1960 and began to take courses in statistics, animal breeding, and genetics. I had some great teachers, in addition to Kempthorne they included H.O. Hartley, Bob Buehler, George Zyskind, J.N.K. Rao, Dewey Harris in statistics, J.L. Lush in animal breeding, and O'Mara in genetics. This was a busy, but exciting and happy time.

When I started on my Ph.D. research I got involved heavily in the theory of partially balanced incomplete block designs, so that my advisor asked me to give some lectures on this topic to my fellow graduate students – and to him. That was fun. During the work on my dissertation I had many discussions with Kempi. He would come in on Saturday mornings, stuck his head in the door of my office and said: "Do you want to talk?" Of course, who did not want to do that? We would start out talking about specific points, but soon it would become a general discussion about matters statistical and life overall. I defended my dissertation [2] in October 1963 and graduated at the end of the Fall quarter 1963, a few days after the assassination of President John F. Kennedy. My sister Lilli was able to come from Germany to attend the graduation ceremony.

It is hard to express all my positive feelings towards ISU and in particular my appreciation for what my association with Oscar Kempthorne has meant to me. In the Festschrift on the occasion of his 65th birthday [8], when he was a visiting professor in our department, and in my article "Remembering Oscar Kempthorne" [9] I describe some of my feelings towards him.



Lecturing at the University of Freiburg in 1965

What brought you to the Virginia Tech Statistics department and what was your experience with Boyd Harshbarger?

After graduation I returned to my former position in Germany, when I received a letter from Boyd Harshbarger offering me, at the recommendation of Kempthorne, a position as assistant

professor at VPI. I told him that I wanted to stay at least two years in Germany to consider any possibilities there. Shortly thereafter I also received a letter from H.O. Hartley, who offered me a position at Texas A&M. Exactly two years later – I had at the end of 1964 taken a position as Scientific Assistant at the Institute of Medical Statistics at the University of Freiburg – I received another letter from Dr. Harshbarger, offering me now a position as associate professor. I gave it a great deal of thought, and I still remember the words of my boss, Professor Walter, as we returned from a meeting in Oberwolfach: " Herr Hinkelmann, think about this: here (in Germany) you can be a big fish in a small pond, in the U.S. you will be a small fish in a big pond". Dr. Harshbarger called me a couple of times to help me make up my mind. So I finally decided to accept the offer, and in late August 1966 my wife, Christa, and I took our honeymoon trip on the *M.S. Hanseatic* across the Atlantic to New York and from there in my VW (which had come with us on the boat) to Virginia. It is worth mentioning that shortly after our debarkation in New York a fire destroyed the *Hanseatic.* What kind of omen would that be?

Marrying in Freiburg(1966)

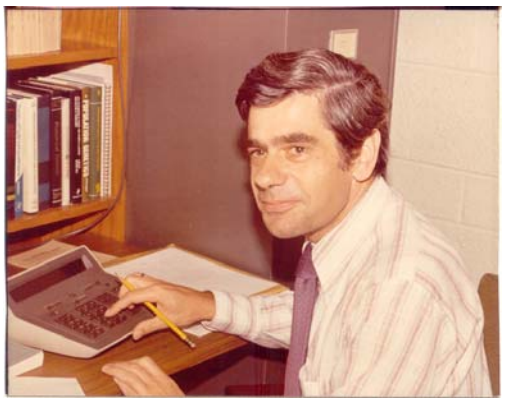
In Blacksburg Dr. Harshbarger as well as Mrs. Harshbarger did everything, in their gracious ways, to get us settled in our new surroundings. We fell in love with Blacksburg and the surrounding mountains from day one.

On the academic side Boyd made sure that I got to teach graduate courses that I really enjoyed. He was always keen to make sure that students became aware of and interested in new research topics. So, for example, before I taught a course in genetic statistics he asked me to present a colloquium giving a brief overview of this subject. That proved to be quite successful as a good number of students enrolled in the course and some subsequently chose to do their Ph.D. research in this field. Boyd also made sure that we attended and presented papers at professional meetings. He was especially supportive of the Summer Research Conference sponsored by the Committee on Statistics of the Southern Regional Education Board (SREB), and he made sure that younger faculty members were given a chance to present their research there. Even though we had occasionally some gripes with Boyd, he was always most supportive of the students and faculty and helped in any way he could.

When I received an invitation from H.O. Hartley at Texas A&M for a one-quarter visiting appointment, Boyd made the arrangements for a leave of absence, convinced that I would return to VPI. He did many things in his low-key fashion, for example, handling tenure cases. I did not even know that I was being considered for tenure, so I was surprised when, one day, I met him in the hallway and he said: "Oh, by the way, congratulations, you got tenure." The same thing happened with my promotion to full professor. Things were so much less formal than they are now.

Was there any specific reason you wanted to be department head and any particular memories you have from that period of time?

I had no particular ambition to become department head, but it just happened. Since I had been the Graduate Administrator for six years, my colleagues felt that I had the most administrative experience and gave me their votes to succeed Dr. Arnold when he stepped down as Department Head in 1982. And I must say that I enjoyed – for the most part – having this position. Together with my colleagues it gave me the opportunity to shape the direction of the department, even though severe budget cuts in the late 80's and early 90's did not help. Among other things we had to give up the



As Graduate Administrator (ca 1980)

position we had reserved for a visiting appointment, which over the years we had been able to fill with prominent statisticians.

An important event was the change from the quarter to the semester system, a move to which we as a department objected. In the end we were successful in setting up a coherent set of courses for majors and non-majors. Another change which had a great impact on how we taught many of our courses was the introduction of computers and statistical software, such as Minitab and SAS, into most of our methods courses. I think it made statistics more relevant and more "fun" for many students, even though it took some faculty members a while to get used to this way of teaching. At the same time we were able to increase our computing facilities. And although I am a non-Bayesian, I was able to hire a Bayesian to introduce our first regular courses in Bayesian statistics, which turned out to be quite successful.

What is it that interests you most with regards to the areas of experimental design and genetics?

While working on my DFG project I became aware of the close relationship between certain aspects and notions of genetic statistics and experimental design, and I explored that even further in my PhD. research. These relationships were mainly of a theoretical nature and, being trained as a mathematician, I became quite fascinated by some of the mathematics associated with experimental designs, such as combinatorics, finite fields, finite geometries, linear algebra, and even number theory. These concepts are important for developing methods of constructing experimental designs, such as partially balanced incomplete block designs, fractional factorials, and response surface designs.

Of particular interest to me is also the close relationship between the factorial structure of treatments and the genetic structure of offspring from mating designs, i.e., between main effects and interactions on the one hand and additive, dominance and epistatic gene effects on the other hand.

During my interaction with experimental scientists at Virginia Tech I became much more aware of the applications oriented aspects of experimental design. It was a very satisfying aspect of my job to help researchers set up their experiments and help them analyze the data and interpret the results. All this I tried to incorporate into the courses I taught, not only experimental design courses, but also methods courses for non-statistics majors. I tried to explain to everybody how powerful and how important it is to use the concepts of experimental design and to begin every investigation with an appropriate experimental design.

What is the accomplishment you are most proud of, why?

It is hard to concentrate on one single accomplishment since my professional career covers several different aspects. As a researcher I am most proud of the beginning, i.e., my dissertation, and the end, i.e., my design books. I had six articles published from my dissertation (*Annals of Mathematical Statistics* [3]*, Biometrika* [11]*, Sankhya* [4], *Biometrische Zeitschrift* [5, 6], and *Theoretical and Applied Genetics* [7]). These articles gave rise to a great deal of further research, not only by me and my students, but also by other researchers, for example at the University of Madras, India.

There is a little story behind the publication [11] which might be of some interest, in particular to young researchers when things don't seem to go right. When Kempi returned to Ames after teaching during the Summer 1962 at Kansas State University he asked me if I had made any progress on my dissertation. I told him that, indeed, I had discovered in interesting relationship between incomplete block designs and partial diallel crosses. He agreed with me and urged me to write up my results and submit a paper to *Biometrika* for publication, which I did. Shortly after I sent away my manuscript Kempi was asked to review a manuscript which had been submitted to *Biometrics*. It dealt with the same topic contained in my manuscript and so Kempi gave the paper to me and asked for my opinion. I realized immediately the similarity between the two papers, but I also recognized that there were important differences as well. I therefore recommended that the paper be accepted for publication. Shortly thereafter, to my surprise, I received a letter from Egon Pearson, the editor of *Biometrika,* that my paper had been rejected, not on technical grounds, but because he understood that a similar paper had been accepted for publication in *Biometrics.* I was furious, to say the least, and went to Kempi for advice. He was able to calm me down and made some suggestions for some changes and additions. He then wrote a nice letter to Egon Pearson and the paper was accepted.

Now, at the other end of my career, the design books [12,13], co-authored by Oscar Kempthorne, represent the culmination of a long process of searching for the best way to present the material to graduate students, so that they obtain a thorough understanding of the philosophical, statistical and mathematical aspects of experimental design, both from a practical and theoretical point of view.

These books also make me proud as an educator, as I hear very often from former students how valuable and beneficial the design courses have been to them in their careers. Also, it has been a gratifying experience to having directed 23 Ph.D. students and influencing their scientific thinking and appreciation of the subject.

Finally, I consider my work in the professional societies as important. In particular my editorial work has been a source of great satisfaction to me. I mention here in particular my work as Editor of *Biometrics*.

Do you have an advice you can offer to current/future statistics students?

The statistics profession has undergone tremendous changes in the last few years, and more changes lie ahead. Two things stand out to me: statistics has become even more interdisciplinary and more computer-oriented. This has to do with the generation of vast data sets in many scientific disciplines and industrial settings. It is, therefore, important for a student to have, in addition to a good knowledge of statistical concepts, a solid understanding of computing and to have a sufficient grounding in one or more subject-matter disciplines, for example genetics. To be able to communicate effectively with other researchers is important in order to be able to advance our knowledge in many different areas of our life.

If you could go back in history or forward into the future, who would you most like to sit down to coffee/tea with for a conversation? What would you ask them about and why?

It may be hard to believe, but my worst subject in high school was German. I had a difficult time writing compositions about abstract themes, and I was unable to appreciate and understand belletristic literature, in particular poetry. When I finally found a poet who appealed to me and whom I thought I understood, my German teacher told me otherwise. I remember in particular one poem entitled *Herbst*

(Autumn): Die BlÄtter fallen, fallen wie von weit….(The leaves are falling, falling as from far ….). I thought I knew what it all meant, but I was told no. This poet was Rainer Maria Rilke (1875-1926) [17,18]. I would like to meet him and ask him about the meaning of this poem, and to find out whether my interpretation was right.

Is there anything else in particular you wish to say?

I only wish that everyone can love his/her profession as much as I do. Mine had many different aspects, such as teaching, consulting, doing research, publishing articles and books, directing students, administrative work, editorial duties, and working in professional societies. I enjoyed every aspect and every minute of it, so much so, that I have a hard time stopping. That is why I still enjoy talking to graduate students and colleagues, in particular the younger ones, reviewing occasionally journal and book manuscripts, and, most of all, editing Volume 3 of my series on experimental design books [10]. All those activities keep me going and make me feel still "young".

I also tried to convince our son, Christoph, to follow in my footsteps and get a degree in statistics. Getting a joint B.A. degree in Mathematics and Economics at the University of Virginia, I figured that a graduate degree in econometrics would be a logical choice. During one of my sabbatical visits at Iowa State Christoph came to see me, and I made sure that he talked with Wayne Fuller, one of the leading figures in econometrics. However, I did not have much success. After a brief stint at the Federal Reserve Bank in Washington, Christoph decided to get a Ph. D. in Finance at the University of Rochester. From there he went on to pursue careers in academic and non-academic institutions, where he is using many statistical tools, except experimental design.

Enjoying 40 years together in 2006

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