A SHORT HISTORY OF STATISTICAL SCIENCE AT THE OHIO STATE UNIVERSITY

D. Ransom Whitney
Jagdish Rustagi
Thomas Santner
H. N. Nagaraja

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Introduction

The academic discipline of statistical science came to its present status in the mid-twentieth century. In the early part of the century, numerous applications of statistical methods were made to the biological and the physical sciences, to the agricultural sciences, and to psychology. Individual faculty members at universities and industrial laboratories used statistics for their research work. The Ohio State University, with a land grant heritage from its founding in 1870, also had such statistical users on its faculty and they, as well members of the Department of Mathematics made important contributions to the statistical literature. The history of the Ohio State Department of Statistics, presented below, describes the forces that led to creation of the Department, as viewed by D. Ransom Whitney. Jagdish Rustagi and Thomas Santner trace the subsequent evolution of the Department from 1974 to its current state in 1999.

Part I: The Period 1870-1974 as seen through the eyes of D. Ransom Whitney

The development of Statistics culminating in departmental status was a result of the environment and the people at Ohio State University. The reasons I may give for certain events occurring depend at least on my perceptions of the environment. This is why as much (or maybe too much) of my personal history is included as well as changes in the University and the Department of Mathematics.

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1. From 1870 to the End of World War II

In the beginning, Mathematics and Civil Engineering constituted a single department in the College of Arts, Philosophy and Science. From about 1912, new appointments to the Department were made to individuals whose chief interest was mathematics. R. D. Bohannon was department chair from 1904 to 1926.

The Department of Economics and the Bureau of Business Research were in the College of Business. The activities of some of the members of these groups constituted an unofficial grouping of persons interested in statistics. I believe that this group started the local chapter of the American Statistical Association. Many of the persons in the local ASA Chapter worked for local businesses or the state government.

C.C. Morris joined the Department of Mathematics in 1909. He was responsible for courses in Statistics and Actuarial Science. As a side remark, a person with an advanced degree in mathematics was confined, for the most part, to academic employment or working as an actuary. World War II ended that restriction.

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2. Early Post World War Years: 1945 - 48

Henry B. Mann, an immigrant from Austria, was a member of a group of statisticians at Columbia University under the leadership of Abraham Wald. He came to Ohio State on a research grant through the Engineering College. He had an office in the Mathematics Department located in "old" University Hall. In 1945 he joined the Department as an Associate Professor. Henry’s chief love was Algebraic Number Theory. However he was very much interested in statistics and was most willing to help others in their research, particularly those in Agriculture or the Biological Sciences.

Following graduation from Oberlin College in 1936, obtaining an MS in Mathematics at Princeton, and my marriage, I taught at Mary Washington College in Virginia. Then during the war, I was an officer in the U.S. Naval reserve. After a number of different assignments, I was on a light cruiser in Tokyo Bay at the end of the war in the Pacific.

My interest in mathematics led me to Ohio State and a graduate assistantship in 1946 with the hope of studying under J. L. Synge, an applied mathematician. He had become chair of Mathematics in 1942 but spent much of his time in London working on ballistic problems. Unfortunately for me he left Ohio State within a year and I was left looking for an advisor. Statistics had some appeal and Professor Mann was happy to be advisor to anyone interested in his work. The first few courses in Statistics were at the instigation of Mann. My first course in Statistics was based on notes by Wald. The second was on the Design of Experiments. The notes in this class became a book by Mann with the same title. These courses were very mathematical. Other courses leading to the PhD were the usual ones in real and complex variables, algebra and topology. My dissertation was on the power of various non-parametric tests under various alternatives. (It did not set the world on fire.)

In 1948 there were very few universities that had a Department of Statistics. However the opportunities for consultation and collaboration with faculty across the University seemed boundless. From my point of view the outlook for Statistics at Ohio State appeared to be better than most and I accepted a position as Assistant Professor of Mathematics. Tibor Rado was chair of Mathematics at that time; R.G. Helsel became chair in 1949 and continued through 1961.

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3. The Period From 1948 to 1962

Department of Mathematics

From the beginning, the four tenure track positions in the Ohio State system included the rank of Instructor. The wave of students after 1946 required the Department to hire many teachers who would not be considered on the tenure track. Those hired as instructors included three types of individuals: recent PhDs, advanced graduate students (not necessarily in Mathematics), and others, many of whom had taught in high school. The stipends of instructors could be quite varied. The University made efforts to have salary levels in each rank be uniform in departments across the campus. It never happened.

Statistics evolved slowly during this period as the table below shows; the proportion of the total number of each rank of faculty who had an interest in statistics or probability grew but slowly.

	Professors & Assoc. Professors		**Assistant Professors & Instructors**	
Year	**Total**	**Stat/Prob**	**Total**	**Stat/Prob**
1948	7	1	17	2
1951	8	1	15	1
1954	12	2	21	3
1957	12	2	23	2
1960	17	3	17	1

In this period nine students received the PhD in Mathematics with an emphasis in Statistics, and considerably more earned the MS with an emphasis in Statistics.

Statistical Training

The following lists the course offerings in statistics and related topics that were available in 1948 and the *additional* ones offered by 1960. The maximal requirement is given in parentheses. Nearly all courses were open with permission of the teacher.

By 1948 the following courses were taught at Ohio State:

- An Elementary course (admission to the university)
- An Elementary Course (calculus)
- Finite Differences (advanced calculus)
- Three quarter sequence on Probability
- Analysis of Variance and Design of Experiments (advanced calculus and graduate standing).

By 1960 these original courses were supplemented by

- An Elementary Course (advanced calculus and major in Engineering)

An Elementary Course (calculus and major in Statistics or Mathematics)

- Probability (advanced calculus).

One of these courses was requested by Professor Lehoczky, chair of Industrial Engineering. (His son became a prominent statistician who teaches at Carnegie Mellon University.) Lehoczky's interest was in Labor Relations, but he felt that his Department should include some statistics in their curriculum.

There was statistical activity in many University departments, particularly in Economics, Psychology, Zoology and The Agricultural Experiment Station in Wooster, Ohio. In many departments a particular faculty member would teach courses in statistics (under a non-statistics label) and also help other faculty members with their research problems. Mann continued helping researchers with their statistical problems and I followed suit. The campus grape vine provided clients, both faculty and graduate students. Mann and Professor Earl Green from Genetics pushed the idea that the Department and University should recognize this type of consulting work as an integral part of the academic community. At their instigation, a formal consulting service was started within the Mathematics Department. Following the successful model at Iowa State University, we used the name Statistics Laboratory. I was given a slightly reduced teaching assignment to be in charge of the operation. In time a secretary, two graduate assistants and an instructor were assigned to the Laboratory. Eventually the University gave us permission to establish a rotary fund. Consultations involving only a small amount of time or computation were essentially free. If extensive computations were needed the fund allowed us to bill the client and then be able to hire more clerical help as needed. Consultation with students and faculty was part of my assignment in the Department but was the most enjoyable. Those seeking assistance in the Laboratory came from every College and from many different departments. Lunch at the Faculty Club provided a pleasant and efficient time to discuss problems. I believe that hearing how a person from a different academic discipline reacts to common problems not related to statistics, helps one in having a successful consultation.

Considering the large number of contacts that I had with faculty through the Statistics Laboratory it is not surprising that requests for statistical advice or help in the computation would come from outside agencies. Problems that required a minimum amount of consulting could be handled through the rotary fund. If the problem involved extensive work on my part there seemed to be no easy way to incorporate fees for consulting in my university stipend. As a result I did some private consulting. This was rewarding, not only from the fee, but I could take on only the jobs that were interesting and conformed to University policy. The work came from State Government units, Business and Manufacturing.

One problem of particular interest to me at that time, that persists today in a different setting, is that of complete enumeration as opposed to random sampling. In case a telephone company wished to raise rates it needed permission from the Ohio Utilities Commission. State law required a complete study that meant that each item in the telephone system had to be given a dollar value based on examination of that item. For example, each switch, pole, wire, etc had to be examined. The Company hired W.E. Deming to use a sampling method to accomplish this evaluation of the worth of the telephone system and to convince the Commission that the law had not been ignored. The Commission hired me to check on Deming's plan and see that it was properly carried out. (From my point of view I was the fox guarding the chickens.) When the Commission interrogated Deming they were no match for his style. In essence the work was accepted. The next time the Company hired me on Deming's advice. The law has since been changed.

Computation

Several makes of ten bank electro-mechanical computers were available in the Department. These were transferred to the Statistics Laboratory. The Department purchased additional machines; the last one, from Frieden, was capable of producing a square root with one key!

A project in the Chemistry Department had at their disposal an IBM Punch Card setup that included a sorter, keypunch and reproducer. On the latter machine one could wire a panel that enabled one to perform computations on a data card and punch the result on the data card. A forerunner of program storage was a deck of cards containing the program for a square root. When the Chemistry Project was finished, the Research Foundation desired to keep the Punch card equipment on the campus and the Statistics Laboratory was the beneficiary.

The Research Foundation was interested and willing to send three faculty members from the Mathematics Department to IBM's Research Center in New York to find out what was new in Computing. Three of us (Leslie Miller, Roy Reeves and myself) were there for a week. An outcome of this was the establishment of a Numerical Computation Laboratory (NCL). Reeves was the head of this first computation service offered to the entire campus community.

The development of the NCL led to changes in the work of the Statistics Laboratory. The first step was the Laboratory putting the data on punch cards and delivering it by hand to NCL. With a wire connection to NCL and the introduction of statistical routines we were able to carry out most of the necessary statistical computation in our office. The computational facilities made by the Statistics Laboratory progressed from an electro-mechanical device to an electronic computer using vacuum tubes and then to an upgraded model that replaced the vacuum tubes with improved electronic circuitry that greatly increased the capability of the machine. In retrospect, the more obvious changes over the years were the demise of the slide rule and the need for tables such as those for trigonometric functions, distribution functions and others. On the negative side the ability of a researcher to estimate the size of some statistic in advance (or the position of the decimal point) diminished. Another unfortunate negative was that the proliferation of canned statistical programs induced some researchers to try different programs (and methods) and then choose the one that made the researcher's data conform to what was hoped for.

Other Developments

In this period my work centered on teaching statistics courses and consulting in the Statistics Laboratory. Other activities were related to the operation of the Department itself. Some of these are described below.

The University became concerned with the numbering of courses in the various departments. In particular, it was desired that the numbering have a connection with the prerequisites for a given course. Numbers in the 100-400 range were to be exclusively for undergraduates, those 700-900 would be for graduate students, and 500-600 level courses could be taken by either group. In a given department the prerequisite for a course should not have a higher number than that course. I was given the assignment to make the mathematics numbering consistent with these goals. The only difficulty was getting agreement from the faculty involved with a given course. Some other disciplines had more difficulty.

The Graduate School had rules for the preliminary examinations for the PhD and for the final oral examination. The Graduate School recognized that different departments interpreted these rules in different ways but they wanted internal consistency within a department. The Department's four written examinations were in Algebra, Topology and Real and Complex variables. As a member of the Graduate Committee I was an impartial arbitrator with the faculty on the requirements for taking these examinations. In the process the Committee agreed to let Statistics be an optional replacement for one of the four. In each Commencement program the PhDs were listed with name and department, in our case with Mathematics. Both the Graduate School and Mathematics approved the option that Statistics could replace Mathematics for an appropriate candidate.

Eventually, I served as Chair of the Graduate Committee in Mathematics, and was acting chair during a few summer quarters, in particular that of 1962. Chair Helsel was away virtually every summer and the acting chair rotated among those who were willing.

University policy required that each department chair should be reviewed every four years. In general it appeared that the first phase of that process consisted in the Dean of the College obtaining opinions from the faculty as to whether a change in the Chair is in the department's best interests. Dean Osborn Fuller decided that there should be a change in Mathematics. Names of possible candidates were submitted to the Dean. A few of the faculty felt that I should be considered. My answer was that I did not desire that position and felt that the Mathematics Department needed a strong Mathematician as its head.

The new Chair, effective Autumn quarter 1962, was Arnold Ross, then Chair at Notre Dame. His commitments at Notre Dame prevented him from coming to the campus until a year later. I was asked to be acting chair (a default appointment) starting with the Summer quarter, 1962 and ending with the arrival of Arnold Ross for the Autumn Quarter of 1963.

A new building for Mathematics, attached to Cockins Hall, was ready for occupancy in the summer of 1962. The Department had been housed in the third floor of "old" University Hall for many, many years. The Mathematics-Physics library had been in Mendenhall but when the Physics Department moved to a new Smith Laboratory their library joined them. The Mathematics library was moved to the Main Library. In the summer of 1962 the Mathematics library was moved to the new building for Mathematics. Almost immediately the space allotted to the library was too small. We discovered after the move that the Architect and the Department had apparently little contact with each other. No assignment of offices for the faculty had been made prior to the summer move. As acting chair I had the job of getting the offices matched with faculty so that seniority and office (good size and location) were highly correlated. As with most of the usual Chair decisions I kept Ross informed. At the time of moving there were enough offices to house all faculty in private offices and all the graduate assistants in shared offices. Before long the building had no space for graduate assistants.

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4. The Period 1963 to 1974

Major changes in the University affected both Mathematics and Statistics during this period. With Ross as Chair, the Department of Mathematics took on a different look and mood. While Ross was still at South Bend and I was acting chair there was considerable contact between us. I answered his questions about the department and his ideas on the hiring of new faculty. This continued on for a number of years. Ross suggested that I have the title Assistant Chair, but I declined since I still felt that statistics should be my main priority. Before 1963 1 believed that any job I did for the Department was done by default. I think that under Ross I would not have felt that way. The Mathematics faculty (and those in the Department with statistical interests) continued to grow as the table below shows.

Faculty of the Mathematics Department

	Professors		
Year	**Full**	**Associate**	**Assistant**
1962	9	11	11
1963	11	22	1
1966	17	13	2
1970	17	27	30
1974	18	31	6

(The complete data on Instructors was not immediately available. Persons on leave or in a visiting category were not included. Much of the variability in the numbers is due to promotions, new appointments and the transfer of faculty to other University units.)

For a student to receive an MS degree, the Graduate School required a thesis. Many of the faculty across the campus held the opinion that a student aiming at a PhD should be able to either skip the MS degree or not be required to write a thesis. I agreed with this with one exception. If the student dropped out of the PhD program the thesis should be a requirement for the MS degree. This view was not to increase the student's knowledge of statistics but rather to tell the student that his future employment would require him to be able to convey his thoughts to others both by writing reports and giving oral presentations. In departmental meetings to discuss this question two of us were the only ones not in favor of eliminating the thesis requirement for everyone. My partner in this was Hans Zassenhaus, a University research professor, who was Ross's prize addition to the Department. Zassenhaus had taken the trouble to look at some of the theses, most of them by my students. I was the most surprised faculty member when he spoke in favor of the thesis.

The University decided that there should be a reorganization of the colleges. One result of this was that the departments

in the College of Arts and Sciences were disbursed into five separate colleges. The "College of Mathematics and Physical Sciences" contained the departments of Astronomy, Chemistry, Geology, Mathematics and Physics. The University, deciding that computation should be recognized as a separate entity, created the Department of Computer and Information Science. For reasons beyond me, this Department was placed in the College of Engineering. The Department of Electrical Engineering was and is definitely interested in the design and construction of computers but the usage of a computer transcends engineering.

Personal Thoughts

In my mind the name of the College of Mathematics and Physical Sciences should have used the word *Mathematical* in place of Mathematics. Later, I convinced Dean Colin Bull that this change should be made and it was done. Mathematical could cover Pure and Applied Mathematics, Statistics, and Computer Science. These four areas or departments could be a School of Mathematics. These are already names of departments in many universities. The establishment of a Department of Computer Science in a different college eliminated part of my dream. It seemed then that the time had come that a separate Department of Statistics would be a viable possibility. Prior to this time I had never considered the creation of an independent department as a desirable and realistic goal.

Steps Toward a Department of Statistics

One of many faculty appointments made in 1962 (effective for the year 1963) that Ross acted on with my full concurrence was to appoint Jagdish Rustagi as Associate Professor. This was the first step in appointing persons to the faculty of Mathematics who did not have a PhD in Mathematics. Jagdish brought a fresh outlook for the faculty interested in statistics. In particular, he was interested in developing a Biostatistics program. With the cooperation of Professor Walter Harvey from Animal Science and Professor Martin Keller from Preventive Medicine the Graduate School approved a doctoral program in Biostatistics. In addition to the consultation work done by the Statistics Laboratory, we were requested by a number of departments to hold sessions with their faculty who were interested in a general discussion of statistics. The topics covered ranged from what help the Statistics Laboratory could provide to thoughts on the education of their students. The College of Business expressed an interest in a separate service from the Mathematics Department that would help their faculty with problems that are either of a statistical or mathematical nature. Ross agreed to add two faculty to the Statistics Laboratory to create this service. This project was active for awhile but never came up to expectations. The faculty assigned were mathematically capable but looked at this assignment as the equivalent of a remedial course in mathematics, which it was not.

The University had much information that had to be gathered and numerous criteria that had to be satisfied before granting departmental status to Statistics. Evidence had to be gathered showing that many universities had Statistics departments, information collected that there was a sufficient number of statistics courses being offered across the campus, endorsement for a separate statistics department had to be gathered from many of the departments offering statistics courses, and an estimate prepared of the budget to meet the expected departmental needs. Gathering this data as well as having frequent meetings with the University Committee that was supervising the process was time consuming and frustrating at times. In addition, the Board of Trustees had to eventually approve the proposal.

The University Committee asked many questions. One in particular was "How do you expect to fulfil the needs of those departments who are taking care of their own problems in statistics?" My answer covered two phases. If a statistics course in another department is essentially at the undergraduate level (even though its number may indicate something else) we would argue that we could handle that course in a better way. At that level, examples of the use of statistical methods should cover a variety of academic disciplines. This has two advantages. If the enrollment in the other department's course was small our department could service multiple departments with a single course. It was our contention that faculty members (and their departments) would rather lecture in their own discipline than teach a course in a different field. The second phase of my answer covered the case where the course in statistics was not at the undergraduate level but the student was knowledgeable of the types of problems that occur in that discipline. We would have no objection to that course being given by a faculty member in that department. The Statistics Department should make every effort to coordinate the teaching efforts in statistics with those of other such departments. Another criterion for departmental status was that existing faculty on the campus who were willing to join the department should exceed a specified number. At that time our existing statistics group in Mathematics fell short of that figure. That was

disappointing but the net result, with the approval of Arnold Ross, was the creation of a Division of Statistics in 1970. I was appointed chair with an independent budget. We kept the offices we had been using. During the first year of existence, the course offerings were under Mathematics and then changed to Statistics.

Following its existence as a Division within Mathematics for the 1970-1974 period, Statistics finally became a department in 1974. The founding group of faculty were

*Professors:*Whitney, D. R. (Chair), Rustagi, J., Willke, T.

*Associate Professors:*Dudewicz, E., Srivastava, R., Wolfe, D.

Assistant Professors: Archambault, W., Jr

*Instructors:*Eberhardt, K.

with joint appointments for J. M. Shapiro and L. Sucheston.

In retrospect, the many endorsements in the application for the Division followed by the Department were, in part, the result of the goodwill generated by the activities of the Statistics Laboratory.

Personal Remembrance: Henry B. Mann - My Mentor, Colleague and Friend

Henry was a peaceful and caring man. Other than Number Theory and Statistics he had several hobbies. Philately and swimming were dominant, with bridge a distant third. Stamps issued prior to World War I, particularly Russian, were those of most interest. However his collection of British Colonies was beautiful, but he sold those in order to buy one Russian stamp. A safe in an upstairs room took care of these items. Swimming was partially satisfied by maintaining a house on the shore of Lake Mendota across from the University of Wisconsin. That was the Mann's summer home. His solo swims across the lake bothered some and for his own safety he was supposed to have a boat along side for the trip. An answer to that was putting his wife, Anne, in a small boat and towing her across the lake.

He retired at the end of the 1962-63 academic year. His next residence was the home on Lake Mendota. He certainly connected with the Mathematics Department of the University of Wisconsin, but I do not know the details. The Manns moved to Tucson, Arizona where we visited them in 1990. Since then his wife died and his health deteriorated. His grandson has been our only source of information in the last few years.

Academic Press published a book in 1977 entitled "Number Theory and Algebra: collected papers dedicated to Henry B. Mann, Arnold E. Ross and Olga Taussky-Todd", edited by Hans Zassenhaus. (Biographies of all three are included in this volume.)

Part II: The Department from 1974 - 1999

- By Jagdish Rustagi and Thomas Santner

Table 1 traces the growth of the Department since its inception. We now elaborate on some important phases of this evolutionary process.

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1. The 1970s - Initial Developments

Among the early additions to the Department of Statistics were Michael Fligner (nonparametric statistics), Paul Feder (statistical theory), and then later Jason Hsu (experimental design for multiple comparisons). Also Louis Sucheston and T. Shapiro, probabilists who remained in the Mathematics Department, continued to have strong interest in the probability and statistics program. Fred Ruland was employed in the Department's Statistical Laboratory from its

inception until the early 1980s.

Biostatistics

Following the appointment of Jagdish Rustagi in 1963, Arnold Ross supported the development of a Committee on Biostatistics that was set up in 1965. This committee consisted of Ransom Whitney, Walter Harvey of Animal Science and Martin Keller of Preventive Medicine and was chaired by Rustagi. The graduate school approved a doctoral degree program in biostatistics and several students enrolled. Among the early PhD's from the biostatistics program were V. J. Shrikhande, Umed Singh, Gary Zerbe, and Jean Powers.

A process of cooperation between nontraditional departments was initiated with a joint appointment (Animal Science and Mathematics) of Professor Frank Allaire whose research interests were in population genetics. As another example, Rustagi had a joint appointment with Preventive Medicine. The program in biostatistics flourished and ultimately was administered by the Department of Statistics after its establishment in 1974 and the Committee on Biostatistics was disbanded.

Research Conferences Organized by Members of the Department

In addition to the Departmental role in teaching service courses for undergraduates enrolled in the Colleges of Business, Engineering, Agriculture, Arts, and Sciences, the faculty took an active interest in research. Beginning in the 1970s and continuing through the 1990s, the Department has organized numerous conferences in Columbus and abroad with the cooperation of other universities in keeping with OSU's increasing role in education and research. Some of these conferences are listed in Table 2.

Degree Programs

The undergraduate major in statistics attracted very few students. The graduate programs leading to the PhD in statistics, the PhD in biostatistics, and the Masters of Science in Statistics were an essential part of the Department from its beginning. A Master of Applied Statistics degree (the "MAS" degree) was developed later. Graduates with MAS degrees have supplied industrial and government needs. The Dean of the College of Mathematical and Physical Sciences, Colin Bull, was instrumental in getting the MAS degree program through several university committees and lengthy administrative procedures to approval in 1978. He also inspired the formation of an Industrial Advisory Committee for the Department in 1979 and gave some financial support. The Industrial Advisory Committee has been a great help in the improvement of the graduate programs and applied statistics courses. It is an example of the selfless service that the members of the industrial community and government statisticians provide to the university. The Industrial Advisory Committee typically meets annually with faculty and graduate students; over the years, its recommendations have been instrumental in improving courses and the degree programs. In addition, the members of the Committee have helped our graduates in finding summer and regular jobs after graduation.

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2. Growth of the Department during the 1980s

During the 1980s, The Ohio State University regularly reviewed its programs and developed strategies to achieve excellence in various academic disciplines. A review of the statistics program was carried out in 1980. Based on the recommendations of the local and external committee of experts, Statistics was designated as a central discipline with high potential to achieve excellence. The University agreed to fund a full time Director of the Statistics Laboratory and add senior faculty in various specialties, such as multivariate analysis and computational statistics. To formalize the process, a Memorandum of Understanding was signed between the Provost of the University and Chairman of the Department. As a result of these recommendations, three senior appointments were made at the level of professor: Prem Goel, Robert Bartoszynski (now deceased), and Saul Blumenthal. The appointment of these senior members brought the Department into the national light and statistical activities in research and consulting increased. Joint appointments with other departments as well as honorary joint appointments of statisticians at Battelle Memorial Institute added to the expertise in the Department.

In addition to senior hires, a large number of junior faculty were made who form a critical part of the current Department's core strength. Tables 4 and 5 give a detailed list of tenure track faculty and their years of service in the Department of Statistics. Among current faculty who were hired as junior personnel during the 1980s are (in alphabetical order): M. Berliner, D. Critchlow, A. Dean, S. MacEachern, H. N. Nagaraja, W. Notz, D. Pearl, E. Stasny, and J. Verducci.

Distinguished Visitors and Honorary Degrees

As the department developed a national and international reputation, it attracted a group of highly distinguished visitors who stayed for varying periods of time. These visits helped in the development of the academic program in general, and provided the younger faculty members with stimulation for research, in particular. They interacted with campus researchers as well and took part in the teaching program. A partial list of visitors and the year of their visit are

Professor C.R. Rao	1978-79
Professor Om P. Aggarwal	1983
Professor Morris DeGroot	1985
Professor Herman Rubin	1986
Professor Abram Kagan	1987
Professor Adrian Smith	1991
Professor Niels Keiding	1991
Professor Valery Nevzorov	1994
Professor Noel Cressie	1995

As another measure of the growth of the influence of the Department (within the Ohio State community), the Department was successful in having a number of its candidates granted OSU honorary degrees. The list of awardees includes C.R. Rao (1979), W. Edwards Deming (1982), and Herman Chernoff (1983).

As the decade ended, the Department had firmly established itself on the national scene. Its degree programs and the bulk of the research reflected a strong interdisciplinary flavor. There were research groups in nonparametric statistics, biostatistics, experimental design, and Bayesian analysis, among others. The faculty had grown to 21 members. Prem Goel began a term as Chair beginning in 1988. Well over 200 students had earned MAS and PhD degrees by the end of the decade.

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3. Increasing National Prominence in the 1990s

At the beginning of the 1990s the Department's academic reputation could be gauged by comparing the change in its National Research Council ranking from the 1982 rating to the 1993 rating. In 1982, the NRC ranked the OSU Department of Statistics 36th in overall program quality out of the 64 Biostatistics and Statistics Departments that were considered. In 1993, it improved to 29th position in overall quality. The overall quality index of the department showed the 9th best improvement of any department in the nation. Other rating groups gave similar improved assessments to the OSU Statistics program.

However the early 1990s were a period when the downturn in the U.S. economy dramatically slowed the gains of the Ohio State Department of Statistics (and every other academic department and most industry in the United States). Indeed, a second decennial departmental review was conducted in the early 1990s that had essentially no impact because of the economic situation of the University. Positions were cut and salaries were essentially frozen. A number of senior faculty retired, including Jagdish Rustagi, Ramesh Srivastava, and Jean Powers. Others were attracted away by competing schools, including John Klein and Sue Leurgans, both of whom had been hired as junior faculty; these last

two losses hurt biostatistics in the early 1990s because both were making significant professional contributions by this time in their careers.

Among the groups that remained the Department had strength in applications of Bayesian statistics (Goel, Berliner, Stasny, and junior hire MacEachern), aspects of experimental design (Dean, Hsu, and Notz), and nonparametrics (Wolfe, Fligner, Verducci, Critchlow), as well as a diminished effort in biostatistics (Pearl, Nagaraja). A number of these efforts involved substantial computational development. In the face of the continuing shortage of resources, the Department identified three major areas in which to devote additional resources, as they became available: Biostatistics, Computation, and Pedagogy. It already had core activity in each of these areas and the intent was to dramatically strengthen each. The university instituted an "Academic Enrichment" program to help circulate the limited monies that it had; each year, each department was taxed a small fraction of its total annual rate to provide a pool of funds that were distributed to departments based on an internal grant-type competition among new departmental initiatives. The Department of Statistics eventually won substantial parts of five of these awards.

Biostatistics

As noted above, the departure of John Klein and Sue Leurgans hurt Biostatistics. The senior hires of Tom Santner, Hani Doss, and Stan Lemeshow and the junior hires of Shili Lin and Mark Irwin eventually redressed these losses. Santner was hired to be Director of the Statistical Consulting Service and because of his interest in statistical applications in biomechanics; Doss provided additional leadership in Bayesian statistics, especially in survival analysis. Lin and Irwin inaugurated a new area of research for the department, Statistical Genetics. Stan Lemeshow joined OSU in 1999 to head the reinvigorated biostatistics program (the appointment partially supported by an academic enrichment grant and in conjunction with the newly formed OSU School of Public Health). Improved consulting with the Medical College and a new Master’s degree in Biostatistics are two of the initial outgrowths of these activities.

Computation

The Department’s emphasis on computation eventually sharpened on environmental applications. This focus formed gradually. First, we should mention that on the hardware side, the departments computing facilities were greatly improved by two National Science Foundation grants, the first awarded in the mid 1980s and the second in the early 1990s. Following a period in the mid 1980s in which the department had a single Pyramid server for all faculty and students, by the early 1990s it had a distributed workstation environment consisting of DEC equipment. Its hardware has evolved during the decade to HP and then to SUN hardware. In addition, the Department’s ability to hire support personnel has dramatically improved with two full-time system personnel in 1999. On the research side, the number of faculty involved in highly computational projects has grown dramatically from the initial interest by Jason Hsu in projects motivated by multiple comparison applications. Newer research efforts involved the study of climate modeling and atmospheric science (M. Berliner), Bayesian modeling (M. Berliner, M. Peruggia, S. MacEachern, and T. Santner), the design of optimal and computer experiments (A. Dean, W. Notz, and T. Santner), and function estimation (X. Shen, D. Wolfe). The culmination of the effort to improve the highly computational, interdisciplinary side of the program resulted with the hiring of N. Cressie (again partially supported by an academic enrichment grant) to develop a program in Environmental Science and Spatial Statistics.

Pedagogy

The National Science Foundation has provided continuing support for W. Notz, D. Pearl, and E. Stasny to develop an electronic encyclopedia of statistical examples. Indeed, the faculty, as a group, have published nearly 30 text books ranging from study guides for elementary statistics courses to books covering advanced topics. Various department members, most notably D. Pearl, have developed one of the most widely taken introductory courses on campus, Statistics 135. An academic enrichment grant provided monies for improving the lab facilities for 135 and other courses.

Other Developments

In addition to increasing its involvement with the School of Public Health, Statistics increased its association with the Department of Psychology by jointly hiring M. Browne (multivariate analysis). It helped provide leadership for the

university graduate programs as Doug Wolfe spent the period 1995-97 as an Associate Dean of the Graduate School. It selected a new Chair as Tom Santner began these duties in 1992. By 1998 the Department had nearly 500 graduates spread all over the world, and a newly created newsletter to keep in contact with them. In 1998 it moved (from the first floor) to new space on the top floor of Cockins Hall; this was the first time since its early history that the Department had its graduate students together in the same building! It also has an entirely new (and enlarged) staff compared to that present only six years earlier in 1992 (Table 6). As a final commentary on the improvement of the program, we note that the recent 1997 survey of research productivity during 1985-1995 ranked the Department 22nd in the U.S. (C. Genest (1997) "Statistics on statistics: measuring research productivity by journal publications between 1985 and 1995" in *The Canadian Journal of Statistics*).

Acknowledgment

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Appendix

Table 1. Number of Graduates of the Ohio State Department of Statistics 1974-1998

YEAR	FACULTY FTE'S	PhD	MAS	MS	TOTAL DEGREES
1974	9	2	0	7	9
1975	7	3	0	1	4
1976	9	2	0	4	6
1977	10	11	0	5	16
1978	11	3	0	2	5
1979	12	1	0	1	2
1980	12	2	0	1	3
1981	10.4	3	*	4	7
1982	13.4	2	*	3	5
1983	10.4	5	*	1	6
1984	13.4	7	14	3	24
1985	15.4	0	11	0	11
1986	20.4	7	9	1	17
1987	20.4	7	11	5	23
1988	19.4	6	8	8	22
1989	16.4	10	22	11	43
1990	19.4	0	11	8	19

1991	20.4	11	22	8	41
1992	21.8	8	14	6	28
1993	21.4	8	13	7	28
1994	20.4	6	23	8	37
1995	21.4	2	20	12	34
1996	23.4	3	12	10	25
1997	20.4	8	13	13	34
1998	21.4	8	13	7	28
TOTAL		**128**	**224**	**143**	**495**

* MS count includes MAS degrees.

Table 2. Some Conferences Organized by Membersof the Ohio State Department of Statistics

1971	Optimizing Methods in Statistics (held on campus)
1977	Optimizing Methods in Statistics (held in Bombay, India and organized jointly with IIT, Bombay)
1978	Nonparametric Decision Theory (held on campus with T.S. Ferguson as lecturer)
1979	G-inverses (held on campus with C. R. Rao as lecturer)
1980	Teaching of Statistics and Statistical Consulting (held on campus)
1984	First Ohio Statistics Conference (held on campus)
1987	Splines in Statistics (held on campus with G. Wahba as lecturer)
1987	Recent Developments in Statistics (held in Seoul, Korea and organized jointly with Korea University)
1990	Bayesion Computation (held on campus)
1990	Survival Analysis (held in Columbus)
1990	Ranking Models (held in Amherst, Massachusetts)

1993	Quality Improvement (held in Columbus)
1995	12th Ohio Statistics Conference (held in Columbus)
1999	16th Ohio Statistics Conference (held on campus)

Table 3. Chairpersons of the Department of Statistics 1974-2000

D. Ransom Whitney	1974-79
Jagdish S. Rustagi	1979-83, 1984-88
Douglas A. Wolfe	1983-84
Prem S. Goel	1988-92
Thomas J. Santner	1992-96, 1997-2000
William I. Notz	1996-97

Table 4. Former Department of Statistics Faculty 1974-1999

Name	Period of Service
Archambault, W. A. T., Jr	1974-1977
Aubuchon, James	1983-1987
Bartoszynski, Robert	1984-1998
Blough, David	1983-1984
Chan, Wai	1985-1988
Costigan, Timothy	1989-1993
Dudewicz, Edward	1974-1983
Eberhardt, Keith	1974-1980
Fairley, David	1983-1988
Feder, Paul	1975-1980
Kikuchi, David	1981-1983
Kinateder, Kimberly	1991-1995

Klein, John	1981-1994
Klotz, Jerome	1981-1983
Leurgans, Sue	1985-1993
Nelson, Peter	1977-1981
Obremski, Thomas	1977-1981
Policello, George	1976-1981
Powers, Jean	1980-1992
Rustagi, Jagdish	1974-1988
Srivastava, Ramesh	1974-1990
Whitney, Ransom	1974-1983
Willke, Thomas	1974-1987

Table 5. Statistics Faculty As of January 1999

(and Their Appointment Date)

Name	Research Area
Mark Berliner (1981)	Bayesian and robust Bayesian theory and applications.
Saul Blumenthal (1984)	Estimating sample size with truncated data, superimposed renewal processes.
Micheal Browne (1991)	Multivariate analysis.
Noel Cressie (1998)	Theory and application of spatial stochastic modeling, Bayes and empirical Bayes methods, goodness-of-fit.
Doug Critchlow (1989)	Analysis of ranking data, statistical inference for phylogenetic trees.
Angela Dean (1981)	Design of experiments for comparing the effects of several treatments.
Hani Doss (1995)	Bayesian analysis and survival analysis.
Mike Fligner (1975)	Nonparametrics and probability models for rank data.
Prem Goel (1984)	Bayesian decision theory, file merging methodology/data association.
Jason Hsu (1978)	Multiple comparisons and statistical computing.
Mark Irwin (1994)	Simulation methods in the analysis of genetic pedigree data, analysis of survival data.
Stan Lemeshow (1999)	Applications of statistical modeling and sample survey data to issues in medicine and epidemiology

Shili Lin (1996)	Statistical genetics and Monte Carlo methods.
Steve MaEeachern (1989)	Nonparametric and semiparametric Bayesian models.
Haikady Nagaraja (1981)	Order and record statistics, applied probability models, biostatistics.
Bill Notz (1985)	Optimal design of experiments, and designs which are robust to missing data.
Omer Ozturk (1995)	Robust estimation, testing and nonparametric inference.
Dennis Pearl (1985)	Probabilistic modeling of biological phenomena and simulation-based estimation for high-dimensional models.
Mario Peruggia (1991)	Iterated function systems, computational and graphical methods for statistical analysis,and Bayesian inference.
Nandini Raghavan (1994)	Nonparametric curve estimation and in statistical computing, Monte-Carlo methods.
Tom Santner (1990)	Statistical applications in orthopaedics; Brain mapping;Design of experiments for selection and screening
Xiatong Shen (1993)	Likelihood methods, semiparametric and nonparametric inferences, graphical methods, and statistical applications to atmospheric science and neural networks.
Elizabeth Stasny (1985)	Modeling missing data, particularly in categorical data from large-scale sample surveys.
Joe Verducci (1983)	Modeling random objects, such as random graphs and random pairs of permutations.
Douglas Wolfe (1974)	General development of nonparametric estimation and testing methodology.

Table 6. Current Administrative and Professional Staff Department of Statistics

(And Their Appointment Date)

Name	Position
Paul Brower (1998)	*Office Manager & Fiscal Officer*
Rob Leighty (1990)	*Manager Statistical Consulting Service*
Martha Six (1999)	*Fiscal Processing & Course Support*
Justin Slauson(1997)	*Mac Systems Administrator*
Brian Smith (1992)	*Unix Systems Administrator*

Dianne Spinazzola (1997)	*Graduate Studies Secretary*
David Todd (1998)	*Human Resources & Course Coordination*

Department of Statistics
The Ohio State University
404 Cockins Hall
1958 Neil Avenue
Columbus OH 43210-1247

Ph. (614) 292-2866
FAX: (614) 292-2096

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