

A conversation with Martin Bradbury Wilk

By Christian Genest and Gordon Brackstone

Abstract. Martin Bradbury Wilk was born on December 18, 1922, in Montréal, Québec, Canada. He completed a B.Eng. degree in Chemical Engineering in 1945 at McGill University and worked as a Research Engineer on the Atomic Energy Project for the Natural Research Council of Canada from 1945 to 1950. He then went to Iowa State College, where he completed an M.Sc. and a Ph.D. degree in Statistics in 1953 and 1955. After a one-year post-doc with John Tukey, he was Assistant Director of the Statistical Techniques Research Group at Princeton University in 1956–57, and then served as Professor and Director of Research in Statistics at Rutgers University from 1959 to 1963. In parallel, he also had a 14-year career at Bell Laboratories, Murray Hill, NJ. From 1956 to 1969, he was in turn Member of Technical Staff, Head of the Statistical Models and Methods Research Department, and Statistical Director in Management Sciences Research. He co-authored a number of influential papers in statistical methodology during that period, notably testing procedures for normality (the Shapiro–Wilk statistic) and probability plotting techniques for multivariate data. In 1970, Martin moved into higher management levels of the American Telephone and Telegraph (AT&T) Company; he occupied a succession of positions culminating as Assistant Vice-President and Director of Corporate Planning. In 1980, he returned to Canada and became the first professional statistician to serve as Chief Statistician. His accomplishments at Statistics Canada were numerous and contributed to a resurgence of the institution’s international standing; he played a crucial role in the reinstatement of the Cabinet-cancelled 1986 Census. He remained active after his retirement, serving as a Senior Advisor to the Privy Council Office as well as on several national commissions. In addition, he chaired the Canadian National Task Forces on Tourism Data and on Health Information. Martin is a former President of the Statistical Society of Canada (SSC) and Vice President of the American Statistical Association (ASA). He is an elected member of the International Statistical Institute and an honorary member of the SSC. He has received many honors, including the George Snedecor Prize, the Jack Youden Prize, the F.G. Brander Memorial Award, the SSC Gold Medal, and a Distinguished Alumni Achievement Citation from Iowa State University. He is a fellow of the Institute of Mathematical Statistics, the American Statistical Association, the Royal Statistical Society, the American Association for the Advancement of Science, and the New York Academy of Science. He was made an Officer of the Order of Canada in 1999 for his “insightful guidance on important matters related to our country’s national statistical system.”

The following conversation took place at Martin Wilk's home in Salem, Oregon, October 6–7, 2005.

INTRODUCTION

Christian: Martin, tell us something about your youth.

Martin: I was born in Montréal in December 1922. I was the youngest in a family of three children. I have two sisters who are still alive today. We lived in a part of town where English was dominant, and I should immediately confess to you, Christian, that although I had many years of training in French, I ended up with virtually no capacity in that language. I think I'm just one of those people, unfortunately, who inherited not much capability for a second language. But I dare say, it wasn't much of a handicap in Montréal, at least in those days.

I got my secondary education at the now defunct Strathcona Academy in Outremont. I had no burning academic interest at the time. What I thought was easiest was mathematics and geometry. In Grade 11, which was the final year, my worst grades were in French, oral and written. Other than that, all topics seemed pretty easy, and I guess I learned some bad working habits as a result.

ENGINEERING AT MCGILL

Christian: After graduation from Strathcona in 1940, you studied Engineering at McGill. What guided your choice?

Martin: When I was young, I was generally interested in the technical side of things, and McGill seemed like the place to go. It was one of the largest and most prestigious universities in Canada. It had a big reputation, especially in medicine. There was a year of transition with English literature, history, mathematics, and so on. Then you could go with a four-year program in the Engineering Faculty.

I found that first year really easy, but once I got engineering, that turned out to be quite a different story. The first two years of the engineering program were common to all. We were about 130 people at the start, and whoever gave the welcoming speech made a remark to the effect that half of us would be gone by the end of the first year. And he was right.

The first year in engineering was really hard for me. My bad habits were a disservice to me, and I ended up being second to last in the list of people who made the cut! Luckily, my performance began to improve at that point, and I was able to complete the program.

Gordon: What got you interested in chemical engineering specifically?

Martin: I enjoyed chemistry in high school, although we never had a chance to use a laboratory, because that wasn't part of the understanding at the time. Once I got to McGill, I found out that I was very good hands-on. Also there was an arrangement at that time that you had to be employed for the summer and write a term paper with regard to your experience. And as it turned out, all my summer jobs had to do with chemistry.

SUMMER JOBS

Christian: Where did you work as a student?

Martin: At Howard Smith's paper mill the first summer. They operated out of Cornwall, Ontario. Then a year later I worked for Distillers' Corporation. They used to produce commercial alcohol but during the war, they were busy making pure alcohol for the army. In my final summer before graduation, I worked for the Montreal Coke and Manufacturing Company.

The Montreal Coke was the most interesting of my summer jobs. It was a dry distillation of coal to produce coke. It was done in drying ovens whose temperature had to be monitored very closely, 24 hours a day. There were data to be collected and I was involved in that. I remember going up the chimney, wearing a sweater to keep me from being burned, and gathering data.

Gordon: Did the war affect you in any way?

Martin: Not really. There was no conscription in Canada in the early 40's. However, we did have to come to school in uniform twice a week, and spend some time at so-called training. I also learned how to identify a flying aircraft and to read Morse code along the way. But more significantly, perhaps, is that when I graduated in 1945, the war was still on. So I was offered a choice between doing a Ph.D. in chemistry at McGill or join Canada's National Research Council (NRC).

Christian: You make it sound as though you had no other option. Was that really the case?

Martin: Well, I mean I was told "That's where you're going." And at the time it was part of the understanding that you do as you're told. I mean, the alternative to that was you go in the army.

Gordon: And why didn't you go for the Ph.D.?

Martin: It paid well: \$75 a month, if I recall. This was a substantial amount of money at the time. But I didn't have the patience. You see, I don't think I'm a natural student. This is something I learned subsequently. And I found that listening to people telling me about things that they have done, or about things that other people have done, was not part of my nature.

CHALK RIVER LABORATORIES

Christian: What was your position at NRC?

Martin: When I was hired in June 1945, I moved to Ottawa and spent about six months there. Then I joined the Chalk River Laboratories, located in Deep River, in the upper Ottawa valley. The first nuclear reactor outside of the United States had just gone operational up there. There were about 250 scientists on the site. Nuclear technology was the focus of our activity.

There were many people from abroad. One of the most remarkable figures was Bruno Pontecorvo, an Italian physicist who had worked with Enrico Fermi. I got to know him

because each of us separately had a bad habit of missing the bus that drove us to work in the morning. Pontecorvo was probably a genius, and I am not using that term loosely. It came to me as a great surprise when he defected to Russia in 1951, in the middle of the Cold War.

Gordon: And what were your responsibilities?

Martin: I was mostly in charge of testing an air cooling system for the rods that were used in the experimental heavy water pile. I gathered a lot of data in this context and under the best of circumstances, there was a lot of variability associated with it. Radioactive behavior is by-and-large unpredictable, except on average. So I began developing a few techniques of my own to handle such data.

STATISTICS TRAINING IN IOWA

Christian: Does this explain why you chose to leave Chalk River in 1950 to do graduate work in statistics at Iowa State College?

Martin: Well, not quite. Let me explain. My time in Chalk River was quite pleasant and productive. I even had a paper published there [1]. But after five years, I had a feeling that if I stayed longer, I'd probably be there for the rest of my life. And I should mention something here, which at the time I had no knowledge of, but it's really turned out that throughout my career, I had a different job every five years. Not that I ever manipulated or arranged for it, but it just so happened.

Anyway, it so happened that some friends of mine had gone to Ames (Iowa). They were microbiologists and enjoyed it there. So they encouraged me to join them and even went as far as negotiating a contract for me with a chap called R.G. Tischer, who operated in food technology. He offered me a position as a research assistant and the salary was enough to make me feel that I could go.

Gordon: So you went just like that?

Martin: To tell you the truth, it was sort of a mindless decision, like many I took in my life. I didn't really think hard about it and don't recall that I needed to be particularly brave. And actually, once I got there, I found out that Professor Tischer's research program was much too prosaic in my outlook. I do recall spending countless hours in the lab, carrying out experiments for him, and reading instruments, etc. But I was quickly bored.

Now Professor Tischer knew enough about his own subject to recognize that there was variability in the observations he was dealing with, and given my prior exposure to data in Chalk River, I could provide some assistance with this. Eventually, he encouraged me to sign up for a statistics course, which I did, and I was interested to discover that there was a theory behind much of what I had basically developed on my own, in some form.

Christian: Do you remember who taught you that course?

Martin: It was Bernie Ostle. He had me meet with various people in the Statistics Department, and he encouraged me to solidify my mathematical encounters. I began doing that, and it all came very naturally. I mean, I really never had in mind that I was going to leave chemical engineering, but before the first year in Ames was over, I decided that it

wasn't right for me to continue taking money from Tischer. I decided to pursue the mathematics I was engaged in and work towards a Master's degree.

Gordon: Who was your supervisor?

Martin: It was Oscar Kempthorne. He supervised my Master's thesis, which I completed in 1953 and persuaded me to stay on for the Ph.D., which I got in 1955. My thesis was in the area of linear models and the analysis of variance for randomized block designs. It led to several publications [2–6], some of them joint with Oscar.

Christian: How was it like to work with Kempthorne?

Martin: He was a man of substantial intellect and he had very strong feelings about a variety of matters, technical and non-technical. I shared an office with him throughout most of my studies in Iowa, and we grew to be very good friends. He tended to be quite outspoken and to express his opinions emphatically. This may explain in part why the department was polarized, or at least separated between those people around Herman Hartley, who were involving in survey sampling, and those like Oscar Kempthorne and I, who were more concerned with analysis of variance and experimental design.

Gordon: Who else was there at the time?

Martin: People like Bernie Ostle, John Gertland, Ted Bancroft, and so on.

Christian: And you joined the group after you completed your thesis, right?

Martin: No, actually I was established as an Assistant Professor there before I completed my Ph.D. But as it turned out, Oscar wanted me to gain additional experience before settling in at Iowa State. So he got in touch with John Tukey, who was working at Princeton and for Bell Laboratories, and he made arrangements for me to go there for a year as a post-doctoral fellow.

I was actually quite pleased with this offer, because I had already met briefly with Tukey at the ASA meeting in Montréal in September 1954. I presented a joint paper with Oscar Kempthorne at that meeting, and I encountered John Tukey at that time. He already had a reputation as the ultimate wise man, and my impression was one of awe. He struck me as a very intelligent fellow, but it was only later that I found out how smart he really was.

POST-DOC AT PRINCETON UNIVERSITY

Christian: Tell us about your post-doc year at Princeton University then.

Martin: I arrived at Princeton in the spring of 1955. Sam Wilks was about to leave for Texas and I inherited his office. That was a good start! David Cox was there at the time; he and I worked under Tukey's leadership that summer. Tukey had a grand plan and lots of problems he wanted us to work on. He was the smartest man I've ever associated with up close. His speed of thinking was quite incredible, and his ability in mathematics was overwhelming. He was always so far ahead that he could lecture me on what I was trying to do far beyond what I could ever manage to accomplish. The whole process was very depressing and irritating to me. David Cox seemed to cope better; I guess he had an interest and a capacity that I didn't

have. But until David left in early fall, the two of us would often commiserate on the fact that Tukey was as smart as he actually was.

Anyway, my propensity is not to want to learn things unless I have a motivation, so I thought my year in Tukey's environment at Princeton was miserable. Maybe I didn't do as badly as I felt at the time, but in any event, I was in pretty bad shape by the end of the year. At the same time, my home life was hectic too. While doing my Master's thesis in Ames, I got married to Thora Sugrue and by that time we had four young children. That drew a lot of energy!

RESEARCH AT BELL LABS

Christian: So how come you didn't go back to Iowa at the end of the year?

Martin: Well, in the spring of 1956, John Tukey, who seemed to know more about me than I knew about myself, said how would you like to spend the summer at Bell Labs? I hadn't a clue what Bell Labs was, but it sounded intriguing. So at John's instigation, I went there and gave a talk in front of the statistics group, which was under the direction of Milton Terry at the time. I must have made a good impression but at the end, they made me an offer and after some cogitation, I accepted.

Christian: Did they offer you a regular contract right then?

Martin: No, it was just a post-doc at first. But then John Tukey arranged for me to work two days a week at Bell Labs and the rest as an Assistant Director for the Statistical Techniques Research Group at Princeton. So I got in touch with Oscar Kempthorne and Ted Bancroft at Iowa State College to let them know that I would not return after all.

Gordon: What prompted your decision?

Martin: The first summer I spent at Bell Labs was a very exciting time. To begin with, I encountered computer technology in the guise of an IBM 650, I believe. Also, the friendly atmosphere and the freedom you enjoyed as a researcher working for Bell Labs were exceptional. The staff was about 20,000 overall, and maybe 10% of these were scientists doing research in physics, chemistry, materials engineering, mathematics and statistics, etc. The Research Department had a distinctive character, and I was able to get involved in many projects as a statistical consultant and, to some extent, as a chemical engineer too. A couple of publications ensued [7-8].

Christian: And what were your responsibilities at Princeton?

Martin: I was involved in research there too. But I still found that association to be disappointing.

Gordon: And why is that?

Martin: Chiefly because of my inability to support the work of George Box, who had just joined Princeton. He was a very kind person, and he had a quick and relatively creative mind, but our styles just didn't match. He tended to be very focused in his research, and he was good at it too, but I guess because of my background and through my contacts with people at

Bell Labs, I had a much broader view of things. Besides, I had pretty well fallen in love with Bell Labs at that time. So I quit Princeton after only a few months, but through Bell Labs, my association with John Tukey lasted a long time.

Christian: Did your responsibilities at Princeton include any teaching?

Martin: I had done a little bit of teaching in Iowa, but I did none at Princeton. Where I did teach was at Rutgers, where I was a professor from 1959 to 1963.

PROFESSOR AT RUTGERS

Gordon: How did that come about?

Martin: I was approached in 1958 by Ellis Ott, who was heading the Department of Statistics there. He wanted to establish a Ph.D. program. He persuaded me to come down and teach an evening class in mathematical statistics. I agreed, and then in January 1959 he came up with the notion that I could be a full professor there and have the responsibility for research. I agreed, on the provision that I could still do consulting and other work with Bell Labs, one day a week.

The arrangement appealed to me on several accounts. First, Rutgers paid well and I needed that kind of money, given that by then I had a family of five children. Second, I thought maybe I'd like to teach in a university and lecture, as opposed to listening to other people. But I didn't want to give up on Bell Labs completely. The colleagues at Bell Labs turned out to be very encouraging in this regard.

Finally, an additional reason why Rutgers appealed to me was that the current Dean of the Graduate School, Marion Johnson, was close to retirement and the indication was that I would be a good candidate for replacement.

Christian: And did your expectations materialize?

Martin: I was on faculty at Rutgers four years in total, and I certainly did my best to serve their interests. But to tell the truth, I had a miserable time throughout that period, in that my wife Thora came down with cancer. This episode started almost immediately after I joined the faculty at Rutgers. I was at home almost round the clock, caring for her and looking after the children. In the end, we lost the battle against cancer and she died on April 15, 1965. Needless to say, I never applied for the dean's position at Rutgers.

Somehow, despite the hardships, I managed to be reasonably productive throughout that period. No doubt, this was due in part to the great collaborators I had. I am thinking especially of Ram Gnanadesikan and Sam Shapiro. Another more prosaic factor is that throughout my entire life as an adult, I never slept more than about four hours a night. Of course, I would also "cat nap" on occasion during the day. In fact, I did it even while I was Chief Statistician of Canada, but I'm getting ahead of myself now.

CONTRIBUTIONS TO STATISTICAL METHODOLOGY

Christian: You made a large number of contributions to statistical methodology in the 1960s. How did that develop?

Martin: Much of the research I did in that period was dictated or inspired by questions of consultancy at Bell Labs. If you look at my publications from the 1960's [9–32], you'll see that a prime concern of mine was diagnostic procedures for classical distributions, e.g., the normal or the exponential and the gamma. A fair portion of this work was carried out with Ram Gnanadesikan, who was a colleague at Bell Labs, and Samuel Shapiro.

Ram and I formed a highly compatible team. I think we wrote 11 papers together. One thing about Ram is that because of his Indian origins, he had a cultural bias about seniority and although each of us would do our fair share of our joint work, he insisted that my name be listed first, at least in the beginning [9, 11]. As for Shapiro, he was a student in one of my classes at Rutgers. He was a good guy, and he became one of my Ph.D. students.

At one point in time, it became clear to me that the behavior of order statistics, in some sense, would have to reflect the nature of a distribution. Ram, Sam and I used the properties of rank statistics to design QQ-plots and goodness-of-fit tests.

Christian: The 1965 *Biometrika* paper introducing the Shapiro–Wilk test statistic is certainly a classic.

Martin: I am obviously pleased with that, but to be truthful I don't regard this work as such a great accomplishment. I am fond of saying, significance tests are things to do while one is trying to think of something sensible to do. This being said, while it is true that the idea behind the test was mine, Sam carried it considerably further with power comparisons and approximations to the null distribution of the W statistic, as he kept calling it.

Christian: This was seminal work, although people sometimes think it was done by Sam Wilks!

Martin: The difference between Wilk and Wilks was always clear to me! But you are right that my work with Ram and Sam led to a host of publications, much of them quite sophisticated mathematically, too. To an extent, however, this flurry of activity illustrates a problem I see with mathematical statistics and more generally with science as I see it today. The problem is that there are a lot of facets to science, and it is now quite fragmented and being pursued in an opportunistic fashion by individuals in ever more specialized categories: mathematics, statistics, multivariate analysis, and so on down the line. I think this is regrettable.

We need people who look at problems much more broadly, and certainly the work that Ram Gnanadesikan, Marilyn Becker and I did on the problem of speech recognition was much broader in nature and of much greater importance potentially, although our work in this direction did not translate into refereed publications. Ram has given a very good account of the atmosphere in our research group, and the issues we contended with, when he was interviewed himself by Jon Kettenring [*Statist. Sci.*, vol. 16 (2001), pp. 295–309].

Gordon: It sounds as though you have become gradually disenchanted with mathematical statistics, if not more. Is that why you moved on to management at AT&T in 1970?

Martin: I certainly became disenchanted. Through the 1960s, I acquired a certain sense of the whole organization: I mean Bell Labs, of course, but also more generally AT&T. And if

I self-examine, I would say that by 1969, I was waiting for an opportunity to go into administration.

BEING NOTICED BY UPPER MANAGEMENT AT AT&T

Christian: How did that actually happen?

Martin: Through hearings for a rate case that AT&T had to submit to in front of the Federal Communications Commission (FCC). At the time, AT&T was a huge organization. It was effectively controlling the local and long-distance telephone network throughout the US, and because of its quasi-monopolistic position, the FCC had something to say about its rate of return to equity. One important ingredient in the hearings held at the end of the 1960s was the so-called Gordon model. It is a variant of the discounted cash flow model, that is, a method for valuing a stock or business that was often used at the time to provide difficult-to-resolve valuation issues for litigation. It was named after Myron Gordon, who was a professor at the University of Toronto.

Now at the time, John Tukey had been asked by AT&T to criticize some conclusions that had been derived by the FCC using this model. And John being the irritating person that he was (because he could figure out everything so much more quickly than anybody else), I was curious to see how my hero would fare in the formal and constrained environment of a federal commission hearing. So I asked permission to attend that part of the hearings. And at the time, I had no sense of the global issue at hand, but John talked about this model, and I was a bit amazed to see that everybody treated him with such greatest respect. Not that he didn't deserve it, but litigation tends to be rather merciless.

Gordon: It sure can be. But how did you personally get involved?

Martin: John's testimony sparked my interest in the Gordon model, so upon my return to New York, I started to investigate it on my own, and then I ran quite a few computer simulations. Within about a week, I got a pretty good sense of what was wrong with the proposed application of this simplistic model. I wrote up my findings as a technical note and sent it to John Tukey, who suggested that I pass it on to the upper management at AT&T. So I did, and then I got a phone call from Mark Garlinghouse, AT&T's General Counsel, who asked me whether I would mind briefing him about the Gordon model. Amazingly, he had read my report, which was definitely not written from a business point of view. In fact, part of it was later published in conference proceedings [35].

At any rate, Mark Garlinghouse and I met for a whole day shortly thereafter. We got on extremely well, though we had important political differences. He listened to me quite carefully and ended up making representations to the FCC, based on my report. I attended his presentation and found the experience quite interesting.

The bottom line is that through that event, the senior people at AT&T developed the realization that they needed more attention paid to what was referred to them as "management science." Subsequently, I was invited to spend some time there and help them out with some of their difficulties. It was a lateral move, shall we say, and at first I did it as a courtesy to them. But after I had a few interactions, I just got captured by the effort and started taking an interest in the general character of AT&T as an organization.

GOING UP THE RANKS AT AT&T

Christian: From 1970 to 1975, you worked at AT&T in various capacities. You were successively Director of Corporate Modeling Research (1970), Director of Corporate Research (1971), Director of Planning (1972), and then Director of Corporate Planning (1973–1975). What was the bulk of your responsibilities?

Martin: I was initially part of a unit headed by Henry Boettinger. The function of that small group, less than 20 people in total, was to look into managerial and financial problems. The group was actually unique at AT&T, which had no mathematicians, no economists or statisticians at the time. The organization had basically three functions: raising money, operating interstate transmissions, and providing common services for the 22 telephone companies in the AT&T group that ran within-state communications. Our group was set up to formulate plans and policies, to ensure coordination with the developers at Bell Labs and the implementers at Western Electric.

Gordon: With such responsibilities, was it difficult for you to remain active on the statistical front?

Martin: Well, I didn't actually drop technical work completely, at least in the early 1970s. For instance, I wrote that paper with Sam Shapiro on an analysis of variance test for the exponential distribution [34]. We were subsequently awarded the Jack Youden Prize for the best expository paper that appeared in *Technometrics* in 1972. I also managed to get some joint work done with Jane Gentleman [37, 39]. But as time unfolded, my bulk of my responsibilities became more and more managerial. And of course even more so when I was Assistant Vice President and Director of Corporate Planning, from 1976 to 1980.

Gordon: Can you summarize what you accomplished in that period?

Martin: Generally speaking, I carried out work on many large and small tasks in economics, financial and technological areas, including picturephones, registration, cost analysis, etc.

One major thing that was dumped on me was the Management Research Information System (MRIS). It had been initially designed to be the ultimate path-finding operation, a crucial ingredient in operating an interrelationship between the thousands of pieces and parts that a telephone system involves.

As it turned out, this MRIS was a colossal mess, and I made it legal to say so. I found that it was not possible to reorganize it in any sense or fashion. And the embryonic computing system that was there to make it alive, supposedly, consisted of parts that could never fit together. In part, this was because every operating telephone company had a different computing environment at the time. Also, sadly, some of the people did not have the expertise and the knowledge required to pull it together. There just weren't many people around then who knew how to operate these systems in a coordinated fashion. Yet the notion of an integrated system came up every time AT&T wanted to make an upgrade with what was already in place! In the end, I got this MRIS closed down.

BECOMING CHIEF STATISTICIAN OF CANADA

Gordon: How about the transition from AT&T to Statistics Canada? This occurred in 1980, right?

Martin: Again, this is not something that I sought. It came up on its own about five years into my executive position at AT&T. As it happens, things were in a bad shape at Statistics Canada at that time, and the Secretary of the Treasury Board had set up a group under the headship of Claus Moser to look into the technical competence of the federal agency. And there was a second, thicker document that had been prepared by Price-Waterhouse. At any rate, some member of the Executive Recruiting Committee phoned me in New York on a Friday afternoon, either in May or June 1980, to tell me this long story.

Gordon: Sorry. Were you being approached for the position of Chief Statistician of Canada?

Martin: They probably had that in mind, but the guy was not explicit about it and it didn't occur to me at first, for two reasons. First, it was not unusual for senior people at AT&T to be approached for counsel, as a service to the public, and given my background, it would not be completely unexpected for Canadians to seek my opinion in a period of turmoil at the national statistical agency. Second, I was 58 at the time, so I considered myself too old or too close to retirement to be perceived as a candidate for the job.

Nevertheless, I was sufficiently interested to look at the reports that were sent to me after the call, and then to travel to Ottawa to share my impressions.

Gordon: Who did you meet in Ottawa?

Martin: The meeting was chaired by Jack Manion, who was Secretary of the Treasury Board of Canada at the time. Other participants were Harry Rogers, Fred Drummie, and Larry Fry, who was then Acting Chief Statistician. They summarized the two reports briefly, and then Manion asked me point blank how I would handle the situation, and why I felt I could do the job! That was a real eye-opener to me, and I responded by saying that I had come to give my reactions to the reports, and that I would like to stick to what I came up there to do. He seemed rather puzzled by my reaction, but we stuck to my agenda.

After I returned to New York, we had an exchange of correspondence and eventually, I went back to Ottawa for further discussions. The Moser report was well done, though possibly a little too lenient on the quality of the surveys and the publications, but it was a fair assessment. The Price-Waterhouse report, on the other hand, was a terrible document with all kinds of criticisms that made no sense to me, even though I knew little about the organization. But what I knew and what I had heard did not correspond at all to that report's assessment of the situation.

Gordon: So what convinced you to meet that new challenge in the end?

Martin: As I reflected upon the subject, I became quite apprehensive as to what might happen to Statistics Canada if nothing was done. And the thing that attracted me to take the job is that contrary to the US, official statistics in Canada was set up as an integrated system in which data collection, analysis, and so on are coordinated parts of a grand plan. Anyway, I think I was half decided already when I was invited for brunch by Michael Pitfield.

Christian: Who is this?

Martin: Michael Pitfield was Clerk of the Privy Council and Secretary to the Cabinet. He was a most obliging person. He gave me a very honest briefing about the realities of what was going on at Statistics Canada. He was quite frank, in particular, about the existing fracture lines within the organization.

Gordon: Before we get to that Martin, could you tell us how soon after that meeting you accepted the position?

Martin: It took a few more months. You see, my second wife had problems with her eyes at the time. She had to undergo surgery, and I was not in a good disposition to make a decision right then.

However, I kept making enquiries about Statistics Canada through the fall of 1980, while attending to my regular duties at AT&T. There was a certain amount of reorganization taking place in the head office in those days and in the end, this influenced my hook up.

Gordon: Had you had any real involvement with official statistics prior to becoming Chief Statistician of Canada?

Martin: I was on the US Census Advisory Committee in the early 1970s. I remember urging them to develop some sort of strategic plan for evolution and commit it to paper. And I remember making an argument (which I subsequently made at AT&T too) that although the plan may not be fully implemented, it would at least force them to think where they were, where they wanted to go, and how to get there. Also, it is important to put a calendar to it. At a later stage, I remember making a number of concrete suggestions to the US Census Director, Vince Barabba, and they were well received.

MAIN CHALLENGES AT STATISTICS CANADA

Christian: Can you summarize the issues that you faced Statistics Canada?

Martin: One major organizational problem was the Division of Social Statistics and Economic Statistics into two almost completely separate units. These sections were headed by Ivan Fellegi and Guy Leclerc, respectively. Each of them had a title of Assistant Chief Statistician. The Survey Methodology groups were also split between these two sections.

There was also a major problem in human relations and the image that the organization was projecting. It affected its credibility in the eyes of the public. There were allegations of nepotism in the press and many good people ended up leaving the organization because of the extremely negative climate that prevailed. Jacob Ryten was one of them. And you left too, Gordon, isn't that right?

Gordon: Yes. I went to work for the British Columbia Statistical Agency for a while.

Martin: The morale at Statistics Canada was very low, and this was at a time when the 1981 Census had to be carried out. Mind you, the planning for that operation was well underway.

At the heart of the operation was Ed Pryor. It was a major undertaking, but we were globally satisfied with it.

Gordon: Luckily, by the end of your term, staff relations had improved considerably.

Martin: I am glad it worked out okay. I certainly tried to help every way I could. One person who helped me a great deal in sorting out the staff problems was Jean-Jacques Blais, who was the minister responsible for Statistics Canada when I took office. We developed a very good rapport. In addition, the Treasury Board was prepared to give me some slack, and that helped me considerably in dealing with some individuals. There was a fair amount to be done in this regard, but there is no point talking about this, as it would involve people by name and so forth. Suffice it to say that there was a certain amount of unpleasantness about it, but not much beyond that. And ultimately, staff movements helped resolve the separation between Social and Economic Statistics.

OTHER ISSUES

Christian: Besides human relations, could you give us an idea of the issues you had to deal with?

Martin: There were many on the methodological side. And to be truthful, I didn't have much of a clue at first as to what was going on in terms of production, i.e., what people did, how they did it, why they did it, etc.

One major problem for me was that I couldn't afford to take the time to find out in depth, because I needed speed of reaction that was far greater than my speed of learning. For example, there were major discrepancies at the time between the Labour Force Survey and the Survey of Employment Payroll and Hours. The problem was of considerable importance and urgency because these particular surveys attract a lot of attention in the public.

Another major issue that troubled me very early on was the range of publications that was turned out by Statistics Canada. There seemed to be no rhyme or reason to much of it. Much time, effort and money was being wasted in producing publications that very few people would read. The publication issue was eventually resolved; many significant changes were made. It was a long battle, and many compromises needed to be made, in part because of prior international agreements, in order to make publications self-sufficient.

Gordon: These efforts resulted in fewer publications, and more importance to those retained.

Martin: Right. On another operational front, I promoted a form of integration and also of regionalization of the data collection operations. I tried to give more importance to the regional offices in Halifax, Montréal, Toronto, Winnipeg, and so on. The process has expanded since, but setting up the process involved a lot of fighting initially. I ended up having to move a lot of people around, but in so doing I always tried to avoid disrupting their career goals.

And yet another important battle I recall was getting access to cabinet documents... There were strategic reasons behind this action, but it was part of a concerted effort to bring Statistics Canada into a closer relationship with other departments. This is one thing that struck me when I first joined the agency: it seemed that Statistics Canada operated almost

entirely on its own, and that it had very few contacts with other branches of government. I needed to make the personal effort of contacting the deputy ministers in charge of the various departments to set up working committees that could oversee the information and data collection needs of these folks, and establish mechanisms to meet their demands.

Christian: Were you not responsible also for setting up external advisory groups for Statistics Canada?

Martin: Yes, I set up quite a few of them, maybe of the order of a dozen. And many of them have survived to this day. In fact, were you not a member of the Advisory Committee on Statistical Methods with me in the late 1990s?

Christian: That right. I was on the committee from 1995 to 1998, I think.

Martin: I should take this opportunity to say that while these committees make a fairly important contribution to the effectiveness and coverage of Statistics Canada, the most prominent of these advisory committees was actually set up by my successor, Ivan Fellegi.

Gordon: You mean the National Statistics Council, right?

Martin: Absolutely.

THE 1986 CENSUS

Gordon: Maybe we should move on to the 1986 Census now? I know you had just retired when it was run but as I recall, it was nonetheless a major issue for you.

Martin: Oh yes, indeed. When Brian Mulroney became Prime Minister of Canada, in September 1984, he decided to make a clean sweep and undertook a number of initiatives. As you may remember, his party won the largest majority government in Canadian history. One of Mulroney's priorities was to control the deficit, which was running into the billions of dollars. He started seeking contributions from every department that would result in monetary savings. I was not initially consulted on this issue but it turned out that the Minister in charge of Statistics Canada volunteered on his own to cancel the 1986 Census!

Christian: Who was this?

Martin: It was Harvie Andre, a pleasant enough fellow from Alberta who, incidentally, had a Ph.D. in Chemical Engineering. But he was quite opinionated and didn't have a high regard for statisticians. He could see substantial savings in cancelling the 1986 Census, and so he had simply gone ahead with it!

When I first heard about this, it was underway. When I found out, I really had a rush of anger. I felt he had absolutely no right to make such a judgment without consulting me at least. As I recall, I really blew him.

Gordon: What happened next?

Martin: Given the circumstances, my first responsibility was to establish a high-level committee internally to review what would need to be done to meet the requirement, if it

came to it. Second, in parallel to that, I encouraged people from outside the agency to make their feelings known as to how much their operations would be affected if the census were cancelled.

Pretty soon, we found out that by law, the Prairie provinces had to have a census in 1986. And also, that the lack of census would affect seriously a host of programs within and outside the agency. Harvie Andre and his staff came to recognize their mistake, and so the census was reinstated. But in the meantime, the commitment had been made that Statistics Canada would cut off 100 million dollars from its budget. That was an awful lot of money; maybe a third of the agency's entire budget!

Christian: So it looks like Harvie Andre achieved his goal, albeit in a different way. How did you get around that one?

Martin: Through intense rounds of discussions with government representations like Jack Manion and Harry Rogers, it was agreed that the money we had already saved by integrating our operations and rationalizing our publications would be included in the 100 millions. At the end of the day, that left me looking for some 40 millions only!

Gordon: That's still a hefty sum of money.

Martin: Through additional negotiations and reflection, we came up with a big package in which Statistics Canada absorbed maybe 10 millions on its own. Another chunk came through contributions from some departments that had vested interests in the census. And then the rest came as a credit for student hirings. You see, we estimated that over 40,000 people would have to be hired to run the census, but the money was not actually needed until 1986!

Gordon: All this happened within a very short period of time too. It must have been quite a stress.

Martin: It sure was, and I even got physically ill over it. So once the 1986 Census was officially reinstated, I thought it was a reasonable time for me to leave. I mean it was a big victory, and at the time I felt there was little more that I could do, at least in the short run, to establish Statistics Canada on an on-going basis. Bear in mind also that I was 63 at the time.

Now after Guy Leclerc was transferred to the Secretariat of the Treasury Board, back in 1983, I had arranged for Ivan Fellegi to be promoted to a newly created position of Deputy Chief Statistician. I chose that designation to make it clear that he was a natural candidate for my succession, and when the time came for me to retire, I pretty well made it a condition that Ivan would be my replacement.

As Deputy Chief Statistician, he had begun to think of the organization as a whole, including economics, and he had done very well, making fast progress. So he was pretty well the natural candidate, and the Prime Minister followed the recommendation made by Privy Council. This way, I could retire in September 1985, and Ivan had enough time to get established before the 1986 Census was run. He has done very well since and is now, I believe, in his 20th year at Chief Statistician of Canada. [Note: Dr Fellegi retired from that position on June 12, 2008.]

PRESIDENCY OF THE SSC

Christian: Martin, 1985–86 was also the year when you were President of the Statistical Society of Canada. Could you tell us a few words about your term?

Martin: When I was voted in, I found that the SSC was a pretty messy organization. It was still suffering, I think, from the unfortunate circumstances that led to its creation, in 1978. Of course, you already know that story, Christian, having related it as you did with David Bellhouse in some past issue of *Statistical Science* [vol. 14 (1999), pp. 80–125].

Anyway, I had an orientation at the time of making statistics better known and more visible in Canada. One way of accomplishing that was to elevate the level of the *SSC Newsletter* to a full-fledged publication. I was fortunate that Nicole Gendreau agreed to take on that mandate, and to involve the resources of the Bureau de la statistique du Québec that she was head of at the time. That's how *Liaison* came to be as the quarterly, fully bilingual magazine that it continues to be to this day.

Another major effort was the in-depth revision of the SSC By-Laws, which Peter Macdonald and you [Christian] put a lot of effort into.

Christian: When these By-Laws were adopted, I remember you congratulating me on this effort and telling me “And now, young man, on to greater things!” I've been trying to live up to the challenge!

Martin: These volunteer jobs are essential for the profession, but they can be really time-consuming. I always tried to do my share, having served as President of my local chapter of the ASA, and then as Vice-President at the national level, from 1980 to 1982. For a number of years, I was also an Associate Editor for *Technometrics*.

AFTER RETIREMENT

Gordon: You certainly had a very full professional life, and your merits have been underscored with many honors. From what I know, you didn't really slow down after retirement. Could you summarize very briefly?

Martin: At first, I served as Senior Advisor to the Privy Council Office, say for a period of six months. Afterwards, I did quite a bit of consulting for Statistics Canada, Revenue Canada, the US Bureau of the Census, the Ontario Premier's Council, etc. I also served as a member, and sometimes as a Chair, on various bodies both in Canada and in the USA, where my wife and I chose to go back in recent years.

One of my major assignments was on the Canadian Institute for Advanced Research, whose mission is to orient and promote research in Canada. The Institute might identify nanometrics, say, as an area of opportunity for the country, and then there would be a task force set up to explore that possibility, and so on. The Population Health Program was one of the most visible initiatives launched by this institute.

This led on to my involvement with the Task Force on Health Information. At the time there was a public sense that statistical information about the performance of Canada's health system was either non-existent or fragmented, health being a provincial responsibility in the

country. The Task Force report, that I wrote much of myself, was well received and led to a revamping of the organization and management of health statistics. This included, for example, the creation of the Canadian Institute for Health Information to complement the survey work of Statistics Canada by gathering and analyzing operational information from health institutions across the land.

One other important committee I got involved with had to do with science. Curiously, Statistics Canada had never gotten interested in the area of science. Our objective, or at least one of them, was to report on the characteristics and character of science as being pursued in Canada. Members of the steering committee included Jack Ryten, Steven Fienberg, as well as Mike Sheridan, Michael Wolfson, Scott Murray, Ray Ryan, and possibly others.

Christian: And for quite a while of course, you remained active with Statistics Canada as a member of its Advisory Committee on Statistical Methods!

Martin: I enjoyed that a lot. But I am now 83 and I have pretty well given up on all these things. These days, I just try to enjoy myself with my second wife, Dorothy Barrett, my children and my grand children.

Christian: You certainly deserve it! Is there anything you would like to add before we close?

Martin: With your permission, there are several persons that I would like to thank here because of the important roles that they played in my career. First, I would like to mention my wife Dorothy and my children Rebecca, Carol, David, Teresa and Kathryn who saw me through both difficult and very pleasant times.

Throughout my career, I was fortunate to find many collaborators and friends. I am particularly grateful to Oscar Kempthorne, John Tukey, Ram Gnanadesikan, Henry Boettinger, Paul Reed, Harry Rogers, Ivan Fellegi, Jacob Ryten, and Fraser Mustard.

Gordon: Thank you very much, Martin, for all the time that you have given us.

Martin: And thanks to you guys for traveling to Oregon and for the time you have devoted to me.

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