Autobiography of Lifetime Achievement Award Recipient

Martha Evens, Brief Autobiography

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The most common question that I have been asked recently is "How did you get started in what was classified as a man's job?" First, I tell people that I started early enough that computer science was not yet really classified as a man's job and, second, that there were quite a lot of women in the field in the beginning. My family already had a tradition of ignoring the limits on "proper jobs for women." My parents met in graduate school in Cambridge, Massachusetts. My father, C. Russell Walton, was a student at Harvard Law School. My mother, Virgene Dupka, was studying architecture at the Cambridge School of Architecture, which was bought by Harvard several years later and renamed the Harvard School of Design. They were married in the summer of 1933 and I was born on January 1, 1935.

My father wanted to have several more children. What's more, he wanted to bring us up to learn to grow fruits and vegetables and care for farm animals, so when I was two and a half, he bought a recently abandoned old inn with a big barn and a couple of acres of land and an apple orchard. My mother started repairing and repainting the walls of the inn and my father started work on a huge garden. Of course, he disappeared every weekday to lawyer away in Boston, taking a train to work and back, but as soon as he got home he changed into gardening clothes and took me outside to work with him, while my mother made dinner.

In 1939 my mother, after several miscarriages, produced a baby boy named Russell, but always called Rusty. In the fall of 1940 I was old enough to start in first grade in the little school around the corner. It had two classrooms, one for the first and second grades and the other for the third and fourth grades. In the first classroom the first grade sat in the front of the room and the second grade sat behind them. Since I could already read, the teacher had me sit with the second graders. After two summers with my mother's father, an accounting expert, I also knew first grade arithmetic, so I could learn second grade arithmetic with the second graders very comfortably. It turned out that I could not see or hear very well, which led to some awkward moments, but all in all I got along pretty well. However, my teacher insisted that my parents take me to have my eyes and hearing tested toward the end of that first school year. I came away with my first pair of glasses. The doctor said my hearing was indeed poor, but he felt that I was too young for hearing aids and maybe I would improve with time.

During the next summer (1941) my parents decided to move back to Cambridge. They found a really nice house to rent. The only problem was that we would have to

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wait until December to move in. My father found a live-in assistant at the prison in Framingham for my mother, and my mother began to drive me to Cambridge every weekday morning so that I could start at the Cambridge School. Sometimes she stayed in Cambridge for an hour or two to meet some of her old friends and tell them that we would be coming back. The Cambridge School discovered that I could read fairly well and handle second grade arithmetic problems and put me in the third grade. I found it rather scary to go into a class where everyone was about a year older than I was, but the work was interesting and I found people to play with during breaks. I stayed there until I finished seventh grade, when that school came to an end. Our new house was on Buckingham Street, so my parents decided to send me to the Buckingham School. The Buckingham School served both boys and girls in kindergarten through fifth grade, but after that it was for girls only. Also, beginning at the sixth grade all the students started to learn French. My parents asked around and discovered that down the street in a building with four apartments there lived a retired school principal who had also taught French for many years. My parents hired her to teach me French after my first two summers at Buckingham, and we kept on being friends after that for more than twenty years.

My class at Buckingham had only eight girls and they were very kind and welcoming. We had a lot of fun together. In the ninth grade we started to learn Latin, too. We also learned a lot of English and American history and literature. In the tenth grade we had a year of history of Asia. In the eleventh grade I wound up taking an "advanced" mathematics course with four twelfth-graders. In the twelfth grade I tried not to forget it all, while I tried to figure out where I should apply to college.

I finally decided to go to Bryn Mawr, which was where several people I admired had gone and where I did not know anyone else. I was 16 and rather scared when I got there in September of 1951, but my first calculus course contained a lot of friendly, smart people. When I finished registering I was called in by the dean, who started out by telling me she thought I was going to be bored silly. I had registered for the beginning courses in Calculus, Greek, German, and English—two beginning language courses—and did I really need to learn more math (which she hated). I would be doing nothing in my freshman year but memorizing things, she argued. I wasn't sure what to say, but I told her that I was interested in learning about language and how language worked and I loved mathematics. I went back to my dormitory room and I thought about the response that the dean had elicited from me. I decided that I meant what I said and I refused to change my courses. How did this fit with my plan to major in Mathematics, I wondered. I enjoyed all my courses. My favorite professor was a mathematician, Professor Marguerite Lehr. I had a long-term friendship with her and with several students: Anne Haywood, whom I first met in that first year calculus course (she was pre-med), and Nancy Degenhart, who was in my first Greek course, and who spent most of her life digging up classical archeology sites with her archeologist husband. Clarissa Dillon was in the same dormitory as I was. She wound up eventually helping create a park that taught people around Philadelphia about life in the 1700s and writing books about it. I also became quite close to Clarissa's roommate, Caroline Warren.

Nancy and I both graduated in 1955 with "summa" on our undergraduate degree documents and tied for the top GPA in the class. She spent the next year (academic year 1955–1956) digging in Greece and I spent it in Paris on a Fulbright Fellowship learning more mathematics, improving my French, and learning about new developments in informatics, but I went off to find Nancy and see Greece during my spring break.

In the summer of 1956, I came home to Cambridge, Massachusetts, and applied to the graduate program in Mathematics at Harvard/Radcliffe. On my first visit to the

Mathematics building, a man named Leonard Evens was sitting on the front steps—he had offered to show new students around the building. He told me that everyone called him "Len" and showed me around the building, with emphasis on the library, which was filled with books in French and German, and then deposited me at my advisor's office. As we got to know each other better during the semester, he told me about MIT's Lincoln Laboratory. He had worked there himself the previous summer and was planning to go back in the summer of 1957. He suggested that I apply, too, for the coming summer. I was hired as a mathematician and I was lucky enough to get hired to work for Oliver Selfridge, who was starting to be known as one of the first experts in natural language processing. He told me to learn Fortran programming (MIT had just received the first Fortran compiler to leave IBM). Then he asked me to write a spelling correction program for the Morse code messages that the Navy was getting from ships and islands all over the Pacific. Everyone who sends Morse code has a different style and these examples were full of errors, as well, mostly from people who were just learning Morse code themselves. Several years later our program became the first widely available spelling program.

At the end of the school year I was awarded an M.S. in Mathematics from Radcliffe and admitted to the Ph.D. program. Anne Haywood had been admitted to Harvard Medical School straight from Bryn Mawr and for the year 1956–1957—we shared an apartment in Roxbury just a block away from her classes and not far from Len's apartment in Brookline where he lived with his mother. (His father had died during his last year at Cornell.) Anne and I also lived together for the 1957–1958 academic year. My parents' next-door neighbors invited Anne and me to house-sit free of charge for a year as they went to Europe on a sabbatical. I went back to Lincoln Laboratory for the next two summers, with Len driving me to classes in Cambridge and during the summers to work at Lincoln Laboratory.

Len and I got married in my parents' living room in September 1958, with Anne Haywood as bridesmaid. We moved into an apartment within walking distance of the Mathematics building, but just over the Cambridge border in Somerville. It was several weeks before we discovered that Len's thesis advisor, John Tate, lived on an upper floor of the same building, with his wife and a very new baby. By March I was pregnant myself and miserably sick to my stomach and fainting at the most inconvenient moments. Later that spring I washed out of the Ph.D. program. In October I produced a daughter, named Sarah Helen Evens, but always called Sally by us. Sally was named for a great aunt of Len and a great aunt of mine. By then Len was writing a very exciting thesis proving that the cohomology ring of a finite group is finitely generated. During the spring of 1960 he was invited to spend the next year at the University of Chicago, which was planning to hold a Group Theory year in 1960–1961. Len's mother insisted that he go to Commencement and get his Ph.D. diploma in person. She came back from New York for the occasion and we sat together and cheered at appropriate moments. The next month Len and I took Sally with us to Chicago and found an apartment in Hyde Park close to the campus.

Len and I both enjoyed our first experience of the midwest. Len had a wonderful time meeting the rest of the Group Theory world and teaching a class. I graded papers for an abstract algebra course, took our new baby to meet other mathematical wives/mothers and their babies, and got pregnant again. I found Chicago Lying-in Hospital much more comfortable than Boston Lying-in Hospital, maybe because I felt so much better during my second pregnancy than the first. In May, I produced a son whom we named Samuel Robert Evens, Samuel for Len's deceased father and Robert for several of my ancestors. By this time Len received an invitation from the Mathematics

Department at the University of California at Berkeley to come for a three-year stint as an Assistant Professor. When our son Sam was three weeks old, we put Sally and Sam in the car and set out for California.

After a year in a rented house south of the campus, in the summer of 1962 we bought an old and tired house in the Berkeley hills with four bedrooms and beautiful views. Among other major problems, it needed completely new electrical wiring all through the house. Len bought a book and did it himself. When the city inspector came to inspect Len's work and give us legal permission to use it, he was amazed because it looked so professional. "It looks like a page in a textbook," he said. He was even more amazed when Len pulled out the textbook in question. The next summer Len replaced the old tiles on two sides of the house. I did a lot of work on the garden and helped with the indoor painting but he did most of it. His work on the house was just recreational, he claimed. He needed to take some time off from thinking about mathematics and his students. With a lot of encouragement from Len, I called the branch of the California State University in Hayward, and got a job teaching Differential Equations one evening a week. I also discovered that Berkeley had one of the earliest and best linguistics departments in the country and so I started going to their colloquia and reading some of their textbooks. After Oliver Selfridge came to give a talk and insisted on taking me out to tea afterwards, one of their best Ph.D. students—who was making a start at applying to Mandarin Chinese (her native language) some of the techniques developed for English to Chinese—invited me to write a parser for her. I learned a lot in this process. Len babysat while I taught and I went to meetings on campus. John Tate and his wife Karin and their children came to Berkeley for a year-long sabbatical in the spring of 1963 and rented a house just a block away, and Karin and the Tates' two children came to play with me and our children and go swimming with us almost every day, while Len and John did mathematics together. Not long after they went back to Cambridge, I produced another daughter, whom we named Anne Chaia Evens, but called Nancy. (Chaia was the name of Len's maternal grandmother, whom he and his parents had lived with early in their marriage, but who died before I met Len.) In the spring of 1964, Len got some very bad news. Berkeley decided not to renew his contract. Once he told the Group Theory world that he was available, he got a number of offers and took the one from Northwestern.

Over the telephone with various members of the department, we found a row house in Evanston, about half a mile south of campus, which we rented from a Northwestern faculty member who was planning a year away. He told us that the row houses were full of friendly people with children about the same age as ours. This turned out to be true. The Birchfields lived in the row house right next to ours. Our landlord had told us that the father, Ed, was teaching in the Engineering School at Northwestern. Ed's wife Marilyn rang our doorbell an hour or so after we arrived in Evanston and said "I hear that you just got here from California. You must have lots of dirty laundry if you have just traveled two thousand miles in a car with three small children. If you could let me have it right now, I could bring it back clean and dry later today." I couldn't resist, invited her in, told her I didn't even know yet whether we had a washing machine and handed her two big bags of dirty laundry. When she brought it back clean and folded, she also brought her two children. They started playing together with Sally and Sam immediately, while I nursed Nancy. This was her first birthday, but there was no celebration of any kind. Her sister and brother never permitted such a thing to happen again, while they were all growing up.

After we had lived in the row house for four years, our landlord's family decided to stay at their new university and offered to sell the row house to us. By this time all

three of our children were going to a new school, the Evanston Laboratory School, which was available to students all over the city of Evanston. Len and I were both impressed with it and felt that since we could move without uprooting our children from school again, we should look for a house nearer the university. We told all our friends at Northwestern that we were looking for a house and we got a tip—a law school faculty member named Victor Rosenblum and his family were leaving town. Their house was on Orrington and only a short block away from the Mathematics Department. We bought it as soon as we saw it and moved in at the beginning of August 1968.

Len encouraged me to go back to graduate school in computer science when our youngest child started school. Although I had been going to listen to some people at the University of Chicago talk about computer science, we decided it would be cheaper and more manageable for me to go to Northwestern. Northwestern did not yet have a Department of Computer Science, but I knew I wanted to work with Gilbert Krulee, who was then chair of the Engineering Management Department, so I filled out an application for Engineering Management and started that program part-time in 1969. In 1971, Northwestern created a Department of Computer Science with Krulee as department chair, and I moved over along with him. At the time, Northwestern had a policy of not supporting married female graduate students, but I worked at the campus computer center for two years and then taught courses in computer science there and was able to pay my tuition that way. For my Ph.D. thesis, I wrote a program that was able to read and interpret children's stories, and could answer multiple choice test questions about the stories correctly. The program also could tell students whether their answers to the test were correct, and, if their answers were incorrect, it could explain to them why the right answer was correct.

A week after I defended my thesis in August 1975, I started teaching in the Computer Science Department at Illinois Institute of Technology (IIT), which like the department at Northwestern had been created in 1971. I was hired to teach courses in Computer Science at IIT, developed by Robert Dewar (still the most famous computer scientist ever at IIT), who was just about to take off for New York City to become Chair of Computer Science at New York University. That first year I spent most of my time trying to learn enough to say something sensible in class the next day, but I still made sure to get to the Northwestern linguistics seminar for a couple of hours every week. The Linguistics Department and the Mathematics Department were only a block away from our home in Evanston and my wonderful husband came home early some afternoons to meet our three children when they came home from school and take care of them for several hours until I got home and made us all some dinner. The participants in the seminar included my advisor Gilbert Krulee (who had now become head of the Linguistics Department at Northwestern) and Oswald Werner and Raoul Smith, who were both on my dissertation committee. At the seminar, the other participants kept asking me when I was going to publish my thesis. After several months they got tired of my lack of answers to this question, and one day when the expected speaker did not show up, they together outlined a book and told me to write the first section and they divided the rest of it between themselves. Eventually two good friends of mine, Judith Markowitz and Bonnie Litowitz, who often came to this same seminar, also volunteered to add relevant pieces. It took until 1980 to get it all assembled and organized for publication.[1]

1 Evens, M., B. Litowitz, J. Markowitz, R. Smith, and O. Werner. 1980. *Lexical-Semantic Relations: A Comparative Survey*, Linguistic Research, Inc., Edmonton, Alberta.

In the fall of 1976, early in my second year at IIT, I got a telephone call from a cardiologist at Michael Reese Hospital, which was about four blocks from my office at IIT. He told me that he was a cardiologist and his name was Daniel Hier and that he was looking for someone who could program a computer system to take a list of patient symptoms and come back with a list of possible cardiac diseases that could be responsible for these symptoms. It seemed to me that this task was doable (but not quickly), probably useful, and perhaps publishable. I said I think we could do that, my students and I, but we would need a lot of information from him beginning with a list of symptoms, a list of diseases, and a list of relationships between them. Do you have a favorite textbook that you could lend us? Or a pile of patient records that would help us learn some of this? He laughed and said that part of his job was teaching some of this to first-year residents. But he was worried because they often forgot some of the rarer symptoms and, of course, we occasionally get new information about symptoms and diseases. He told me to call him Dan, and assured me he would produce any lists I wanted, and we made an appointment to get together the next week. This was the beginning of a series of collaborations that lasted until we had both retired. He gave a very kind speech at my retirement party in 2002. About five years after we first met, Michael Reese had to close for financial reasons, and Dan moved to Illinois Medical School. His first step at Illinois Medical School was to hire Johnson Jao, one of a series of excellent students in Computer Science at IIT from Taiwan, whose thesis project was developing another system for Dan. After Dan retired, Johnson went to work for the National Science Foundation.

David Trace, a physician teaching at Chicago Medical School, read a couple of papers written by Dan and me and called Dan to find out more. Dan suggested that he talk to me and gave him my number. David invited me to come to the medical school, which is now called Rosalind Franklin Medical College, and is located in the far north suburbs of Chicago. It was a long way, but certainly worth the drive. David had collected half a dozen people, including several from the computing center, to talk about possible projects in medical informatics. The man in charge of the computing center was Frank Naeymi-Rad, whose family had immigrated from Iran when he was in his early teens. He was writing an M.S. thesis to finish a degree in Computer Science at Southern Illinois University. His most recent hire was Timothy Koschman, who had just finished an M.S. program in Milwaukee. They asked me a lot of intelligent questions about what Dan and I had been doing. At the end of the meeting, David Trace asked me if Dan and I were thinking about expanding our program to other medical areas aside from cardiology. Dan called me that evening to tell me that David had asked him the same question, and Dan had told him, "No, I was interested in computerizing paperwork for cardiologists." In addition, Dan complained that my students were trying to push him to do more in AI. Around this time, Frank asked me to read the draft of his M.S. thesis and make suggestions. He'd asked Tim the same thing but Tim was too polite to make critical comments. The happy result of this interaction was that both Tim and Frank decided to do Ph.D.s with me. Frank focused on designing the patient database while Tim focused on interviewing doctors to discover what services we needed to include in the medical information system we were developing in collaboration with David Trace, which we eventually called MEDAS. The system was designed to build a database for each patient that included contact information, symptoms, diseases, and generated discharge instructions. David stayed at Chicago Medical School and we continued our productive collaboration for many years, and he took the lead in further developments in MEDAS. At some point after Frank got his Ph.D., Frank started his own medical informatics company, which has done extremely well. After

Tim got his Ph.D. he taught and did research at Southern Illinois Medical School and recently retired.

Around 1986, I got another life-changing telephone call, this time from Rush Medical College. Two professors of physiology, Joel Michael and Allen Rovick, called me to tell me about CIRCSIM, their plan for one-on-one tutoring to help first-year medical students do medical problem-solving, something that many first-year students find very difficult. So many students had found CIRCSIM very helpful that a large percentage of the 150 students in their physiology course were asking for it, and they found the effort of handling this load exhausting. They asked if we could figure out a way to put CIRCSIM onto a computer. I wrote a proposal to a naval research fund with the blessing of both Joel and Allen, and we got funding that eventually lasted for 12 years. Michael Glass did most of the parsing and language generation. Reva Freedman did a lot of work that improved the planning and wrote a very good paper on the subject. She was a Ph.D. student in Computer Science at Northwestern at the time. Her research on planning for CIRCSIM-Tutor was the basis for her thesis. Altogether, about 25 of my students worked on CIRCSIM-Tutor for their theses. After I retired from teaching at IIT in 2001, Joel and I eventually wrote a book about CIRCSIM and CIRCSIM-Tutor.[2]

All three of these projects in medical informatics involved building a lexicon. I found the problems involved absolutely fascinating and I continued to work on them throughout my years at IIT. I was very fortunate to get to know several professional lexicographers from England, Canada, France, Germany, Italy, as well as the United States, who invited me to their conferences, which were mainly held in Canada near Toronto, in the Province of Ontario. After more conferences and a lot of time reading journals and writing code, almost ten years later, I edited another book about lexical problems.[3]

Our children went away to college in the early 1980s, and Len and I took pleasure in seeing them find productive careers. At that time, Len became an active runner and qualified for the Boston Marathon. He was also involved in measuring courses for local running clubs in the Chicago area. He set up and maintained our home computer system, and was always supportive of my research activities. Although each of our children lived far away at various times, by 1998, they were all back in Chicago. In 1991, our first grandchild Michael was born, and Len and I enjoyed being part of his life, and the lives of our other grandchildren, who we got to see on a regular basis. In 2016, Len was diagnosed with Parkinson disease, and developed progressive dementia, and we moved to an assisted living place so I could get more help taking care of him. We were fortunate to be able to stay in downtown Evanston, and be able to walk to do errands in our neighborhood, and to live in a wonderful community.

Len died suddenly on the morning of November 12, 2020. I miss him constantly, but I feel very lucky to have been married to him for 62 years. Our three children all live in the Chicago area and they all come to see me often and offer help when I need it to get to doctor's appointments. I have five grandchildren aged 21 to 31, and I am hoping for great grandchildren.

2 Evens, M. and J. Michael. 2006. *One-on-One Tutoring by Humans and Machines*. Erlbaum, Mahwah, NJ.
3 Evens, M., editor. 1988/2009. *Relational Models of the Lexicon: Representing Knowledge in Semantic Networks*. Cambridge University Press.

At this point, I find the current progress in natural language processing, including machine learning tutoring systems and medical informatics, tremendously exciting. I hope these advances will lead to material progress in making health care more broadly available. I look forward to seeing what the next generation of researchers will manage to accomplish.