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Interviews of the Margaret MacVicar Memorial AMITA Oral History Project

Harriet Fell – Class of 1964 (SB) & Class of 1969 (PhD)

(interviewed by Tatiana Mamaliga)

April 2, 2013

Dr. Harriet Fell

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Tatiana Mamaliga

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MAMALIGA: Could you please tell me about your childhood, where were you born, and how it led to your coming to MIT?

FELL: I was born in Brooklyn, New York, in 1944. I have a sister four years older than I and a sister three and a half years younger. I'm the middle kid. I always liked math. My dad was a lawyer, and my mom was at home at first, and then worked as a secretary. People knew I liked math and science. My dad got a microscope in the house. My older sister liked science too. My younger sister was a dancer, but very bright. I can remember my mother one day telling me about Mobius bands because they had shown them to her at work. My mother's brother, my uncle, used to tell me things about the numbers table. He was a foreman in a paper factory, but he knew I liked math, and he told me things about numbers. And I can remember my father's father, who got through third grade and was a store-keeper, taking me on his lap when I was seven years old, and telling me about Gauss in school about adding up the numbers from one to one hundred, by adding the first and last, the second and next-to-the-last and so on. I tell this story

to my discrete math students. Interestingly, when my father was near his death, I happened to mention this story to him and he said sadly, “My father never told me that story.” Somehow they all knew I liked math. I expected to go to Queens College. My parents moved from Brooklyn to Queens, and my older sister went to Queens College. They made it pretty clear that they couldn’t afford to send us anywhere else – that was just understood. We were each allowed to apply to one other place but not go there.

MAMALIGA: Was Queens College an all-girls college?

FELL: Queens College is part of the City University of New York, and it was one of their best campuses. I could live at home because it was close enough to commute by bus, and that is indeed what my older sister did. At that time, it was a strong place; they were glad to be in that neighborhood. I had only applied to Queens and Antioch, but I won a Westinghouse scholarship, and it gave me the chance to go somewhere else for college. I was at a party at a friend’s house, who was a year younger than I, and there was one of my classmates who had applied to MIT and was waiting to hear back. It was already March. Applications went in later then. He was looking at the catalog, and I was drooling over all those math courses and no French. I said, “Gee, I

wish they took women,” and my classmate said, “They do!” He searched and found a place where it said they took women. I said, “But it’s March. It must be too late to apply,” and he said, “Actually the deadline is next Friday.” This was on Sunday. Today, getting the application in by next Friday would be plausible, but remember then everything was by snail mail, and snail mail was not overnight. There was no time to ask for an application, get it, and get it back in a reasonable time. I sparingly gave up, but the young man at whose house we were at said, “Oh, I just went on a tour of colleges. I have an MIT application, and I don’t need it for a year.” So he gave it to me. I filled it out at the party. His mother wrote the check, and I mailed it on the way home. And that’s how I came to college at MIT.

MAMALIGA: That’s an interesting party you went to – very eventful!

FELL: (Laughs) And my friend got into MIT too.

MAMALIGA: Was your friend a male?

FELL: Yes, he was a male. He is Whitfield Diffie, the person who invented public cryptography. Rusty Bobrow, whose house the party was in, also came to MIT the next year. We all went to MIT.

MAMALIGA: Where did you live at MIT?

FELL: The first year, I lived at 120 Bay State Road. They had a house that housed 17 young women, and one junior – not so young, and one house-mother. Then the extras they had in some secretarial dorm, or they commuted. There were 23 freshmen women. McCormick wasn't up yet. There was no housing. Basically, you had to look for apartments after freshman year. Except that one wing of Bexley Hall that was reserved for women. They saved that for the people whose parents absolutely insisted that they had to be on campus. The rest of us didn't tell our parents it was available.

MAMALIGA: Did you not want to live in Bexley?

FELL: No, I wanted to live in an apartment. We had a basement apartment on Marlboro Street. We started with three of us. It was a one-bedroom apartment with a living room. We had our desks in the living room,

and there was a kitchen in between. We set up the bedroom with three beds, and then we broke out a fourth woman who was a freshman from 120 Bay State Road. Around December, her parents said they couldn't pay anymore, and it was cheaper for her to live with us. We snuck her out one night, and she moved in with us. Then we got permission for her to move in with us afterwards. So we had four people in this one bedroom apartment.

MAMALIGA: Why did she have to sneak out at night?

FELL: Well, she was a freshman. She had to live at Bay State Road. We were sophomores, but we knew she couldn't afford to stay at Bay State Road.

MAMALIGA: Was there a curfew?

FELL: Oh yes, there was a curfew at Bay State Road, but not for us in our apartment. When we snuck her out, the challenge was also in getting her bags. It wasn't just her. We also had to get her stuff and bring it to our apartment. As a freshman she couldn't leave, so we just did it at

the semester break. Then we informed people that that's the way we had to do it, and they said it was okay.

MAMALIGA: What was the social atmosphere like for you at MIT?

FELL: I thought it was great. I was incredibly naïve and shy. I really barely dated at all in high school. I got a date for senior prom. He also went to MIT, but we never were close then. At MIT I had dates, and that was novel. There were seventeen women. We were quite different, and yet, we had so much in common. That was different. I had a few friends in high school. I went to a high school that was of similar size as MIT. My high school had 4,500 students. So MIT didn't seem huge to me. The undergraduate class was of similar size to my class in high school. But at MIT it was more "my kind of people."

MAMALIGA: What was the percentage break down of boys and girls in your high school?

FELL: It was half and half. It was a public school. It was not one of the exam schools. It was Jamaica High School. It was one of the top-notch regular public schools. My parents didn't want us to go to any of the

exam schools and have to take buses. They wanted us to go to the neighborhood school. They purposely moved to a neighborhood with a good neighborhood school.

MAMALIGA: How was your transition coming into an all-boys school environment at MIT?

FELL: I liked it. I thought that was fun. I loved being able to do mostly math and science. It is funny, and my friends laugh at this, but the fact that I wouldn't have to take French here, whereas I would have had to take French at Queens College, was a real win as far as I was concerned.

MAMALIGA: Did you not like French?

FELL: I was lousy at it. I didn't think I could pass another year of French. I took three years of French in high school; I didn't take the fourth. We didn't have language labs. We just memorized, and it was not what I did well in. Interestingly, I am totally fluent in French now. I've lived in France and taught in French. I read it about as well as English. Most of my friends find it funny that not having to take French was one of the things that appealed to me about MIT.

MAMALIGA: What did you major in at MIT?

FELL: In math. I wanted to be an algebraist, and I did every math course I could get in a year. I took six courses at a time, and I graduated in three years. I came in with only a year of Calculus and still graduated in three years.

MAMALIGA: That is impressive. Do you remember how many women there were in your department?

FELL: I can remember four math majors in my class. I think that was it. But I was a year ahead in math, in part because of the Calculus, but also because I insisted on taking the junior courses my freshman year. I did three math courses my freshman year. I did the second year in Calculus. I skipped Differential Equations and tested out of it by an exam, a year later. I did Mathematical Analysis and Modern Algebra. And I took something in the spring, which I can't remember now.

MAMALIGA: Were the math classes easy for you?

FELL: No, they weren't easy. I just loved them. I really worked hard, I really did. My older sister worked much harder at school than I ever did. She was always known as the girl with the long papers and the long homework. She would spend hours and hours doing meticulous homework. And she struggled at Queens College, and mostly got C's. I just came here figuring I'd flunk out. I worked with some mathematicians the summer before I came, at the Bureau of Standards. They said, "If you're going to flunk out, you might as well learn some math before you flunk out." So I took these courses.

MAMALIGA: Did you take courses before coming to MIT?

FELL: No, it was the courses I took my freshman year that they persuaded me to take, even though I didn't have the prerequisites for them. They said, "Well, if you're really convinced you're going to flunk out, learn some math first." It was very hard work. I was pretty determined also to be financially on my own. I knew my parents were fussing about paying. I got most of my tuition paid, and they were paying my room and board. I had a summer job that covered all my books and clothing, and a bit more than that. They sent me \$90 a month, for 10 months – in a year, \$900. I wanted to be supporting myself, which was really a big

part of the reason I pushed to graduate early. In a way, it was silly. I might have learned more, if I'd spent my four years in college.

MAMALIGA: But if you took all the courses...

FELL: Most of them were graduate courses, after the first year and a half. Well, I learned later that you learn more if you have more time. You can do more, you can spend more time in the library, and you can be looking up more things. But it was different. It was just very hard work. I did other things too.

MAMALIGA: What extracurriculars were you involved in?

FELL: I spent two years to get permission to row. Then finally they let us out in tanks. Then this woman, Elaine, transferred from Wellesley, and she'd been rowing there. So finally, they let us actually row. I was a grad student by then. I stayed here for graduate school. I rowed in the tanks and once in the river, the year before, as an undergraduate. Then they left us out. That was not something women did. I fenced one semester. The fencing master was nice to women but I was not very good at fencing. He lent me his wife's fencing outfit for a meet; . I left

it in a friend's trunk, and it leaked; and the suit was badly stained. I felt embarrassed and never went back. I did some sewing for the Drama Society. They still send me emails. I was active in the Women's Organization. I was an Officer. In graduate school, I was president of the Graduate Student Council. I was active in the student art association, especially when I was in graduate school. I did photography, drawing, and painting.

MAMALIGA: Why did you decide to come to graduate school here at MIT?

FELL: I didn't apply anywhere else. I was pretty naïve. I had internships outside of MIT. I worked at Bureau of Standards for three summers – the one before I came to MIT and the next two. Then I worked at GTE Sylvania. It was a research job also. I didn't understand the job market. I didn't understand the academic one either, but I knew how to be in school. I thought, "Okay, I'll stay in school." I really didn't apply anywhere else. At Arthur Mattuck's suggestion, I went to look at the Harvard math department. They were totally obnoxious, and I didn't apply. I went with a friend. She went to look at the applied math. I went to look at the pure math. The applied math people were very nice, but the pure math department wouldn't even let us talk to any professor. They told us we could go in the common room where there

were some grad students. The grad students told us that no woman had passed their Orals in the past 20 years, and they were very proud of that. I thought, "I don't need this." I thought about applying to Berkley, but I didn't. I only ended up applying to MIT. I got in a week later than one of my friends who applied, so I was pretty worried. But I did get in.

MAMALIGA: How was your experience in Graduate School? Was MIT letting more women into graduate school at the time?

FELL: Not on purpose. Officially, my year, I was the only one. The year before me, a bunch of women got in. Then my year, I was the only one. So it was not on purpose that they admitted more women. I saw one postdoc who was a woman. Then, toward the end, my last year, there was a woman who was a Moore. instructor. We're still very good friends. We see each other every Sunday, and we do Qi Gong and Martial Arts together. She's a professor at Boston University. In fact, she and her husband got me the job at Northeastern University some years later.

MAMALIGA: Did you start working at Northeastern University right after graduate school?

FELL: After my thesis defense, Kenneth Hoffman offered me a one-year position because I didn't even think about what I was doing next. I just knew that it was time to finish. It had been five years. I had written my thesis, and I thought, I'm going to defend it and be out. I had already been teaching. At that time TA's in the math department only graded. But there were two of us whom they, instead, gave half-time positions, and we taught actual sections. So I'd already been teaching. I got this one-year position. The next year, I got offered a research position in France, and that's when I had to learn French. I went to France, and by that spring I actually taught at the university. I thought of that as my year abroad. I didn't realize it was actually a job I could stay with forever. During that year, I got a letter, by snail mail, from Nancy Kopell, asking if I wanted a job at Northeastern because there was an opening, and if I did, to let her know who could write recommendation letters to apply for the job. I don't remember whether I sent a resume with it. I wrote a snail mail letter. I sent it off, and they got recommendation letters. They offered me the job, and I came to Northeastern. This was two years after I had gotten my degree because I had one at MIT and one in France.

MAMALIGA: When did you know that you wanted to teach?

FELL: I liked teaching – I really did. And I knew that. I loved doing math. I've ended up in Computer Science. I had tenure in math, but then I left in 1982 to help start our Computer Science College. I had to shift my research from pure math to actually building things. I get torn between the two. There are times that I'd rather be doing math, but at times it's pretty satisfying to be building nifty things.

MAMALIGA: What was the most challenging for you as a woman in going from MIT to an actual job?

FELL: Things were getting easier by then. There was still a low population of women out in academia. Even years later, I noticed at Northeastern there was about 25% women on the faculty. That was after a few years. I don't mean in math. I mean the whole university. The Math Department was actually pretty decent. We had 40 people, and eight of them were women, which was high for anywhere in U.S. The university as a whole had about 25% women, but in order to balance things, every committee had to be 50% women. We got to do a lot

more committee-work than men. They were dumping secretarial stuff on us in an attempt to balance things. So women got stuck with more committee-work. I think still, there's some of that imbalance. We're not up to 50% yet, and they still try to keep committees balanced in that sense. I don't think I ever left academia, in a way. I did have experience outside of academia. I had a consulting job at IBM Cambridge Scientific with one of my colleagues. So we actually took a quarter off, and we were going into Cambridge and working with this group. Of course it was in the R&D group, and we were developing the Font Design System for them. I loved it, and I thought, I could've done this as a job. It was the only time I wasn't teaching. I was doing development much more than research, as far as I was concerned. It was nifty. It was a nice group.

MAMALIGA: Was that right after MIT or later?

FELL: No. I was already in Computer Science. I was a full professor already by then. Just somewhere along there was this experience of trying something else out. I also do work outside of academia these days too. I work with a company up in Bedford. I do applications to speech analysis, looking for medical information and speech, and speech-like signals. It's pretty applied.

MAMALIGA: What was the most challenging thing for you throughout your career?

FELL: Getting away from home, and even just getting here – just sticking with it. Look, this is my 42nd year at Northeastern; I've stuck with it a long time. I've been in France for a few years in between. I've had sabbaticals. I switched my thesis topic at MIT, and I think there was a strong feeling that I would never finish and that I should go and look for a teaching job somewhere that didn't have any research involved in it. I sort of ignored that pressure and got my thesis after all.

MAMALIGA: Do you think there was some kind of bias involved because you were a woman?

FELL: Parts of it were. Parts of it were also my own naïveté. It was mixed. Things were a lot harder in many ways being female. My first thesis advisor went to Princeton for a year. His male students all followed; they went to Princeton for a year. There was no place for women at Princeton at that time, so I stayed home. I had no idea what was going on. We didn't have email, we weren't in contact, and we didn't make phone calls. I just had this year on my own. I got nowhere. It was after

that that I switched to doing something quite different. Even then, spending five years instead of four to get out seemed excessive. Yet, it's more than one that I'm in academia now. So it took sticking with it and finding people I could work with.

MAMALIGA: What do you like to do now, outside of teaching?

FELL: Well, I'm a cyclist. This is the first year I'm not commuting by bike. I decided it got too dangerous, and my hours are too long. I've done endurance cycling all over France and here. I met my husband on the road. He died five years ago, so I now maintain this cycling website, which probably is the biggest, most used website on technical bicycle information site. I paint. I do watercolors. I play classical guitar except arthritis is getting in the way. I just took up doing some mathematical art. I think I'll do more of that, when I retire.

MAMALIGA: What is mathematical art?

FELL: I can show you on my phone. It involves using things that are generated through mathematics or are related to mathematics. There's a national group that has art shows, and I had an art piece in one of

their shows. It involves thinking about mathematics underneath. I'm thinking of doing some illustrations online.

MAMALIGA: Is it based on a formula?

FELL: These are based on formulas and movement and choosing colors. I wrote a program to generate your own images in these manners. I'd also like to do some illustrations even of proofs, showing how one thing transforms into another through computer graphics – using computer graphics to create proofs. I think there are things that would be just fun.

MAMALIGA: I know you mentioned that someone else from your family also went to MIT...

FELL: My daughter. She went to graduate school in math.

MAMALIGA: She followed your path.

FELL: Yes, she also went in math. Her thesis advisor left after two years and went to Berkley. She didn't want to tell me that she was going to leave town. Her father, my husband, had already died, and my son was in Wisconsin at the time. She confessed to me in August that she planned to go to Berkley for the spring semester because her advisor would support her for the spring. She was afraid I'd be terrified. I said, "Go see him tomorrow, and ask him if he can support you for the whole year and leave next month. Get your thesis done." And she did. He said yes. She packed up, and she moved to Berkley. He supported her for a year and a half, and then they let her teach IAP, the next winter for a spring salary. She finished up. She's a postdoc at UCLA now. My son finished last summer from University of Wisconsin Madison, and he's teaching at University of Wisconsin Stout. He's looking for a postdoc for next year. He's also in math.

MAMALIGA: It runs in the family.

FELL: Yes.

MAMALIGA: What would be your advice for incoming freshman women to MIT?

FELL: Be passionate about something – not a guy, I mean a subject. I really think it matters that you love something. I think your life here just feels right if you are really, deeply interested in some field. You might change what that field is, and you should be open to that. The world keeps changing. But if you're just working on grades and don't really care about anything but getting good grades, I don't think you'd be happy here. I think it really helped me that I cared so much about math. I just loved it. I felt good when I solved things. That kind of passion really matters.

MAMALIGA: Thank you so much.