An Interview with

CAROL EYMANN MOLLER

OH 498

Conducted by Thomas J. Misa

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Abstract

Carol Moller took courses at a branch of UCLA close to her childhood home in Los Angeles and then graduated from Stanford University in 1957 as a math major. She took a job as a computer programmer at Shell [Oil] Development in Emeryville, CA. She describes flow charting in machine language, batch processing with punch cards, and then the coming of FORTRAN. She and her husband came to Minnesota for his pediatrics residency, and she took a position with General Mills mechanical division (on East Hennepin) working on a highly classified antimissile project. She moved to Texas for two years when her husband went into the Army. In the 1980s she studied several languages (at the University of Minnesota) and then took up historical linguistics and ESL teaching.

Misa: My name is Tom Misa. It's the 26th of January 2016, and I'm here with Carol Moller. We're doing a set of interviews for the Sloan Foundation, interested in the experiences of women in the computing industry, particularly in this early period. Carol, your computing career goes before the 1960s, but that's actually quite helpful. Could you say a few words about hobbies or activities in your childhood, thinking of either grade school or high school, or some part of your family background that might have led you toward the later pursuit of a career in the computing field?

Moller: I think the most significant about my early childhood was that my father thought math and arithmetic were fun, and he did a good job of showing me that. And I think all my life I have thought math and arithmetic were fun. I went to UCLA training school in Los Angeles, which was a wonderful experience. It was very hands-on. We built little ships. We had access to all kinds of unusual things for that era, but I don't remember any particular things in elementary school in relation to math or arithmetic. Guess my most vivid memories are in high school. I had a wonderful math teacher in 10th, 11th, and 12th grade. I took algebra and geometry. I guess both algebra and geometry were my favorite subjects for all time. I thought all along, I do not want to become a math teacher and so when I went to Stanford I didn't even seriously consider being a math major because I didn't want to be a math teacher. I started Stanford in 1953 and thoroughly enjoyed Western Civilization, a three-quarter course that all freshmen were required to take. Then the first quarter of my sophomore year, in the dormitory where I lived, in the room next door was a fellow student who said, you know the computer industry is coming into view so maybe you should consider majoring in math. I took her seriously [pause]

Misa: A student somehow had figured this out.

Moller: A fellow student. How she knew this I don't know. I didn't keep track of her, I don't know where she ended up. I don't even know what she herself [did]. She was not a math major. So I took her seriously and I went to see a professor named Harold Maile Bacon, who was a very significant person at that time, and head of the math department at Stanford. He was mostly involved with training teachers but he was very helpful to me in telling me what I could do. So I started calculus the second quarter of my sophomore year. Our teachers were Ph.D. students who were excellent teachers. I took the first quarter of calculus in winter quarter of sophomore year, the second quarter of calculus spring quarter, and then a third quarter I went to summer school at UCLA, which was run as a private enterprise. It had nothing to do with University of California, it was just a group of teachers who gathered together, made charges, and divided up the [pause]

Misa: Now was your family living in Los Angeles?

Moller: I grew up in west Los Angeles, three blocks from UCLA, so I could walk to school. Then my junior and senior years at Stanford, you know it's a liberal arts school so there are things you are required to take just as an undergraduate and certainly things you're required to take as a math major. So most of the things I took those two years were to fulfill requirements. I had a wonderful teacher for ordinary differential equations, a lively guy who made it fun. After we got beyond three dimensions, I didn't enjoy it as

much. As I remember there were 12 of us in my class of 800 who were math majors, about half men and half women.

Misa: Half men and half women.

Moller: I'm not sure, but I think about half. And one of my classmates who **did** want to be a teacher failed fundamental concepts of analysis, which was about the driest course I can ever remember being exposed to. Every problem started, "given the quantity *epsilon*, there exists a quantity *delta* sufficiently small that . . ." you know you do this all quarter, that's all you do.

Misa: It's very formal.

Moller: Very formal, very dry. She got a "D" so she had to drop out and go to San Jose State and finish her major. And she did become a teacher. I had a teacher named Gábor Szegő, who in 1956, he went to Budapest during the uprising, and we went to facilitate some of those students coming to Stanford. I forget what it was he taught. So I finished and graduated with a B.S. in math from Stanford. We were married. My husband and I agreed — and both sets of parents — we would not get married until I graduated and I could support us.

Misa: And when did you graduate?

Moller: 1957. My husband, at that point, was entering his senior year of Stanford

Medical School, so it was very easy to find a job as a computer programmer.

Misa: Before we move forward to 1957, you ended up having this fellow student tell you

about computing. Did you have access or contact with computing before your graduation

at Stanford? Were there computing courses, or programming?

Moller: I took numerical analysis.

Misa: Numerical analysis.

Moller: Yes, and we learned about binary and that was the closest thing to computing, I

think, as an undergraduate that I had.

Misa: Can you say a little about numerical analysis because I think the 1950s had very

specific meaning that connected to computing. Do you remember?

Moller: Binary is the main thing that I remember; and what is the word for eight?

Misa: Octal.

Moller: Octal, I think we did some with that. I've not thought about it or talked about it

so I can't tell you much more about that course. I just don't remember.

Misa: Okay. So in terms of when people think about computing, oftentimes they think of doing programming. I mean, the languages people might have used, FORTRAN and COBOL, were just being invented at the time.

Moller: Right, they weren't there yet.

Misa: So the idea of having a course in a programming language would be something that would be popular in the 1960s and 1970s and 1980s, but computing really meant something different in the 1950s, during your time.

Moller: Okay, do you want to hear about my job now?

Misa: Yes.

Moller: I ended up working for Shell Development, that was the research division of Shell Oil at that time. I don't know if it still exists. It was in Emeryville, California.

Misa: Emeryville, so Bay Area.

Moller: Yes, East Bay, right beside Oakland. There's still an Emeryville but I think it's more suburbia than it was then.

Misa: It was pretty common then for math majors to get jobs in the early computing industry? You said it was easy for you to get a job.

Moller: There was much more demand than there were [pause]

Misa: That was a clear path that if you didn't want to be a teacher, that was an open door.

Moller: Oh yes. And not very many — I don't know about other schools, but there certainly weren't many of us and I think certainly half of the 12 of us were headed for Ph.D.s at Stanford. I wasn't. My friend that got the "D" is the only one I remember. I don't think the other ones I knew very well, out of a class of 800.

Misa: Can you say a little bit about what you did at Shell, the early job? What were your duties, job responsibilities?

Moller: We programmed, it was an Electrodata Datatron. It filled a whole big room and had to be shut down at least four hours out of 24 for maintenance and to check all the radio tubes. There were I think three of us women programmers. We were professional; and there was one woman non-professional, whose job it was to prepare the paper tapes.

Misa: Paper tapes, okay.

Moller: I think my whole department, all the work had to do with modeling distillation columns in refineries. And I still feel a real affinity for refineries, you know when I look at those distillations I can see the evaporation going up and things dripping down.

Misa: [Laughs.] Yes, that's right.

Moller: And the product they were most interested in was butadiene. I don't know what that does but that was the main concern.

Misa: You optimized for that.

Moller: Yes, that's what they were. Depending on what you put in and where you take things out determines what you get out of that column. So it was complicated.

Misa: Computer modeling of the distillation.

Moller: Yes.

Misa: Carol, if you can take us inside of that work, I mean, did you do flow charting? What kind of languages? I'm really interested in the details and textures of this early work.

Moller: Yes. I loved doing the flow charts and we programmed in machine language. I loved both of those things. FORTRAN was just coming into view.

Misa: Right. Not everybody liked it.

Moller: I don't think everybody had an opinion even as early as 1957-58. I just remember it being the next thing to come. I did at some point study — it must have been in Emeryville — start studying FORTRAN, anticipating using it. Then in 1959, my husband finished. We stayed in San Francisco, so he graduated in 1958 from medical school. He stayed put and did his internship in San Francisco, so I was employed those two years in Emeryville, supporting us.

Misa: In Emeryville.

Moller: He made $80 a month from being an intern.

Misa: Oh boy.
[Laughter.]

Moller: And they did his laundry.

Misa: Carol, if we could just circle around a little bit, you had a bit of a theoretical background, thinking about binary numbers and things like that, that's very, very useful.

But in terms of actually doing machine language programming, was that something that were there classes at Shell? Did you pick this up just on the job? How did you learn it?

Moller: It must've been on the job. Yes. I just don't remember it that well, learning the machine language. But I think we would program it on an 8x11 sheet, and then give it to Grace. She would transcribe it into a tape to feed into the machine.

Misa: Okay. So you'd actually be writing [it] out. At what level would your flow charts be done? Would you be writing a flow chart instruction in machine language then?

Moller: Yes.

Misa: And then Grace, the non-professional, would be taking that and typing it in or punching the tape that would actually go into the computer.

Moller: Yes.

Misa: Do you remember anything about your supervisor for that early job?

Moller: Yes, his name was Ben Rosen.

Misa: Ben Rosen.

Moller: About the same time — I don't remember whether it was just before or just after we moved to Minneapolis — he also moved to our neighborhood.

Misa: Oh really.

Moller: I didn't know it at the time, but he had a position at the University of Minnesota. I think head of computing in the math department.

Misa: Oh really?

Moller: He's no longer living. I think he died a while ago and I never did see him here.

Misa: But he was your supervisor in Emeryville?

Moller: Yes. And our vice president was from Holland. I don't remember his name. He was part of Shell.

Misa: Sounds like it was a fairly small unit then, if it was just the three of you women professional programmers.

Moller: Yes. And about six or eight. I think they were all Ph.D.s in physics or physical science. I don't think anybody had a Ph.D. in mathematics, it was more applied science at Shell Development rather than theoretical.

Misa: Did you have interactions with them to try to make sure the computer modeling was connected to the physical equations that they would understand at the time?

Moller: Yes, and I can still — sitting at my desk — I shared the room with one of the Ph.D.s and I sat looking out the window, and it was full of model refineries.

Misa: Model refineries.

Moller: Yes, it was very real.

Misa: Do you remember the turnaround for your programs? Sometimes if you're on a university campus, it may have been an entire day. People would have taken, in batch processing, they would've sent their cards or their tapes to a computing facility and it would've run how many minutes or hours, and they wouldn't get any kind of feedback, printout or anything, for at least 24 hours, sometimes longer. Do you remember the sort of cycle of getting feedback?

Moller: The only feedback I got was with debugging, you know to make sure that my program worked. After I had done my assigned task then I didn't hear any more specifically about that.

Misa: But the debugging, how frequently would you end up getting responses on the debugging stuff?

Moller: I don't remember waiting, particularly; I think probably by the next day.

Misa: Next day.

Moller: I think so. It was efficiently run and Grace did her job. Did she ever! And she demanded respect, too. I mean, she was a Hispanic.

Misa: Well it was very exacting work.

Moller: Oh gosh, yes, and she was the one and only in the whole group.

Misa: And absolutely necessary to get your charts through the machine.

Moller: Oh, absolutely. It's often the case, isn't it?

Misa: Yes it is. The computing oftentimes has brilliant people somewhere, but it's a team effort to keep everything —

Moller: Not just computing, a lot of things are that way.

Misa: You mentioned the down time, and that all is the maintenance; we'd like to know more about that as well. Tends not to be written up by the computer scientists, but that was absolutely essential to early computing, keeping them going, and doing testing, and doing checks and all the preventative maintenance. There's a whole world there that we don't historically know a lot about.

Moller: Yes. And I think the computer worked 24 hours a day because there was a 12:00-8:00, and an 8:00-4:00, and a 4:00-midnight person in the computer room in charge of operating it.

Misa: But you weren't on that kind of shift work, you just were working during the day.

Moller: Yes. I think all of us were.

Misa: That would be typically segmented and separated; it would be a different work force.

Moller: Yes.

Misa: Anything else about that early time in Emeryville that would be helpful to pin down?

Moller: I don't think so, not that I know of. And my husband — this maybe is just an anecdote — when he finished medical school, you know you apply for different internships and you rank them, and then you are ranked, and then there's a matching process nationwide. Initially, he put Hennepin County on his list, but then he read the temperatures and crossed it off at the last minute so that's the year we stayed in San Francisco. Well the next year, same choice. So he knew then he wanted to go into pediatrics, so he did apply and was accepted at University of Minnesota for pediatric residency, so that's when we came to Minnesota.

Misa: Okay, so it would be a year after, so that would 1959.

Moller: 1959. And I only remember applying at one place; General Mills mechanical division is where I ended up. I also applied at Sperry Rand, which was out — I can remember riding public transportation to downtown St. Paul and then taking a taxi all the way out.

Misa: They had a big facility; it was Shepard Road.

Moller: I think so. It was right near the airport.

Misa: They had another facility south, in Eagan, was it that far south?

Moller: It wasn't in Eagan, it was not south of the river.

Misa: Oh, it's possible that they had another facility that I'm not aware of.

Moller: I'm sure it's long gone from that site.

Misa: Well the funny thing is the Shepard Road site was there until about two years ago. It had been abandoned by Sperry Univac, and had been a bank for a while, and just recently I think had been torn down. So it's funny, there's bits and pieces you can see all the way stretching back to 1946 and the original Engineering Research Associates factory is still standing.

Moller: Yes.

Misa: So tell me what the Twin Cities were like in 1959 when you arrived.

Moller: 1959. Well, let's see, we came in June and I guess since I grew up in southern California — my parents were Midwesterners who had moved to southern California, as well as many of their friends — I don't think my parents knew any native Californians their own age.

Misa: They were all transplants. [Laughing.]

Moller: All transplanted Midwesterners. So we were led to believe there was no place colder on earth, and I thought it would be foggy all the time. But those people were talking about Detroit so I was very surprised how sunny it is in the wintertime here.

Misa: That's true, yes.

Moller: And as I say, I applied two places and I ended up at General Mills mechanical division. Is that what you want me to talk about now or about the Twin Cities?

Misa: I'd just be interested in your impressions of the two of them together. We'll want to go into detail about General Mills. Did you do an interview?

Moller: Yes.

Misa: What were they like? Do you have any memories or recollections?

Moller: Of the interview?

Misa: Yes.

Moller: Not really. Let's see, I hadn't thought about the interview.

Misa: Or just your impressions of the company, as well. I mean, 1959 and 1960, that was a time when the computing industry in the Twin Cities — you probably know this — was really taking off.

Moller: General Mills mechanical division was at, I think, 2013 East Hennepin. And as I understood, its origin was, there were two things: one — and the man was still there — who had made packaging for machines to put flour into flour sacks, and this was also adopted by the cosmetics industry. And then the other thing was weather balloons. Two things had been done in this facility.

Misa: Yes.

Moller: Neither one was happening in 1959, but they were engaged in a thing called Classified Anti-Missile Missile things going on at Wright-Patterson Field, in Dayton, Ohio. Even the name was classified. It was called Project Left Field.

Misa: Left Field, okay. [Laughs.]

Moller: Yes. So I never knew much of anything about how our program, what happened after we wrote our programs. Maybe that was classified, too. But there was a guy who came on board the same time I did, the same age, same experience, but he made $20 more a month — I forget how much — but he made more a month because he was a guy and it was assumed that he was supporting his household and that I wasn't.

Misa: Even though you'd been supporting your household back in Emeryville.

Moller: Yes, and I still was, still was supporting him. He was a resident here and he made quite a bit more than an intern, still not enough. We saved his salary from his first year as a resident, and then I — we didn't plan that I would get pregnant — but I did get pregnant and so I just ended up working one year at General Mills mechanical division so then we used his salary as a resident plus what we had saved the previous year to support ourselves that second year of residency. After that, he went into the army.

Misa: Okay.

Moller: So we were in Texas for two years. What was I going to say?

Misa: It's really interesting because there are so many people who worked in the computing industry and they tell a variant of your story, that they worked on some military project or some classified project and they didn't have the full picture. And the other thing, too, is that it was made very clear to them — and I'd be interested in your response — it was very difficult to talk to friends, neighbors, family members, church members, anybody outside that project. Was that the case for you?

Moller: Oh absolutely yes. As I said, I couldn't even say I was working on Project Left Field. That would've been forbidden.

Misa: Right, which is kind of funny, it's like well what is it?

Moller: Yes.

Misa: Did you know the name at the time but you were forbidden from using that word?

Moller: Yes, exactly. Right. Taboo.

Misa: So it's a bit of secrecy.

Moller: Yes.

Misa: General Mills also — this is something that is not well known — they ended up for a time not only doing programming, but I believe they ended up *making* computers that went into the intelligence agencies.

Moller: Is that right?

Misa: Same time, exactly. Late 1950s.

Moller: Okay, our computer was a Bendix.

Misa: A Bendix.

Moller: It was shaped like a water heater, and about the size of a water heater with a drum that went around. I remember multiplication took the longest so you had to be careful how you times. I don't remember exactly what the sheet looked like, but you had control of where on the rotation of the drum you were so you had to pay attention *when* you multiplied because it would go around I forget how many times.

Misa: Yes. It's hard to remember, the IBM 650 did the same thing, the ERA machines also, all the drum machines. The computation was much, much, much faster than the memory. The things were spinning pretty fast, but in terms of the electronics, the electronics were much, much, much faster than the read and write from the spinning drum.

Moller: It seemed to me that this computer was less flexible or less effective than the Electrodata Datatron. I don't know, just seemed like a more rudimentary operation, in general.

Misa: I think it was much smaller, too.

Moller: Yes.

Misa: The Electrodata, that machine, I think, was a really big, quite powerful, full blown scientific computer.

Moller: Oh yes.

Misa: This was a Bendix that if the whole thing were about the size of a water heater or so, then it was a fairly modest size for that time. Did you mean that the drum itself, because the drums of course were cylindrical, typically the ones that I've seen were horizontal rather than vertical.

Moller: Really? I picture it being vertical but I'm not sure.

Misa: I can show you a picture of one of the other drums; you would probably recognize some of the versions.

Moller: Anyway, I had a very interesting boss here. His name was William Sollfrey, S-O-L-L-F-R-E-Y, and he left and went to the Rand Institute, I think. He was brilliant and funny.

Misa: Oh the RAND Corporation in California.

Moller: I think so. And he had a Ph.D. in math. Very bright person. How he ended up in the Twin Cities at General Mills, I have no idea, because I think he was from New York.

Misa: There were all kinds of people that moved from California to here. It's a little hard to imagine when we think about Silicon Valley today, but there were people that moved from Los Angeles to here, to be involved with the Minnesota computing industry at the time, 1950s and 1960s.

Moller: I have to tell you, when we moved I kept track of our expenses. They paid to move our household things, General Mills did, to move from San Francisco to here. They said we'll also pay your expenses as you come across. We had a used Chrysler that we had bought for $100 and so we kept track of all our expenses. My husband would joke and say check the gas and fill up the oil; we used like 10 quarts of oil coming across. They said oh no, we do it by the mile, so we ended up $90 ahead.

Misa: It was just a flat mileage fee.

Moller: Yes, so the car ended up costing us $10; and we used it another year here, too. My husband said it was too loose to ever freeze. [Laughs.]

Misa: Yes. The General Mills facility, about how large was it in terms of number of people, do you recall?

Moller: I don't remember anybody except those on our floor, and I don't think there were more than 25 of us. It was a small operation. In our immediate group I don't think there were more than six or eight.

Misa: Do you recall any female [colleagues] at all, or an impression of that?

Moller: I don't remember many females. One interesting thing is our next door neighbor for about 20 years, in our present house — he doesn't live there anymore but when they were there — he was an engineer going back and forth to Wright-Patterson Field the same time as I was a programmer. We never met each other at that time.

Misa: He may well have been working on the same project, but again the way these things went, compartmentalization was the policy and unless there was some reason for you to —

Moller: He was working for FluiDyne. That's where he was employed.

Misa: At the time, did you have the sense of computing being a field where there was a future in it? That is to say you're on the ground floor of something big. Did you have a sense of what future might hold, or was that just hard to see at the time?

Moller: I guess my feeling at the time, and my feeling still, is that I loved doing flow charts and programming in machine language, but interacting with machines was

something I didn't want to continue. And I think it was obvious that the field was going to grow and continue to flourish and expand, even at that time.

Misa: You were doing machine language programming in Emeryville, did you continue that also here?

Moller: Yes. It was more.

Misa: So it was again, not higher level language but actually pretty close to what you'd say —

Moller: More elementary here.

Misa: Oh more elementary.

Moller: Yes, because we didn't have to pay attention to things, how fast anything went around in Emeryville.

Misa: So the mechanical constraints or something were even more pressing.

Moller: Yes, everything was more elementary here. And I never felt discriminated against as a woman in Emeryville. I guess the only indication would be that there weren't any female Ph.D.s in my department but that's not discrimination against me.

Misa: Right. But here you said there was a salary differential that didn't make much sense.

Moller: Yes.

Misa: I think it was extremely common in the 1960s and into the 1970s.

Moller: Even the 1970s?

Misa: Yes, well affirmative action kicks in in the 1970s, and after 1970, many women basically organized and started comparing numbers, and gender disparities are closed. But through the 1960s I think that was extremely common.

Moller: I'm sure that was so.

Misa: There were all kinds of assumptions about what men were supposed to be doing, family responsibilities, and even though you were the breadwinner for your family you were put in at a lower level.

Moller: This for men, too, there are certainly some men who are better at child care than women. I can remember my father once, when he was pushing one of us in a go-cart, somebody made a snide remark so he never did that again. And I can remember even at

the checkout, the cashier making some remark about are you babysitting today? Just some father, and he was insulted. Finally, it's okay for fathers and men to do child care and thank goodness! It's a similar kind of thing.

Misa: You mentioned your father as being positively influential in getting you to think positively about mathematics. Can I ask about the background of both your mom and dad?

Moller: Sure. They both grew up in Kansas. My mother's family lived on a farm until she was 12, then they moved to town, Great Bend, in central Kansas. My father was an only child. When he was born, his father — [who] was born in 1853 — so his father was 53 and his mother was 42 when my father was born in Halstead, Kansas. They both went to Washburn University in Topeka. I think they met in speech class. My mother said that she went to college to catch a wealthy husband. [Laughs.] I said I'm going to college to stay uninvolved, not get involved with anybody. That was my idea when I went to college. My father's father had a lumberyard and hardware store, so he was a business man, not a farmer. They're both German families. And both grandfathers were born in Ohio. My father's mother had run a sewing school in Wichita, and I think she supported some of her younger siblings, too. She was a character and I dearly wish my daughter could have met her.

Misa: What kind of work did your dad do that had some contact with math? I mean he conveyed an enthusiasm for math, doesn't mean he worked in math, but how did he get an enthusiasm for math?

Moller: My mother was an English major. I don't remember what my father's undergraduate major was, but all along he intended to go to business school, which he did, at Harvard Business School for two years. They were married in between his two years there. Then the minute he graduated they moved to southern California. I think he was unemployed, you know 1930, and I think he went to USC and got a teaching credential. He would've hated teaching; fortunately, he never had to do it. And my mother's cousin, woman cousin, first cousin, her husband started a steel jobbing business where they bought steel from the mills and sold to construction. So my father was given a job with this company, so that's where he worked until he was 47, when he had a near fatal heart attack.

Misa: Oh good gravy.

Moller: And then he went back to work, had a stroke, he said that's it. He made a good recovery from the stroke, had very little vestige of any kind of the stroke, and lead a very active life volunteering, and all kinds of stuff.

Misa: So he had a business background, not a particularly technical degree or a scientific inclination, but just a love for mathematics he conveyed to you.

Moller: Yes, he was very bright and I'm forever thankful for him conveying to me, you know, it was fun for him and I learned how it could be fun. That's not teaching, it's playing games together.

Misa: What kind of games did you play?

Moller: I don't remember specifically.

Misa: Just number games or something?

Moller: Yes. You hold things in your head and figure things out. I still, when I go to the market, I figure out how much I've spent before I get to the [cash register]. I don't use a credit card. We've been victimized by credit card fraud a long time ago so I do not carry a credit card. At Target, I don't even write a check. Particularly when I'm going to spend just cash, then I'm sure to keep in my head exactly what I'm spending, which is fun.

Misa: It's that everyday mathematics that you can practice without a calculator, you don't need anything very fancy.

Moller: And growing in southern California, we were outside every day of our lives. I was always playing ball with the boys. I still play tennis three times a week, do aerobics

three times a week, and yoga once; and I intend to keep that up. I mean that's fun, too. And piano every day.

Misa: Carol, you said that you ended up moving out of computing, but going into linguistics. Could you say a little bit about that?

Moller: Okay. Well there are kind of steps to that. We went to a church where — now this was back in the 1970s — where there was an assistant minister of a different faith who had gone to Princeton. He too grew up in southern California, and he made a point of learning New Testament Greek. So every church where he was an assistant minister, he taught New Testament Greek so I took that. I thoroughly enjoyed it and it's very useful. You know you learn Greek roots. I've always liked historical linguistics, anyway. So I studied New Testament Greek for about three years and I thought this is really fun, maybe I should try another language. So I went here to summer school [pause]

Misa: University of Minnesota?

Moller: Yes, and took Chinese, intensive Chinese. This was summer of 1983. And then I took the second year, the academic year 1983-84, and then summer of 1984 I went to China and took intensive third year Chinese, which was a wonderful experience. My parents said well, if that's what you want to do!   [Laughter.]
But my husband and my daughter said go for it. And so I did. And after that, I had to back off; I couldn't really keep going with the Chinese. Can't tell you exactly what I was

doing 1987-88, I don't remember. Anyway, my husband took a sabbatical in London, 1988-89, [and] that's when I started linguistics. It's when I came back to the University of Minnesota. I'm not sure what sparked my interest in that, specifically but I thoroughly enjoyed it. Maybe it was 1987, though, because I was a T.A. in elementary linguistics, which I *loved* doing, but you don't make a career out of being a T.A.

Misa: No.

Moller: Historical linguistics, I must have spent two years, 1987-89, at the University of Minnesota in linguistics, because the first year was taking classes, second year was taking classes and being a T.A., syntax and historical linguistics. Syntax is structure, more like mathematics. Then we went to London for my husband's sabbatical, so that kind of interrupted the linguistics. I did take Chinese, but it was teaching to the test; it was very dull and unhelpful. So then we came back in 1990 and again I can't track year by year, anyway, I ended up — I don't know why I was so standoffish about teaching. You know, I didn't want to be a math teacher, didn't want to be an ESL teacher, because some of my classmates in linguistics were headed for ESL. Well, I ended up teaching ESL as a volunteer. I did that for 12 years, and I simply loved it. It was at Central Lutheran Church and to begin with, most of our students were Russians. There's been a steady stream of Russian immigrants to the Twin Cities for years, and many of them live at 13th and Nicollet, which is very close to Central Lutheran Church.

Misa: Yes, that's right.

Moller: And we always had a few East Africans, and I had some from Togo. Not many West Africans though, but fewer and fewer Russians, more and more Somalis over that time period. So I always left class thinking I hope they learned as much from me about language as I learned from them about life, because there's just some amazing stories. So I thoroughly enjoyed teaching. I stopped in 2011. We took a trip to central Asia. We had always wanted to visit the Silk Road, so we visited Uzbekistan, Tajikistan, Kyrgyzstan, and Turkmenistan — no — Kazakhstan, and spent most of the time in Uzbekistan, [in the cities of] Bukhara and Samarkand having the best tomatoes, cucumbers, and watermelon you ever tasted in your life, served three times a day for three weeks. Unfortunately, I came back with giardiasis because of unsafe water supply. You had plenty of bottled water, but those cold vegetables, you know, it's a poor country. I never saw a container of hand cleanser the whole time we were there. Everybody got diarrhea. My husband bounced back but I was a basket case for a while. Ended up I was given sulfa for a bladder infection. The doctor knew I was allergic but she gave it to me anyway and I ended up in the ER with a hyper allergic reaction. So I've had unstoppable coughing fits every day since November 8, 2011. So I couldn't depend on myself to be able to stand in the morning and talk continuously without getting into coughing spells.

Misa: Right. Teaching is a bit about being on stage.

Moller: Yes, well it's just the comb-; And I've been worked up at the U. I've been worked up at Mayo, and the only thing is I've got altered nerve cells from that allergic reaction so I guess there's no answer to it.

Misa: Carol, would you like to make any comments about the connections you mentioned between this kind of computational thinking and the math [algorithms], and your interest in linguistics? Do you see any commonalities between those two?

Moller: Oh, I think there's quite a bit, the systematic, you know, of it. And I guess to me, linguistics means analysis of language. And I guess my interest in historical linguistics perhaps is parallel to my interest in New Testament Greek and all the roots. By the way, you mentioned algorithm. Do you know the derivation of that word?

Misa: It's an Arabic word.

Moller: Yes, do you know where it came from?

Misa: *Al-Khwārizmī*, I believe, is the person, the Arab mathematician.

Moller: Do you know why that's his name?

Misa: No.

Moller: I think his first name was Muhammad, they're not sure about that. But if you visit the westernmost city, Kiva, in Uzbekistan, the province is Khoresm K-H-O-R-E-S-M is the spelling I saw, Khoresm. And Al Khoresm means is Muhammad from Khoresm.

Misa: Khoresm, okay.

Moller: And he was a mathematician.

Misa: Interesting.

Moller: So Muhammad al Khoresm, that's where the word is derived from; algorithm. And algorism is listed in the dictionary along with algorithm.

Misa: Ism.

Moller: Ism, it's right there.

Misa: Okay. Interesting.

Moller: Yes. That's one of the more interesting word derivations I've ever heard.

Misa: We've got a whole lot of math, including Arabic numbers.

Moller: Yes. I never learned that in school, you know? They're called Arabic numbers but nobody ever talked about the history of Arabic mathematics.

Misa: That's right. Try to do your multiplication tables with, like say, Roman numerals, it's really tough.

Moller: I can't imagine.

Misa: Division with Roman numerals is like impossible.

Moller: Yes!

Misa: Different ways of putting numbers together, either facilitates certain kinds of manipulations or operations, or makes others really difficult.

Moller: And this person, there's a more than life size figure of him kind of sitting on the steps of a mosque in Kiva, and the guide said now he had something to do with algorithm. So they know that that's, you know, front and center to Westerners. Maybe that's why the statue is there, I don't know.

Misa: Well, Carol, this has been really interesting. If there's any other topics, or comments, or stories, or something you'd like to relate, this would be a fine time to add that.

Moller: I don't think of anything, you've given me ample opportunity.

Misa: Well thank you.

Moller: Thank you.